MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS

August 06-07, 2024 / Tunceli, Türkiye

THE PROCEEDINGS BOOK

EDITORS

Prof. Dr. Zeynep KARAÇOR
Prof. Dr. Süleyman KARAÇOR
Prof. Dr. Burcu GÜVENEK

ISBN: 978-625-8151-21-3

www.ubakkongre.com/munzur

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS

August 06-07, 2024 / Tunceli, Türkiye

THE PROCEEDINGS BOOK

EDITORS

Prof. Dr. Zeynep KARAÇOR
Prof. Dr. Süleyman KARAÇOR
Prof. Dr. Burcu GÜVENEK

All rights of this book belong to UBAK. Without permission can't be duplicate or copied.
Authors are responsible both ethically and juridically
UBAK Publications – 2024 ©
Issued: 25.08.2024
ISBN: 978-625-8151-21-3

Bu Kitabın Tüm Hakları UBAK Yayınevi'ne aittir.
Yazarlar etik ve hukuki olarak eserlerden sorumludurlar.
UBAK Yayınevi – 2024 ©
Yayın Tarihi: 25.08.2024
ISBN: 978-625-8151-21-3

CONGRESS ID

CONGRESS TITLE

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS

DATE and PLACE

August 06-07, 2024 / Tunceli, Türkiye

ORGANIZING BOARD

Assoc. Prof. Dr. Özlem ÜLGER, Batman University
Assoc. Prof. Dr. Tamer TURGUT, Atatürk University
Dr. Mehtap DEMİR, Adıyaman University

COORDINATOR

Gönül EDEŞLER
Neslihan BALCI

NUMBER of ACCEPTED PAPERS - 215
NUMBER of REJECTED PAPERS – 28

PARTICIPANTS COUNTRY

Türkiye-100, Albania-2, Algeria-10, Azerbaijan-7, Benin-3, Budapest-1, Bulgaria-1, Canada-1, Ethiopia-1, Georgia-1, India-19, Indonesia-2, Iraq-1, Kosovo-3, Malaysia-7, Moldova-1, Morocco-6, Nigeria-19, Pakistan-9, Romania-6, Russia-1, Serbia-5, Ukraine-6, Vietnam-3

SCIENCE BOARD

Prof. Dr. İryna Dryga - National Academy of Sciences
Prof. Dr. Melike Özer Keskin - Gazi University
Prof. Dr. Ümran Türkyılmaz- Ankara Hacı Bayram Veli University
Prof. Dr. Froilan MOBO - PMMA
Assoc. Prof. Dr. Gulbaxar Tavaldieva - Tashkent Chemical-Technological Institute
Assoc. Prof. Dr. Mehmet Emin KALGI - Ardahan University
Assoc. Prof. Dr. Tamer TURGUT, Atatürk University
Assoc. Prof. Dr. Gülahmet IMANOV - Baku State University
Assoc. Prof. Dr. Güray ALPAR- İKSAD Enstitüsü
Dr. Hüseyin ERİŞ- Harran University
Assoc. Prof. Dr. Cavit POLAT - Kahramanmaraş Sütçü İmam University
Dr. Mehtap DEMİR- Adıyaman University
Dr. Muntazir MEHDİ- NUML
Dr. Elvan CAFAROV - Azerbaijan State Pedagogical University
Dr. Terane NAGIYEVA - Azerbaijan State Pedagogical University

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS

August 06-07, 2024 / Tunceli, Türkiye

CONGRESS PROGRAM

Meeting ID: 833 1287 1999
Passcode: 060708

Join Zoom Meeting:
https://us02web.zoom.us/j/83312871999?pwd=d1K7dWmCo00mYDQFCQjbYaF3ry2z80.1

PARTICIPANT COUNTRIES (24):

Türkiye, Albania, Algeria, Azerbaijan, Benin, Budapest, Bulgaria, Canada, Ethiopia, Georgia, India, Indonesia, Iraq, Kosovo, Malaysia, Moldova, Morocco, Nigeria, Pakistan, Romania, Russia, Serbia, Ukraine, Vietnam

Önemli, Dikkatle Okuyunuz Lütfen

- ❖ Kongremizde Yazım Kurallarına uygun gönderilmiş ve bilim kurulundan geçen bildiriler için online (video konferans sistemi üzerinden) sunum imkanı sağlanmıştır.
- ❖ Online sunum yapabilmek için **https://zoom.us/join** sitesi üzerinden giriş yaparak "Meeting ID or Personal Link Name" yerine ID numarasını girerek oturuma katılabilirsiniz.
- ❖ Zoom uygulaması ücretsizdir ve hesap oluşturmaya gerek yoktur.
- ❖ Zoom uygulaması kaydolmadan kullanılabilir.
- ❖ Uygulama tablet, telefon ve PC'lerde çalışıyor.
- ❖ Her oturumdaki sunucular, sunum saatinden 15 dk öncesinde oturuma bağlanmış olmaları gerekmektedir.
- ❖ Tüm kongre katılımcıları canlı bağlanarak tüm oturumları dinleyebilir.
- ❖ Moderatör – oturumdaki sunum ve bilimsel tartışma (soru-cevap) kısmından sorumludur.

Dikkat Edilmesi Gerekenler- TEKNİK BİLGİLER

- ♦ Bilgisayarınızda mikrofon olduğuna ve çalıştığına emin olun.
- ♦ Zoom'da ekran paylaşma özelliğine kullanabilmelisiniz.
- ♦ Kabul edilen bildiri sahiplerinin mail adreslerine Zoom uygulamasında oluşturduğumuz oturuma ait ID numarası gönderilecektir.
- ♦ **Katılım belgeleri kongre sonunda tarafınıza pdf olarak gönderilecektir**
- ♦ Kongre programında yer ve saat değişikliği gibi talepler dikkate alınmayacaktır

IMPORTANT, PLEASE READ CAREFULLY

- ❖ To be able to attend a meeting online, login via **https://zoom.us/join** site, enter ID "Meeting ID or Personal Link Name" and solidify the session.
- ❖ The Zoom application is free and no need to create an account.
- ❖ The Zoom application can be used without registration.
- ❖ The application works on tablets, phones and PCs.
- ❖ The participant must be connected to the session 15 minutes before the presentation time.
- ❖ All congress participants can connect live and listen to all sessions.
- ❖ Moderator is responsible for the presentation and scientific discussion (question-answer) section of the session.

Points to Take into Consideration - TECHNICAL INFORMATION

- ♦ Make sure your computer has a microphone and is working.
- ♦ You should be able to use screen sharing feature in Zoom.
- ♦ **Attendance certificates will be sent to you as pdf at the end of the congress.**
- ♦ Requests such as change of place and time will not be taken into consideration in the congress program.

Session-1 / Hall-1
06.08.2024 / 10:00-12:00 (Ankara Local Time)
Moderator: Hüseyin BENLİ

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Erşan Ömer YÜZER	Hakkari Üniversity	EVALUATION OF THE LIGHT PERFORMANCE AND LIGHT POLLUTION OF OUTDOOR LIGHTING ELEMENTS ON THE SCALE OF HAKKÂRİ PROVINCE
Alper DÖNMEZ Gül Ebru ORHUN	Çanakkale Onsekiz Mart University	STUDY OF THE POTENTIAL OF ANIMAL BIOMASS ENERGY RESOURCES OF ÇANAKKALE PROVINCE
Koray KARABULUT Yeliz ALNAK	Sivas Cumhuriyet University	EXAMINATION OF THE EFFECTS OF NATURAL AND FORCED CONVECTION ON IMPROVING HEAT TRANSFER IN THE CHANNEL IN TERMS OF DIFFERENT VARIABLES
Yeliz ALNAK Koray KARABULUT	Sivas Cumhuriyet University	RESEARCH OF MIXED CONVECTION EFFECTS IN HEAT TRANSFER FROM A HEATING ELECTRONIC ELEMENT PAIR
Musa AYDEMİR Hüseyin BENLİ	Firat University	CALCULATION OF CABLE LOSSES IN SOLAR POWER PLANTS DEPENDING ON DIFFERENT PARAMETERS
Raman JAFAROV Necati KAYA	Çanakkale Onsekiz Mart University	SPECTRAL RESPONSE OF POLYCRYSTALLINE AND MONOCRYSTALLINE SILICON PHOTOVOLTAIC CELLS IN REAL USE CONDITIONS DEPENDS ON THE ANGLE OF INCOMING SUNLIGHT
Volkan ALTUNAL	Cukurova University	PERSISTENT OPTICALLY STIMULATED LUMINESCENCE FROM CaAl12O19 CERAMIC PELLETS
Volkan ALTUNAL Adnan ÖZDEMİR	Cukurova University	EFFECT OF SILICON DOPING ON LUMINESCENCE PROPERTIES OF BeO CERAMICS
Melek GÖKBULUT	Tokat Gaziosmanpasa University	ANALYTICAL SOLUTION OF BOHR HAMILTONIAN WITH YUKAWA POTENTIAL FOR Z(5) MODEL

Session-1 / Hall-2
06.08.2024 / 10:00-12:00 (Ankara Local Time)
Moderator: Neslihan BALCI

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Bilal BEKALP	Uludag University	DIGITALIZATION OF RELIGION AND THE SELF
Zühal GÖKBEL	Kırşehir Ahi Evran University	PERCEPTIONS OF PROPHET MUHAMMAD IN WESTERN DISCOURSE
Kazım ERTÜRK	Selcuk University	OBJECTS AND MYTHOLOGICAL CHARACTERS ON PONTUS COINS
Mehmet CEYLAN	Selcuk University	IN THE TRANSITION PERIOD FROM THE EAST BRONZE AGE TO THE MIDDLE BRONZE AGE KONYA'S RELATIONS WITH NEIGHBORING REGIONS
Yasemin CAN Birkan ŞENYÜZ	Marmara University Nevşehir Hacı Bektaş Veli University	THE EUROPEAN IDENTITY OF THE ENLIGHTENMENT ERA AND ITS EFFECTS ON EUROPEAN CULTURE

Session-1 / Hall-3
06.08.2024 / 10:00-12:00 (Ankara Local Time)
Moderator: Ananda Majumdar

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Sevda Aghayeva Aydin gizi	Azerbaijan State Pedagogical University	HISTORICAL LAND OF AZERBAIJAN – ZANGAZUR
Aishat A. Yusuf A. O. Akanbi Eniola K. Ola-Alani Khadijat S. Ameen	University of Ilorin	EFFECTS OF REGGIO-EMILIA APPROACH IN TEACHING MEASUREMENT OF LENGTH TO PUPILS IN KWARA STATE, NIGERIA
Jibril Wushishi Ahmed Shatima Abdullahi	Universiti Teknologi Malaysia	ENHANCING TECHNICAL EDUCATION THROUGH PROBLEM-BASED LEARNING: EXPLORING THE FACILITATOR'S INFLUENCE
Ferdinand Mara Jorida Çobaj Enkeleida Lleshi	Sports University of Tirana	ASSESSMENT OF PHYSICAL QUALITIES OF STUDENTS IN THE FIRST YEAR
Saifullahi M. Bashir A. U. Garba Shuaibu Osiboye M. O. Ahmed T.	Bayero University Kano	EDUCATING FOR CREATIVITY AND 21ST-CENTURY SKILLS DEVELOPMENT: THE ROLE OF DESIGN-BASED LEARNING INSTRUCTIONAL STRATEGY
Saidu, I.	Niger State College of Education	AI DRIVEN TEACHER EDUCATION: POLICY THRUST AND PRACTICE IN NIGERIA EDUCATION SYSTEM
Ananda Majumdar	University of Alberta	EVERY BEAST OF THE EARTH AND EVERY BIRD OF THE HEAVEN: THE ANIMALS IN BYZANTINE
Ananda Majumdar	University of Alberta	ECOFEMINISM IN ARCHITECTURE FOR SUSTAINABLE ENVIRONMENT AND GENDER EQUALITY

Session-1 / Hall-4
06.08.2024 / 10:00-12:00 (Ankara Local Time)
Moderator: Herman Shah Anuar

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Murat BAYRAKTAR	İstanbul Esenyurt University	SOCIO-ECONOMIC EFFECTS OF AGE DISCRIMINATION
Murat BAYRAKTAR	İstanbul Esenyurt University	THE ROLE OF SOCIAL CAPITAL ON INNOVATION: FINDINGS FROM SELECTED OECD & BRICS COUNTRIES
Omar TADLAOUI Mohamed MACHROUHI	University of Hassan II	ARTIFICIAL INTELLIGENCE AT THE HEART OF MOROCCAN PUBLIC SECTOR REFORM: CHALLENGES AND PERSPECTIVES
Intan Radina Ahmad Laila Ajlaa Jamal Abd Mansor Herman Shah Anuar	Universiti Utara Malaysia	ISSUES AND CHALLENGES IN OPERATION MANAGEMENT: PERSPECTIVES FROM NORTHERN MALAYSIA TERTIARY EDUCATION INDUSTRY
Zohaib Hassan Sain	Superior University	CHALLENGES IN DOCTORAL PROGRAMS IN PAKISTAN: INVESTIGATING QUALITY ASSURANCE ISSUES IN THE QUALITY MANAGEMENT PHD
Zohaib Hassan Sain	Superior University	CHATGPT FOR POSITIVE IMPACT? EXAMINING THE OPPORTUNITIES AND CHALLENGES OF LARGE LANGUAGE MODELS IN EDUCATION
Tetiana BURLAY	Institute for Economics and Forecasting of the NAS of Ukraine	HUMAN-CENTRICITY AS A KEY PRINCIPLE FOR USING AI SAFELY
Volodymyr Mishchenko Ievgen Tishchenko	Institute for Economics and Forecasting of the NAS of Ukraine	MECHANISMS OF DIGITALIZATION'S IMPACT ON ECONOMICDEVELOPMENT
Vasylyna PODLIESNA	Institute for Economics and Forecasting of the NAS of Ukraine	LOCAL-GLOBAL CYCLES OF THE CAPITALIST WORLD-SYSTEM
Herman Shah Anuar Jonathan Putra Bin Laum Wan Arman Bin Wan Omar	Universiti Utara Malaysia	ISSUES AND CHALLENGES IN OPERATION MANAGEMENTS: PERSPECTIVES FROM NORTHERN MALAYSIA FOOD & BEVERAGE INDUSTRY NICHE: VENTURING URBAN CAFE IN RURAL AREAS

Session-1 / Hall-5
06.08.2024 / 10:00-12:00 (Ankara Local Time)
Moderator: Muhammad Waseem Bari

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Radoslav BALTEZAREVIĆ Ivana BALTEZAREVIĆ	Megatrend University	ESSENTIAL ADVANTAGES OF A SUSTAINABLE BLUE ECONOMY
Mihaela-Georgiana Oprea Mihaela-Irma Vlădescu	School of Advanced Studies of the Romanian Academy	BIBLIOMETRIC ANALYSIS OF THE INTERACTIONS BETWEEN POPULATION, MIGRATION AND ECONOMY: TRENDS AND PROSPECTS
Kareem, W. B. Muhammed B.M Abdulrahman, T.S Raji F.A Hassan A.M	University of Ilorin	TECHNOLOGY AND VOCATIONAL SKILLS: A WAY FORWARD TO YOUTH UNEMPLOYMENT IN NORTH CENTRAL NIGERIA
Muhammad Waseem Bari	Government College University	UNMASKING THE IMPACT OF INTERNET ADDICTION DISORDER ON EMPLOYEE PERFORMANCE
Jaya Ganesh Thavarajah Munisah Krishansamy Herman Shah Anuar	Universiti Utara Malaysia	CRITICAL SUCCESS FACTORS OF OPERATION MANAGEMENTS: PERSPECTIVES FROM NORTHERN MALAYSIA ELECTRIC & ELECTRONIC INDUSTRY
Kim-Hang TE Que-Nhu DUONG Nam-Khang Tri NGUYEN	Can Tho University	IMMERSIVE EXPERIENCES: VIETNAMESE TOURISTS' INTEREST IN VIRTUAL REALITY TECHNOLOGY
Lim Chong Luen Chia Huai Kang Herman Shah Anuar	Universiti Utara Malaysia	CRITICAL SUCCESS FACTORS OF OPERATION MANAGEMENT: PERSPECTIVES FROM NORTHERN MALAYSIA ENGINEERING INDUSTRY
Siti Anilah Ardenieti Panisha Ssri Herman Shah Anuar	Universiti Utara Malaysia	ISSUES AND CHALLENGES IN OPERATION MANAGEMENT: PERSPECTIVES FROM THE NORTHERN MALAYSIA ACCOUNTING INDUSTRY
Tan Suan Ching Lee Che Keat Herman Shah Anuar	Universiti Utara Malaysia	CRITICAL SUCCESS FACTORS OF OPERATION MANAGEMENT: PERSPECTIVES FROM NORTHERN MALAYSIA TOURISM INDUSTRY

Session-2 / Hall-1
06.08.2024 / 12:30-14:30 (Ankara Local Time)
Moderator: Handan ÖZCAN

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Duygu Nur ÇOBANOĞLU İkranur FELEK	Bingöl University	INVESTIGATION OF ANTIOXIDANT ACTIVITY OF BEE POLLEN EXTRACT ADDITIVE READY PACK TARHANA
Melike DURMUŞ Handan ÖZCAN	Şişli Hamidiye Etfal Training and Research Hospital University of Health Sciences	VITAMIN D IN PREGNANCY
Melike DURMUŞ Handan ÖZCAN	Şişli Hamidiye Etfal Training and Research Hospital University of Health Sciences	EPILEPSY AND PREGNANCY
Fatma Zehra KARAKURT Okan ÖZBAKIR	Iğdır University	AGRICULTURAL SECTOR AND ACCIDENTS CAUSED BY MACHINERY
Nalan YALÇINKAYA SEZER Öznur TİRYAKİ	Sakarya University	HOME ACCIDENTS AND MANAGEMENT IN 0-6 AGE GROUP
Nursel ALP DAL Gamze DENİZ	Munzur University	FACTORS AFFECTING GYNECOLOGICAL CANCER AWARENESS
Hilal Başak ÇAKIR Handan ÖZCAN	Istanbul Medipol University Health Sciences University	THE IMPACT OF PELVIC ORGAN PROLAPSE ON QUALITY OF LIFE
Hilal Başak ÇAKIR Handan ÖZCAN	Istanbul Medipol University Health Sciences University	PELVIC FLOOR DYSFUNCTION IN THE POSTPARTUM PERIOD PREVENTION MANAGEMENT

Session-2 / Hall-2
06.08.2024 / 12:30-14:30 (Ankara Local Time)
Moderator: Havva ÖZYILMAZ

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Alp ATABAY Nazlı Ferah AKINCI	Yıldız Technical University	THE IMPORTANCE OF ROSE WINDOWS IN CHURCHES AND THE INVENTORY OF ROSE WINDOW CHURCHES IN ISTANBUL
Canan NALÇA KISSABOYLU Yasemen SAY ÖZER	İskenderun Technical University Yıldız Technical University	ANTAKYA AFTER THE EARTHQUAKE: DESTRUCTION OF SPACE AND MEMORY
İlknur GÜÇLÜ Havva ÖZYILMAZ	Dicle University	ERGANI HOUSING PRODUCTION TYPES AND HOUSING PROBLEMS
İlknur GÜÇLÜ İclal ALUÇLU	Dicle University	THE ROLE OF ARTIFICIAL INTELLIGENCE IN SPACE DESIGNS
Sefer MEŞE Gökhan DEMİRDÖĞEN	Yildiz Technical University	UNLOCKING BARRIERS AND DRIVERS: INTEGRATING BIM AND UAV TECHNOLOGIES FOR FATIGUE DETECTION
Seçkin TEKİN Emine Banu BURKUT Murat DAL	Munzur University Konya Technical University	BIBLIOMETRIC ANALYSIS OF ACADEMIC STUDIES ON SMART CITIES AND ART
Gökcan HALİS Murat DAL	Munzur Üniversitesi	HISTORICAL AND FUNCTIONAL INVESTIGATION OF TUNCELI PROVINCE TANGIBLE CULTURAL HERITAGE EXAMPLES

Session-2 / Hall-3
06.08.2024 / 12:30-14:30 (Ankara Local Time)
Moderator: Ivan PAVLOVIC

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Ayhan Öner YÜCEL	Aydın Adnan Menderes University	STRENGTHENING OF CONCRETE SAFETY BARRIERS USING CARBON FIBER REINFORCED POLYMER SHEETS
Abdullah HAMEDY Ertugrul ESMERAY	Karabük University	CULVERT BOX CONSTRUCTION STAGES, IMPORTANT PROBLEMS, SITE SELECTION CRITERIA AND SOLUTION SUGGESTIONS
Binyam Zigta	Wachemo University	NUMERICAL STUDY OF PHYSIOLOGICAL BLOOD FLOW WITH STRETCHING CAPILLARY ON MHD MICROPOLAR FLUID
Rayan Ikram ADDOUN	University m'hamed Bougara of Boumerdes	STABILITY AND REGULARITY ANALYSIS OF NONLINEAR WAVE EQUATIONS WITH LOCALISED INTERNAL AND VENTCELL BOUNDARY CONDITIONS
Andromeda Sonea Pătrașcu	Iași University of Life Sciences	THE CONNECTION BETWEEN HX GROUPS AND C++ PROGRAMMING LANGUAGE
FETTOUCH Houari	University of Mostaganem	ESTIMATES FOR SOLUTIONS OF DIFFERENTIAL EQUATIONS In Unit Disc
Ashwini M Rao Basavarajappa K S Mani K S Krishnakumar T K Sathisha A B	Bapuji Institute of Engineering and Technology	MATHEMATICAL ANALYSIS OF QUANTIFICATION OF POPULATION IN EPIDEMIC MODEL- - A REFERENCE TO INDUSTRIAL POLLUTION
CHOUAIB Ahlem	University of Souk-Ahras	AVIAN PATHOGENIC ESCHERICHIA COLI ZOONOTIC RISK, ANTIBIOTIC RESISTANCE AND HOW TO PREVENT AND CONTROL
Ivan PAVLOVIC	Scientific Institute of Veterinary Medicine of Serbia	PREVALENCE OF ANCYLOSTOMIDAE SP. IN PETS DOGS IN BELGRADE AREA
NTAGBU FOLASHADE GIFT MUHAMMAD H. G ABORISADE, W. T BAMIGBOYE, O. F	Federal College of Wildlife	HAEMATOLOGICAL INDICES OF BROILER CHICKS FED PALM KERNEL OIL (PKO) SUPPLEMENTED FEED

Session-2 / Hall-4
06.08.2024 / 12:30-14:30 (Ankara Local Time)
Moderator: Svitlana Hanaba

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Samir Sameer Hadi Al-Jabir Müge FIRAT	Çankırı Karatekin University	A STUDY ON THE IMMUNE RESPONSE TO Helicobacter pylori AND HISTOLOGICAL CHANGES IN WHITE MALE RATS
Ali Nadhim SHNDIWE KHIKANI Müge FIRAT Zaytoon Abdulrida IGHEWISH AL-KHAFAJI	Çankırı Karatekin University University of Babylon	CYTOMEGALOVIRUS INFECTION DURING PREGNANCY
Noémi Mózes Andrea Lehoczki Mónika Fekete János Tamás Varga	Semmelweis University South Pest Central Hospital	THE PREVENTIVE, CANCER RISK-REDUCING, AND THERAPEUTIC EFFECTS OF THE MEDITERRANEAN DIET
Mohana Radhai G Pradeepa T R Shivani	R.M.K Engineering	HEMOSYNC: REVOLUTIONIZING BLOOD BANK OPERATIONS
Ranti Ekasari Lilis Widiastuty Nasril Nasruddin Sudarsin Khaerun Mawartisna Azzahra Nurul Bahjah Hasyim	Universitas Islam Negeri Alauddin Makassar	ANALYSIS OF LIGHTING FACTORS AND WORK STRESS IN FURNITURE WORKERS
Ishwar Mittal Rosy Dhall Mikul	Maharshi Dayanand University Gandhinagar University	EXPLORING FACTORS SHAPING HOSPITAL REPUTATION: INSIGHTS FROM INDIAN HEALTHCARE
Akinbola , Abraham Ifeoluwal Olufemi-Aworinde, Kehinde Joyce Akinbola, Ibukun Oluwatoyin Ojedokun ,Samson Aderemi	Ladoke Akintola University of Technology	EVALUATION OF HAEMATOLOGICAL PARAMETERS IN DIFFERENT STAGES OF HIV POSITIVE PATIENTS PRESENTING IN SOUTHWEST NIGERIA
ABODOHOUI Orerien Olivier	University of Abomey-Calavi	IN-DEPTH APPRECIATION OF SOCIAL INEQUALITIES IN CHARLES DICKENS'S OLIVER TWIST
Svitlana Hanaba	National Academy of the State Border Guard Service	THE PROBLEM OF SPIRITUALITY IN THE INFORMATION SOCIETY

Session-2 / Hall-5
06.08.2024 / 12:30-14:30 (Ankara Local Time)
Moderator: Major Gheorghe GIURGIU

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Saima ARZEEN Naeema ARZEEN	University of Peshawar	WELL-BEING BEYOND BORDERS: SOCIAL SUPPORT AS A VITAL PREDICTOR FOR INTERNALLY DISPLACED PERSONS
Aimen Imran	University of Management and Technology	SOCIAL MEDIA ADDICTION, COMMUNICATION PATTERN AND RELATIONSHIP SATISFACTION IN MARRIED INDIVIDUALS
Karim MAHAMANE KARIMOU	Abdou Moumouni University	FAATUMATA BIIDAANI SIMBIRI: THE FEMME FATALE THAT RECOGNIZES THE VALUE OF MEN
Major Gheorghe GIURGIU med Manole COJOCARU	Deniplant-Aide Sante Medical Center	THE THERAPEUTIC EFFECTS OF DENIPLANT NUTRACEUTICALS ON THE GUT MICROBIOME IN PATIENTS WITH PSORIASIS
Major Gheorghe GIURGIU med Manole COJOCARU	Deniplant-Aide Sante Medical Center	GUT DYSBIOSIS IN DOGS WITH SPINAL CORD INJURY: IMPACT OF POLENOPLASMIN
K.R.Padma K.R.Don	Sri Padmavati Mahila Visvavidyalayam (Women's) University	HYDROGEL-BASED BIODEGRADABLE MEDICALLY VALUABLE BANDAGES MADE FROM DURIAN HUSK
Igor Pantić	University of Belgrade	GRADIENT BOOSTING ALGORITHM FOR SUPERVISED MACHINE LEARNING IN CELLULAR PHYSIOLOGY: POTENTIAL APPLICATIONS IN APOPTOSIS DETECTION
Igor Pantić Jovana Paunović Pantić Svetlana Valjarević Jelena Čumić Ana Ćosić	University of Belgrade	ARTIFICIAL INTELLIGENCE APPROACHES USING DISCRETE WAVELET TRANSFORM INDICATORS FOR DETECTING PHYSIOLOGICAL PHENOMENA

Session-3 / Hall-1
06.08.2024 / 15:00-17:00 (Ankara Local Time)
Moderator: Bahar TAŞAR

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Mustafa AKBAYIR Aslıhan AKBAYIR	Akdeniz University	SEMIOLOGICAL ANALYSIS OF THE LEADER IMAGE CONSTRUCTION PROCESS IN POLITICS: THE EXAMPLE OF MAHINUR OZDEMIR GOKTAS AND KAMALA HARRIS
Ceren CANPOLAT	KTO Karatay University	EFFECTIVE REMORSE UNDER TCK 221/4 - 2nd SENTENCE IN TERMS OF THE CRIME OF MEMBERSHIP IN AN ARMED TERRORIST ORGANIZATION
Ülkem Cansu AYGÜN KARAKOYUNLU	Yeditepe University	IN TURKISH CRIMINAL PROCEDURE LAW PROHIBITION, REFUSAL AND RECUSAL OF THE JUDGE
Simge EŞSİZ Yusuf FEDAİ	Osmaniye Korkut Ata University	SUPPLIER SELECTION WITH EXPERT OPINION AND SWARA WEIGHTING: TOPSIS ANALYSIS
Faruk Gürsel KOÇAK Erişah ARICAN	Marmara University	THE ROLE OF CENTRAL BANKS IN THE IMPLEMENTATION OF MONETARY POLICIES AND ENSURING FINANCIAL STABILITY BANKING SECTOR RELATIONSHIP: AN APPLICATION
Bahar TAŞAR	Izmir Bakircay University	INVESTIGATING BARRIERS AND DRIVERS TO ARTIFICIAL INTELLIGENCE ADAPTION IN SUSTAINABLE SUPPLY CHAIN MANAGEMENT
Z. Gönül BALKIR	İstanbul Aydın Üniversitesi	THE CONCEPT OF JUSTICE IN LUHMANN
Z. Gönül BALKIR	İstanbul Aydın Üniversitesi	THE INSTITUTION OF DUTY AS A SOCIAL FUNCTION IN DUGUIT'S SOCIOLOGY

Session-3 / Hall-2
06.08.2024 / 15:00-17:00 (Ankara Local Time)
Moderator: İlginç KIZILPINAR TEMİZER

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Metin SÖNMEZ Mustafa GÜMÜŞ	Zonguldak Bülent Ecevit University	INVESTIGATION OF BALANCE PARAMETERS IN BOXERS AND JUDOKAS
Cemre Didem EYİPINAR	Gaziantep University	THE EFFECT OF TAURINE ON AEROBIC CAPACITY: A REVIEW
Cemre Didem EYİPINAR	Gaziantep University	THE EFFECT OF RESVERATROL ON SPORTIVE PERFORMANCE: A REVIEW
Sedef ZİYANOK-DEMİRTAŞ	Bursa Uludağ University	THERAPEUTIC EFFECTS OF KEFIR ON DIABETES
Ferit DOGAN	Harran University	RADIOLOGICAL EVALUATION OF SPONDYLODISCITIS, MRI FINDINGS
İlginç KIZILPINAR TEMİZER	Giresun University	BIBLIOMETRIC ASSESSMENT OF BEE POLLEN RESEARCH: IN VIVO VERSUS IN VITRO INVESTIGATIONS
Eda Duygu İPEK Aybüke SADE Mukadder SUNAR	Aydin Adnan Menderes University Erzincan Binali Yıldırım University	CORRELATION ANALYSIS OF MORPHOMETRIC MEASUREMENTS OF TIBIA EXTREMITAS DISTALIS
Sevil EROL Semra ÖZDEMİR Bahar Öztürk KURT Bircan DİNÇ	Beykent University Istanbul University-Cerrahpaşa Bahcesehir University	COMPARISON OF CELL VIABILITY OF CHLORPYRIPHOS AND ZINC APPLIED TO HEK 293 CELLS AT DIFFERENT DOSES AND DURATIONS WITH MTT AND XCELLigence METHODS
Firdevs Banu ÖZDEMİR Mehmet Üsame KARAOSMAN	Kütahya Health Sciences University	DIAGNOSIS OF LUNG CANCER WITH VISUAL STUDIO USING ARTIFICIAL INTELLIGENCE

Session-3 / Hall-3
06.08.2024 / 15:00-17:00 (Ankara Local Time)
Moderator: Süleyman KOZAT

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Orkan AKKOYUN Aylin RAZLIKLI Berkay ŞERAN Çetin TÖREMEN	Viking Cleaning and Cosmetics Market.San.Tic.A.Ş.	NEW GENERATION DISHWASHER CAPSULE DETERGENT PRODUCT DEVELOPMENT
Alper USALP	Gaziantep University	DETERMINATION OF THE MOST SUITABLE REGION WHERE MECHANICAL AND CHEMICAL APPLICATIONS CAN BE APPLIED IN POLYESTER MELT SPINNING YARN PRODUCTION
Hatice Kübra GÜNERİ Mahmut KAYAR Nuray CEVİZ	Marmara University	NEGATIVE EFFECTS OF FASHION ON THE ENVIRONMENTAL, SOCIAL AND ECONOMIC DIMENSIONS AND IMPROVEMENT SUGGESTIONS
Süleyman KOZAT	Van Yuzuncu Yil University	RESPIRATORY SYSTEM DISEASES OF PSITTACINE BIRDS
Süleyman KOZAT	Van Yuzuncu Yil University	FEATHER PLUCKING IN PARROTS: ETIOLOGY - DIAGNOSIS-TREATMENT

Session-3 / Hall-4
06.08.2024 / 15:00-17:00 (Ankara Local Time)
Moderator: Subhashish Dey

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
İbrahimova Xoşqədəm Qonaq qızı	Azerbaijan State Pedagogical University	TRANSGENIC PLANTS, THE IMPORTANCE OF THEIR USE IN AGRICULTURE
Abdullayeva Təranə Qeyis qızı	Azerbaijan State Pedagogical University	MAIN DIRECTIONS OF GENE MODIFICATION OF ANIMALS
Sabina Khanam	Kanpur University	SOY PRODUCTS PROCESSING AND FOOD ALLERGIES
Dhivya C R. Arunkumar	Tamil Nadu Agricultural University	SOCIAL PARTICIPATION OF TURMERIC GROWERS IN ERODE DISTRICT OF TAMIL NADU
DEGLA Marius Hugues MOUZOUN Séraphin HOUESSOU G. Laurent	Université Nationale d'Agriculture de Porto-Novo	SPATIO-TEMPORAL EVOLUTION OF WATER SURFACES AT RAMSAR SITE 1017 (SOUTH-WEST OF BENIN)
Usman Kris Joko Suharjo Fahrurrozi Fahrurrozi Tunjung Pamekas Isnaini Asdiyah	Bengkulu University	THE EFFECTS OF GIBERRELIC ACID CONCENTRATION ON THE GROWTH AND YIELD OF THREE PEPPER IN TROPICAL AREAS OF INDONESIA
Alexander V. Lagerev Igor A. Lagerev Anna V. Makulina	Bryansk State University Kuban State Technological University	MODELING OF HARVESTER DYNAMICS DURING LOGGING ON STEEP SLOPES
KHIARI Reguia TAREK Mokhnane ADJLANE Sabah	Scientific and Technical Research Center on Arid Regions	AGRICULTURAL TOURISM IN THE STATE OF BISKRA THE GREEN TREASURE INGREDIENTS AND INVESTMENT OPPORTUNITIES
Subhashish Dey	Gudlavalleru Engineering College	CONSEQUENCES DUE TO TRANSMUTATION OF AGRICULTURE LAND TO AQUACULTURE LAND USING GOOGLE EARTH ENGINE
Benyahia Amar	University of Saad Dahlabe	IMPACT OF INDUSTRIAL WASTE POWDERS FROM DIFFERENT SOURCES ON THE PROPERTIES OF CEMENT MORTAR

Session-3 / Hall-5
06.08.2024 / 15:00-17:00 (Ankara Local Time)
Moderator: Yıldız GÜNER

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Serap Yağmur İLHAN	Kahramanmaraş Sütçü İmam University	A REVIEW OF THESES AND ARTICLES ON MARCHES
Sefa KURT	Iğdır University	AN EVALUATION ON THE BUCKETS DESCRIBED ON THE BRONZE BELT OF THE URARTIAN PERIOD
Çağla TULUKÇU ARKMAN	Mimar Sinan Fine Arts University	AN OUTLOOK ON USING OF THE PAPIER MACHE TECHNIQUE IN PUPPET DESIGN AND ARTISTS' PRODUCTIONS
İbrahim Şevket GÜLEÇ	Necmettin Erbakan University	THE CONTENT AND CATEGORIZATION OF ANTONIO CANO'S METHOD BOOKS
Yıldız GÜNER	Mimar Sinan Fine Arts University	THINKING IN PLASTER
Yıldız GÜNER	Mimar Sinan Fine Arts University	MILO OF CROTON
Şenel GENÇ	Marmara University	DIGITAL FASHION DESIGN AND DRAPING

Session-1 / Hall-1
07.08.2024 / 10:00-12:00 (Ankara Local Time)
Moderator: Hesna YİĞİT

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Semra KOCATAŞ Edanur AKTAŞ	Sivas Cumhuriyet University	AN IMPORTANT SOCIAL PHENOMENON: WAR AND TERRORIST EVENTS AND THEIR EFFECTS ON PUBLIC HEALTH
Dilek SAKALLI Seher DİLEN Emine BALİ	Harran University	DETERMINATION OF HEALTH WORKERS' ATTITUDES TOWARDS QUALITY STUDIES
Firdevs KUZU	Sivas Cumhuriyet University	REVIEW OF GRADUATE THESIS RELATED TO ETHICS IN NURSING IN TURKEY
Musayeva Aygün Cavanşir qızı	Azerbaijan State Pedagogical University	PREVENTION OF INTRAPERSONAL CONFLICTS AND THEIR RESOLUTION MECHANISM
Cemile ŞEKER Aslı Ercan ÖNBIÇAK Aslı KAYA Ahmet ERKASAP	Near East University Istanbul Gelisim University Istanbul Gedik University	THE ROLE OF TRANSFORMATIONAL LEADERSHIP PERCEPTION AND ARTIFICIAL INTELLIGENCE ANXIETY IN THE RELATIONSHIP BETWEEN RESISTANCE TO CHANGE AND ORGANIZATIONAL LEARNING IN HEALTH CARE PROFESSIONALS
Muhammed DENİZ Neslihan DURNA	Kafkas University	THE EFFECT OF COLORING BY NUMBERS ACTIVITY ON PSYCHOLOGICAL WELL-BEING, STRATEGIES FOR COPING WITH EARTHQUAKE STRESS, ATTITUDES TOWARDS CLINICAL PRACTICES AND SATISFACTION IN NURSING STUDENTS SURVIVED BY THE EARTHQUAKE: A RANDOMIZED CONTROLLED EXPERIMENTAL STUDY
Muhammed DENİZ İlknur ÇİÇEK Yeliz AKKUŞ Semra ERDAĞI ORAL	Kafkas University	THE EFFECT OF DISTRACTION WITH MIND GAMES IN SURGICAL NURSING CLINICAL PRACTICE ON CLINICAL STRESS, STRESS COPING BEHAVIORS AND SATISFACTION IN STUDENTS: QUASI-EXPERIMENTAL STUDY
Turgay BAL Hesna YİĞİT	Adıyaman University	TWO OLD DRUGS AS POTENTIAL INHIBITORS OF KPC TYPE CARBAPENEMASES: DIFLUNISAL AND DB01662
Gülsüm HOŞ Pınar POLAT Ebru DERETARLA GÜL	Munzur University Mardin Artuklu University Cukurova University	A QUALITATIVE STUDY ON THE INNOVATIVE BEHAVIOR OF PRESCHOOL TEACHERS

Session-1 / Hall-2
07.08.2024 / 10:00-12:00 (Ankara Local Time)
Moderator: Melek EKİNCİ

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Mehmet ÇELİK Aslı BOZDAĞ	Niğde Ömer Halisdemir University	MAPPING ODOR DISTRIBUTION IN URBAN AREAS
Selma KIPÇAKBİTİK Aytekin EKİNCİALP	Van Yüzüncü Yıl University	THE EFFECTS OF CHEMICAL AND ORGANIC FERTILIZER COMBINATIONS ON MACRO-MICRO NUTRIENT IN BELL PEPPER (Capsicum annuum L.) FRUITS
Selma KIPÇAK BİTİK Duygu ALPASLAN Tuba ERŞEN DUDU Nahit AKTAS	Van Yüzüncü Yıl University	IN VITRO DETERMINE OF ANTIFUNGAL ACTIVITY OF NATURAL PARTICLES AGAINST PATHOGENIC PYTHIUM DEBARYANUM
Orhan DENGİZ İnci DEMİRAĞ TURAN Volkan DEDE	Ondokuz Mayıs University Samsun University Ardahan University	COMPARISON OF EROSION SENSITIVITY PARAMETERS OF SOILS FORMED ON THE PERIGLACIAL LANDFORMS OF CİN AND ILGAR MOUNTS
Ertan YILDIRIM Melek EKİNCİ Metin TURAN Selda ÖRS Halil İbrahim ÖZTÜRK	Atatürk University Yeditepe University Erzincan Binali Yıldırım University	FULVIC ACID AS A BIOSTIMULANT IN TOMATO SEEDLING GROWTH
Melek EKİNCİ Ertan YILDIRIM Metin TURAN Selda ÖRS Halil İbrahim ÖZTÜRK	Atatürk University Yeditepe University Erzincan Binali Yıldırım University	CONTRIBUTIONS OF AN ENZYME-CONTAINING BIOSTIMULANT TO TOMATO SEEDLING GROWTH
Abbas TARHAN	Dicle University	DETERMINATION OF ANTIOXIDANT AND ENZYME INHIBITION ACTIVITIES OF SOME DATE VARIETIES

Session-1 / Hall-3
07.08.2024 / 10:00-12:00 (Ankara Local Time)
Moderator: Mehmet Emin USTA

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Hasan KARAASLAN Mehmet Emin USTA Ümit DOĞAN	Sakarya University Ministry of Education	DETERMINATION OF ORGANIZATIONAL COMMITMENT LEVELS OF PRIMARY SCHOOL FIRST LEVEL (ELEMENTARY SCHOOL) TEACHERS (THE CASE OF SAKARYA PROVINCE)
Cansel BURUÇ	Fırat University	2024 SOCIAL STUDIES CURRICULUM ANALYSIS
Aysel AŞIRLI	Ministry of Science and Education	INFLUENCE OF MORAL VALUES ON INNOVATION SKILLS
Aslıhan SEZİK Pınar YAŞAR HAYAL	Trabzon University	TEACHING THE USE OF SANITARY NAPKINS TO ADOLESCENTS WITH AUTISM SPECTRUM DISORDER
Şule YANIK	Trabzon University	HEARING LOSS INDIVIDUALS AND THE ROLE OF ARTIFICIAL INTELLIGENCE IN COMMUNICATION
Pınar YAŞAR HAYAL Selçuk BAYRAM	Trabzon University	INVESTIGATION OF RESEARCH ON PARENT MEDIATED PRACTICES PREPARED FOR INDIVIDUALS WITH SPECIAL NEEDS
Eren DEMİRKIRAN	Bahcesehir University	GRADUATE STUDENTS' ATTITUDES TOWARDS NEW MEDIA CONTENT IN THE POST TRUTH AGE
Eren DEMİRKIRAN	Bahcesehir University	UNDERGRADUATE STUDENTS' USE OF SOCIAL MEDIA IN THE POST-TRUTH ERA
Görkem BİR	Bahcesehir University	SEMIOLOGICAL ANALYSIS OF ADVERTISING: EXAMPLES FROM AWARD-WINNING COMMERCIALS

Session-1 / Hall-4
07.08.2024 / 10:00-12:00 (Ankara Local Time)
Moderator: Valentina MARINESCU

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Naseem Akhter	Shaheed Benazir Bhutto Women University	IMPORTANCE OF HUMAN LIFE AND ITS PROTECTION: A JURISPRUDENTIAL PERSPECTIVE
Naseem Akhter	Shaheed Benazir Bhutto Women University	BALANCING WORK AND FAMILY LIFE
Salim Ayduz	FSTC	THE AMAZING STORY OF MUSLIM AND AFRICAN SLAVE AYYUBA SULEIMAN DIALLO
Ramona MARINACHE Valentina MARINESCU	University of Bucharest	GLOCALISM AND HIBRIDITY OF INDIA'S POPULAR CULTURE IN ROMANIAN
Valentina MARINESCU Ramona MARINACHE	University of Bucharest	THE FASHION OF HEALTH DURING COVID19 PANDEMICS
Polya Yordanova	University of Veliko Tarnovo	MAIN TYPES OF TOURISM IN SOUTHERN EUROPEAN COUNTRIES BASED ON NATURAL RECREATION RESOURCES AND ANTHROPOGENIC TOURISM RESOURCES
Zekirja Shabani	Istanbul University	THE POPULATION OF THE TOWN OF VUSHTRRI IN THE MID-19th CENTURY
Natela Borisovna POPKHADZE	Head of its Scholarly Information Center in Tbilisi and Batumi	THOUGHTS ABOUT AMARNA LETTERS ON THE WEBSITE OF THE METROPOLITAN MUSEUM IN THE USA
Akinola Monday ALLAGBE Ayodele Adebayo ALLAGBE Théophile HOUNDJO	University of Abomey-Calavi	PORTRAYAL OF MALE IMPOTENCE AND STERILITY IN SELECTED NIGERIAN CONTEMPORARY FEMALE NOVELS
Marigonë Rizani-Shabani	University for Business and Technology	STRESS, ANXIETY IN NURSES DURING THE COVID-19: A CASE STUDY IN KOSOVO

Session-1 / Hall-5
07.08.2024 / 10:00-12:00 (Ankara Local Time)
Moderator: Khikani, A.N.S.

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Khikani, A.N.S. Firat,M. Zaytoon Abdulrida Ighewish Al-Khafaji	Karaktein Univesity	MEASUREMENT OF HCMV-MIR-UL36-5P GENE EXPRESSION IN ABORTED WOMEN IN BABYLON
Shitu, S. Musa, M. O. Aliyu, M. Y.	College of Science and Technology	MICROBIAL CONTAMINATION AND AFLATOXIN B1 LEVEL OF PALM WINE IN KADUNA SOUTH AND CHIKUN LOCAL GOVERNMENT OF KADUNA STATE, NIGERIA
Shitu, S. Gambo, J. B. Musa, M. O.	College of Science and Technology	BACTERIAL PRODUCING BIOSURFACTANTS FROM SPENT LUBRICATING OIL POLLUTED SOIL
LADOUALI Zeyneb ABDENNOUR Cherif	University Badji Mokhtar	IMPACT OF ENVIRONMENTAL STRESS ON REPRODUCTIVE BIOMARKERS IN BIVALVES DONAX TRUNCULUS
SALIHU IBRAHIM ALHASSAN WISDOM S. JAPHET MATHIAS A. CHIA INUWA S. USMAN	Federal University of Technology Ahmadu Bello University	EFFECT OF THERMAL TREATMENTS ON PHYSICOCHEMICAL PROPERTIES AND HEAVY METAL CONCENTRATION IN GARDEN AND LEAD POLLUTED SOIL OF MADAKKA
Al-Amin Danladi Bello Aliyu Usman Bamaiyia Abdulrazaq Salaudeen Bashir Tanimu Khalid Sulaiman Aliyu Ishaq	Ahmadu Bello University	OPTIMIZING STREAMFLOW PREDICTION FOR MAJOR WEST AFRICAN RIVER SYSTEM: LEVERAGING META-HEURISTIC ALGORITHMS AND CLIMATE DATA TIME LAG EFFECTS
Bamaiyi Usman Aliyu Al-Amin Danladi Bello Abdulaziz Ahmad Inusa Musa Bashir Tanimu Khalid Sulaiman	Ahmadu Bello University	COUPLED NUMERICAL ANALYSIS OF GROUNDWATER AND TRAIN LOAD-INDUCED CAVITY COLLAPSE

Session-1 / Hall-6
07.08.2024 / 10:00-12:00 (Ankara Local Time)
Moderator: Iram Shahzadi

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Meltem MACIT Muhammed Abdur ROUF	Yeditepe University Fenerbahce University	PREPARATION AND EVALUATION OF TRANSFEROSOMES LOADED WITH MULTIPLE ANTIWRINKLE AGENT
Sejal Porwal Rishabha Malviya	Galgotias University	INVESTIGATING HERBAL MEDICINE FOR RAPID WOUND HEALING IN DIABETICS
Deepak Kumar Rishabha Malviya	Galgotias University	NOVEL APPROACHES TO PHARMACEUTICAL WASTE MANAGEMENT: IMPROVING DRUG RECOVERY
Iram Shahzadi Anam Shahzadi Ali Haider	University of Management and Technology	EFFECTIVE CATALYTIC AND ANTIMICROBIAL PERFORMANCE OF MULTIPLE PHASE AGBR AND POLYACRYLIC ACID DOPED NICKEL OXIDE NANOSTRUCTURES WITH IN SILICO MOLECULAR DOCKING STUDY
Nigar Ahmedova Afaq Abdullayeva Gulnar Atakishiyeva Gulnara Babayeva Gunel Rustemova Namiq Shikhaliyev	Baku State University Azerbaijan State Pedagogical University	IN SILICO PREDICTION OF CYTOTOXICITY FOR TUMOR AND NON-TUMOR CELL LINES OF 4-AZIDO-2-(4-METHOXYPHENYL)-5-(2-NITROPHENYL)-2H-1,2,3-TRIAZOLE
Nigar Ahmedova Afaq Abdullayeva, Gulnar Atakishiyeva İrada Ahmadova Abel Maharramov	Baku State University Azerbaijan State Pedagogical University	BREAST CANCER CELL-LINE CYTOTOXICITY PREDICTION OF 4-AZIDO-2-(4-METHOXYPHENYL)-5-(2-NITROPHENYL)-2H-1,2,3-TRIAZOLE

Session-2 / Hall-1
07.08.2024 / 12:30-14:30 (Ankara Local Time)
Moderator: Neslihan BALCI

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Fatma AKALIN Mehmet Fatih ORHAN	Sakarya University	CLASSIFICATION OF DIGITAL BLAST CELL IMAGES ENHANCED WITH THE PROPOSED IMAGE PROCESSING APPROACH USING MOBILENETV2 TRANSFER LEARNING ARCHITECTURE
Fatma AKALIN Mehmet Fatih ORHAN	Sakarya University	CLASSIFICATION OF DIGITAL BLAST CELL IMAGES WITH IMPROVED THE HYBRID ACTIVATION FUNCTION TO BE APPLIED TO INCEPTIONV3 TRANSFER LEARNING ARCHITECTURE
Ali Cevahir ERKANİ Eralp DEMİR Baddal KARTAL Hakan Zafer KIZILKAYA Şenol ŞİRİN	Duzce University	INVESTIGATION OF SURFACE ROUGHNESS, CUTTING TEMPERATURE AND POWER CONSUMPTION WHEN TURNING Ti6Al4V ALLOY UNDER DRY, MQL, hBN CONDITIONS
Elif TOPAL Cengiz Görkem DENGİZ	Ondokuz Mayıs University	DETERMINATION OF ADHESION PERFORMANCE OF 3D PRINTED PARTS BONDED WITH DIFFERENT ADHESIVES
Orçun ALTINOK Burak KURŞUN	Amasya University	EFFECT OF FIN PLACEMENT ON MELTING AND SOLIDIFICATION PERFORMANCE IN DOUBLE-TUBE ENERGY STORAGE WITH PHASE CHANGING MATERIAL
Ahmet Serhan CANBOLAT	Bursa Uludag University	IMPACT OF CLIMATE ON ENVIRONMENTALLY OPTIMUM INSULATION THICKNESS: EXAMINATION OF EMISSION TYPES AND INSULATION MATERIALS

Session-2 / Hall-2
07.08.2024 / 12:30-14:30 (Ankara Local Time)
Moderator: Majekodunmi Racheal Adedayo

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Fouzia Benoudjit Sarra Deraï Hasna Elamrani	M'hamed Bougara university	EVALUATION OF THE QUALITY OF A RELAXING HERBAL FOOT BALM FORMULATION
Artenisa Hoxha Glejdis Hajdini Armela Mazrreku Marilda Osmani Belinda Hoxha	University of Elbasan	ARTIFICIAL SWEETENERS IN FOOD AND THEIR IMPACT ON THE BODY: A REVIEW
H. El harouachi M. Elgettafi M. Loutou	Mohammed Premier University	EFFECT OF SALINE SOLUTIONS ON GEOPOLYMERS WITH VARYING NAOH CONCENTRATIONS
Youssef ADNAN Noureddine IDLAHOUSSAINE Brahim EL IBRAHIMI Nada Kheira SEBBAR Hassan OUACHTAK Abdelaziz AIT ADDI	Ibn Zohr University Mohammed V University	A NOVEL HETEROCYCLIC COMPOUND AS AN EFFECTIVE CORROSION DEFENDER FOR CARBON STEEL IN ACIDIC MEDIUM
Fiza Bukhtawar Muhammad Usman Atta Ul Haq Muhammad Saeed Atif Saleem	College University Faisalabad	OPTIMIZATION OF MULTI-STAGE MICELLAR-ENHANCED FLOCCULATION PROCESS FOR REMOVAL OF LEVOFLOXACIN HEMIHYDRATE IN WASTEWATER
Majekodunmi Racheal Adedayo Emeka Ngele Titilayo Elizabeth Adesokan	Kwara State University	ANTIBIOTICS SUSCEPTIBILITY PATTERN AND BETA LACTAMASE PRODUCTION BY STAPHYLOCOCCUS AUREUS ISOLATED FROM LOCALLY PRODUCED YOGHURT SOLD ALONG TANKE ROAD, ILORIN, NIGRRIA
Majekodunmi Racheal Adedayo Grace Oluwaseun Famoroti	Kwara State University	FERMENTATIVE PROPERTY AND BACTERIOCINOGENIC ACTIVITY OF LACTIC ACID BACTERIA ISOLATED FROM 'NUNU' AN INDIGENOUS NIGERIAN BEVERAGE
Serhii Lisovyi	--	ACCOUNTING DATA AS A SOURCE FOR DECISION-MAKING IN IT COMPANIES WITHIN SUSTAINABLE DEVELOPMENT

Session-2 / Hall-3
07.08.2024 / 12:30-14:30 (Ankara Local Time)
Moderator: Jogendra Kumar

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Bahijjah Abdallah	Federal Polytechnic Kabo	HYBRID BLOCKCHAIN SOLUTIONS FOR SUPPLY CHAIN MANAGEMENT: ENHANCING SECURE AND TRANSPARENT TRACEABILITY WITH ADVANCED PRIVACY MEASURES
Okafor, Chidozie Raymond Patrick Nwanga, Emeka Mathew	Alvan Ikoku Federal University	COMPUTATIONAL MODEL FOR AN ORGANIZED CRIME PREDICTION IN SOUTH-EAST NIGERIA
Onatere-Ubrurhe, Joyce Ogheneruona Ubrurhe, Ogheneochuko Chrisjoy Tobechukwu Ugworji Chima Uchegbu	Alvan Ikoku Federal University	INTERNET of THINGS (IoT) AND ITS ROLE IN ENSURING BUILDING SAFETY IN NIGERIA
Jogendra Kumar	G.B.Pant Institute of Engineering and Technology	ROUTING ALGORITHMS FOR LINK DISCONTINUITY AND OPTIMAL DATA DELIVERY IN VEHICULAR AD-HOC NETWORKS: A REVIEW
.Jogendra Kumar	G.B.Pant Institute of Engineering and Technology	DESIGNING A SCENARIO TO ENHANCE THE PERFORMANCE OF THE AODV ROUTING ALGORITHM FOR LINK DISCONTINUITY IN VEHICULAR AD-HOC NETWORKS
A.Rajeswari	G.Venkataswamy Naidu College	IMAGE PROCESSING USING PYTHON
Meryem Romaissa DJELLOULI Sid Ahmed CHOUAKRI Abdelkrim GHAZ	Telecommunications and Digital Signal Processing Laboratory	Dynamic Resource Management in DVB-RCS2 Systems: AI-Based Optimization Strategies

Session-2 / Hall-4
07.08.2024 / 12:30-14:30 (Ankara Local Time)
Moderator: ARSENI Igor

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Melisa Nur SAYMA Soner KIZIL	Uskudar University	THE EXAMINATION of PAPER ASH as FORENSIC EVIDENCE
ARSENI Igor	Comrat State University	PERSONS PROMOTING THE IMPLEMENTATION OF CIVIL JUSTICE IN THE CIVIL PROCEEDINGS OF THE REPUBLIC OF MOLDOVA
Geetika Gupta	Symbiosis Law School	EXPLODING THE MYTH OF SELF-SUFFICIENCY OF INDIAN VILLAGES
Sneha Singh	Noida under Symbiosis International University	OLD WINE IN NEW BOTTLE: PRACTICE OF COMMUNITY MEDIATION IN INDIA
Halil Bajrami Blerona Bajrami Venet Shala Fadil Lekaj	University of Mitrovica	MANAGEMENT OF TOURISM POTENTIALS AND DEVELOPMENT OF ECOTOURISM IN KOSOVO
Nguyen Huy Hoang	Tra Vinh University	PERFECTING THE PROVISIONS OF VIETNAMESE LAW ON THE LEGAL CONSEQUENCES OF INVALID LEGAL ACTS DUE TO FORGERY
Nguyen Huy Hoang	Tra Vinh University	TIME LIMIT FOR HANDLING FAKE LEGAL ACTS UNDER VIETNAMESE LAW
Arnab Mahajan Pubalika Bhattacharya Maitra	Kolkata Police Law Institute	GOETHALS INDIAN LIBRARY AND RESEARCH SOCIETY, KOLKATA: AN EXPLORATIVE STUDY

Session-2 / Hall-5
07.08.2024 / 12:30-14:30 (Ankara Local Time)
Moderator: M. Özgün KORUKÇU

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

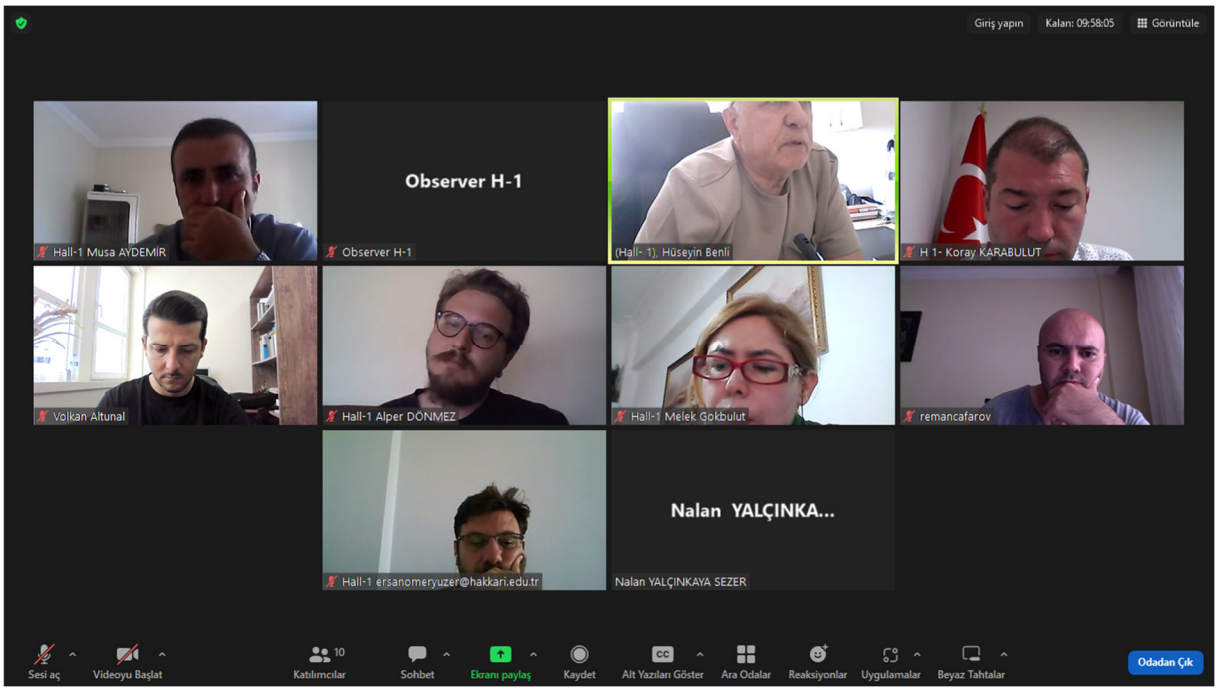
AUTHOR(S)	AFFILIATION	TITLE
Özden İŞBİLİR	Karabuk University	NUMERICAL INVESTIGATION OF COOLING TECHNIQUES IN ORTHOGONAL CUTTING OF A MAGNESIUM ALLOY
Özden İŞBİLİR	Karabuk University	NUMERICAL INVESTIGATION OF BALLISTIC PERFORATION OF AN ALUMINUM ALLOY
M. Özgün KORUKÇU Dr Muhsin KILIÇ	Bursa Uludağ University	DETERMINATION OF OPTIMUM INSULATION THICKNESS BY USING MACHINE LEARNING
M. Özgün KORUKÇU Muhsin KILIÇ	Bursa Uludag University	NUMERICAL ANALYSIS OF FLOW OVER A WEDGE
Alhassan A. Yunusa Abdullahi A. Yassar Alhassan Mohammed	Niger State College of Education	THE DEVELOPMENT OF PRACTICAL SKILLS ASSESSMENT SCALE FOR METAL WORK CUTTING PROCESS IN TECHNICAL COLLEGES IN NIGER STATE, NIGERIA
ORIE, C. JOHN	Federal College Education Technical	EFFECTS OF CAN BUS AND OBD- II CONNECTION SKILLS ON STUDENT PERFORMANCE IN AUTOMOBILE REPAIR: A COMPARATIVE STUDY
Z. El Hamri M. Karaoui Maouhoubi M. Alami M. Assouag	University Moulay Ismail	THERMAL, RHEOLOGICAL, AND MECHANICAL PROPERTIES OF POLYSTYRENE (PS) COMPOSITES REINFORCED WITH SNAIL SHELL POWDER (SSP) BIOFILLER
Z. El Hamri M. Karaoui M. Alami M. Assouag	University Moulay Ismail	INVESTIGATION OF TRIAZOLE'S CORROSION INHIBITION ON E24 STEEL IN 1M HCL THROUGH GRAVIMETRIC AND ELECTROCHEMICAL METHODS
Z. El Hamri M. Karaoui M. Alami M. Assouag	University Moulay Ismail	PHYSICO-CHEMICAL ANALYSIS OF SNAIL SHELL POWDER PREPARED THROUGH MECHANOCHEMICAL PROCESSING AND THERMAL TREATMENT

Session-2 / Hall-6
07.08.2024 / 12:30-14:30 (Ankara Local Time)
Moderator: M. K. GANESHAN

Zoom Meeting ID: 833 1287 1999 / Zoom Passcode: 060708

AUTHOR(S)	AFFILIATION	TITLE
Sabrina Roguai Abdelkader Djelloul	Abbes Laghrour University Khenchel	INVESTIGATION OF NI DOPING ON STRUCTURAL, MICROSTRUCTURAL, AND OPTICAL PROPERTIES OF TIN OXIDE FILMS VIA PSP METHOD
Sabrina Roguai Abdelkader Djelloul	Abbes Laghrour University Khenchel	DEVELOPMENT OF COPPER OXIDE NANOPARTICLES FOR ENHANCED PHOTOCATALYTIC PERFORMANCE
M. K. GANESHAN	MIET Engineering College	THE ROLE OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN ENHANCING EMPLOYEE EXPERIENCE AND ENGAGEMENT
Muhammed Cihat ALTIN Mehmet Salih MAMİŞ	Van Yuzuncu Yil University Inonu University	EXPLORING MICROGRID ENERGY MANAGEMENT: A DETAILED REVIEW OF CONTROL STRATEGIES
K. Thamizhmaran	Government College of Engineering	FUNDAMENTALS OF FILTERS
Nikola Bošković Marija Radmilović-Radjenović Branislav Radjenović	University of Belgrade	EFFICIACY OF MICROWAVE TUMOR ABLATION USING THREE ANTENNAS
Nishu Rani Vijay Kumar Sunil Kumar	Indira Gandhi University	SYNTHESIS AND CHARACTERIZATION OF SM-DOPED SnO2 NANOSTRUCTURES FOR AQUEOUS AMMONIA SENSING APPLICATIONS

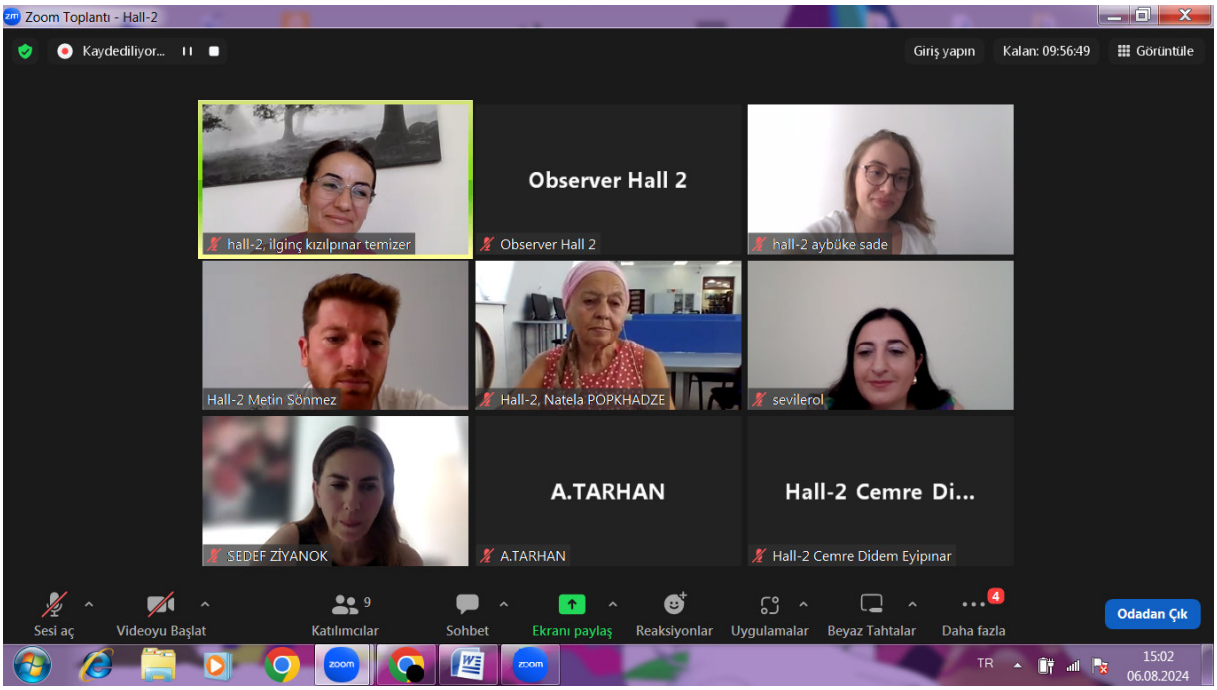
PHOTO GALLERY

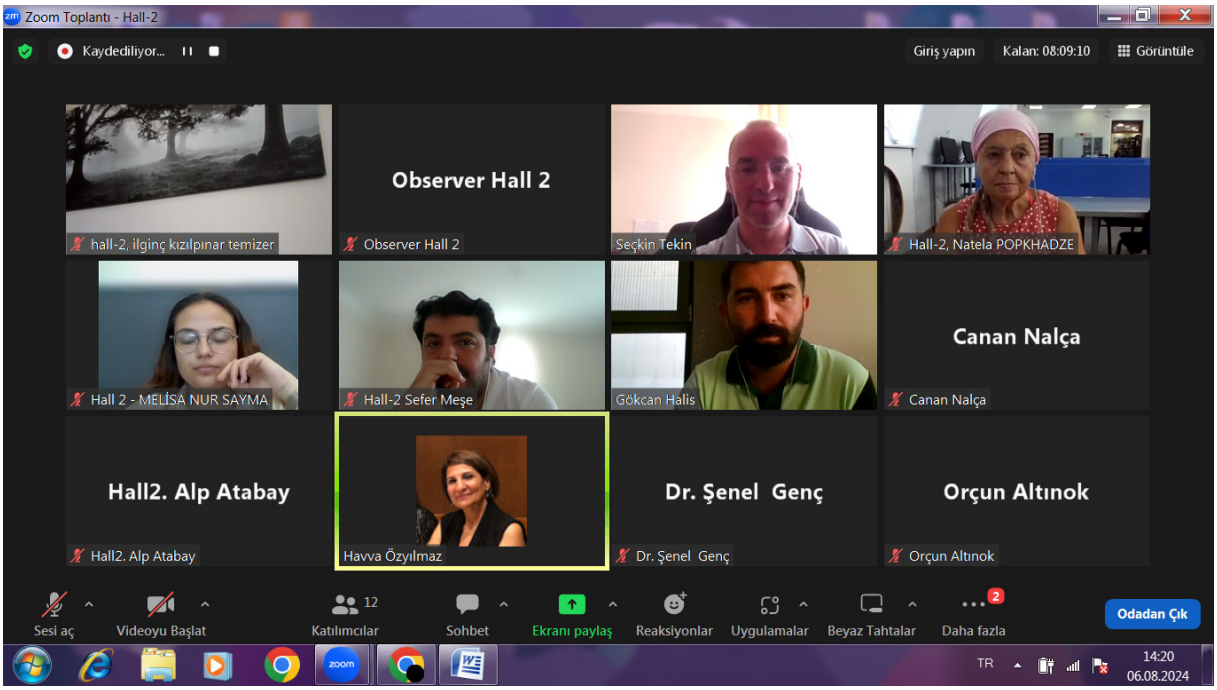


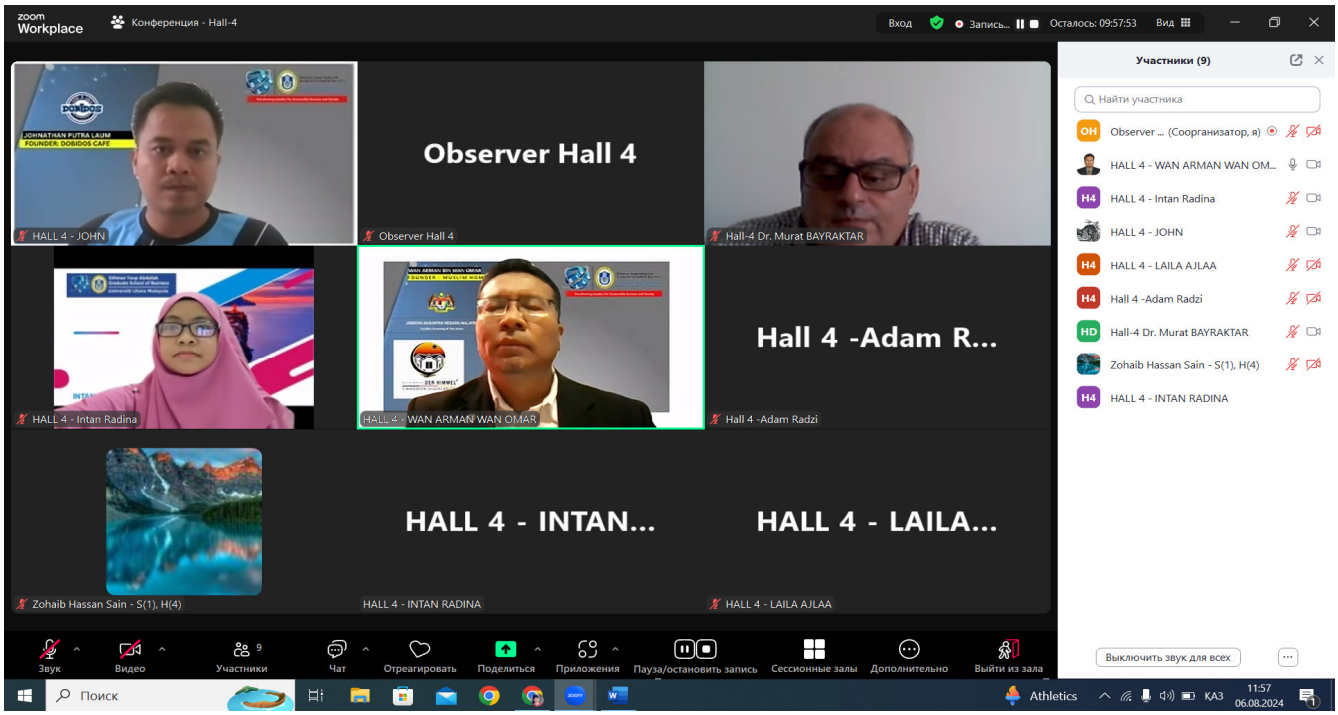


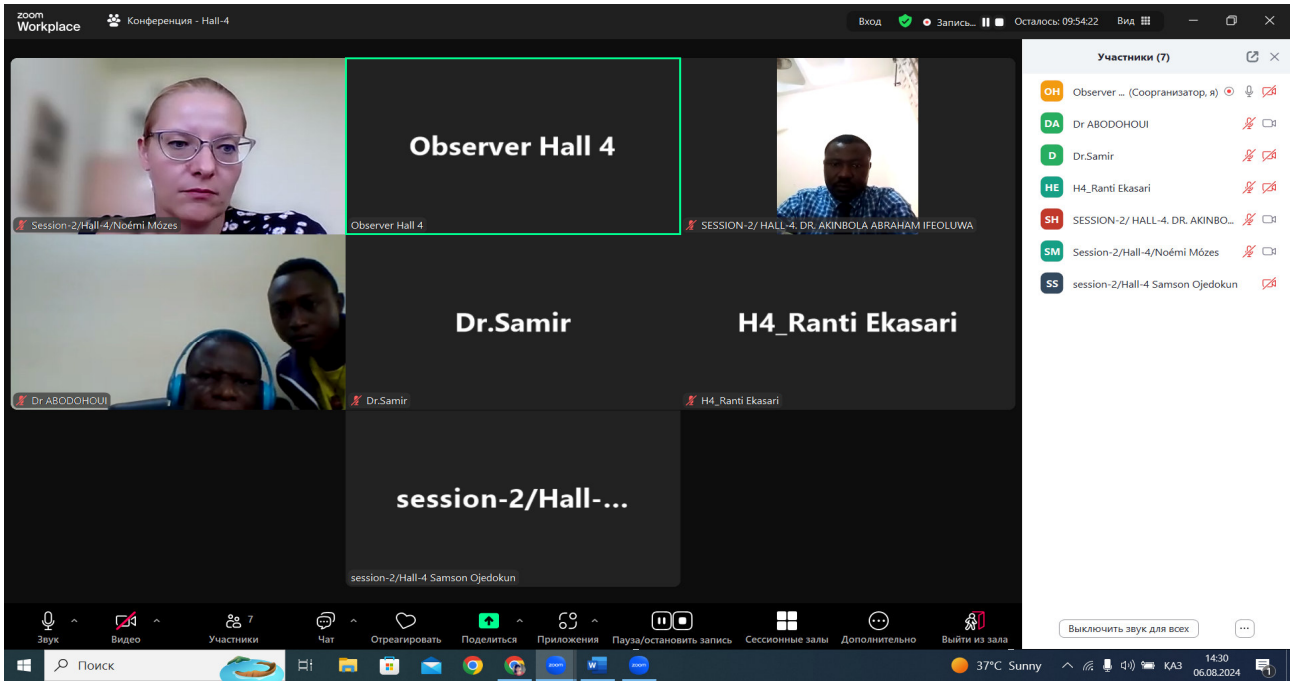

Kaydediliyor...
Giriş yapın
Kalan: 09:41:25
Görüntüle
Observer H-1
Hall-1 Ülkem Cansu Aygün Karakoyunlu
Observer H-1
hall 1-FARUK GURSEL KOCAK
H-1, Ceren Canpolat
H1, Bahar Taşar
Gönül BALKIR
H1- SİMGE EŞSİZ
Hall-1, Mustafa...
Hall-1, Mustafa Akbayır
Sesi aç
Videoyu Başlat
Katılımcılar
Sohbet
Ekranı paylaş
Kaydı Duraklat/Durdur
Alt Yazıları Göster
Ara Odalar
Reaksiyonlar
Uygulamalar
Beyaz Tahtalar
Odadan Çık


Zoom Toplantı - Hall-2
Kaydediliyor...
Giriş yapın
Kalan: 09:58:11
Görüntüle
Observer Hall 2
Hall-2- Kazım Ertürk
Observer Hall 2
Hall-2 MEHMET CEYLAN
Bilal Bekalp
HALL 2 , Zühal GÖKBEL
Sesi aç
Videoyu Başlat
Katılımcılar
Sohbet
Ekranı paylaş
Reaksiyonlar
Uygulamalar
Beyaz Tahtalar
Daha fazla
Odadan Çık
TR
10:02
06.08.2024

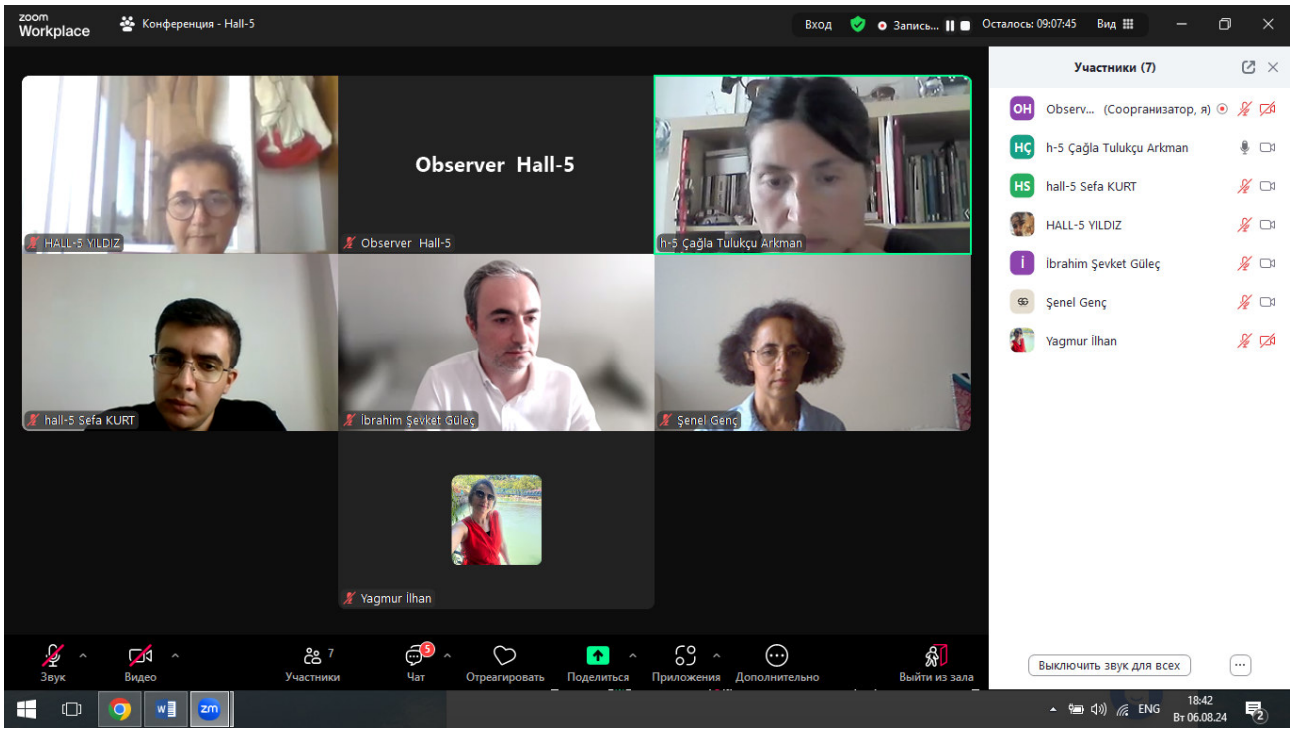

Zoom Toplantı - Hall-2
Kaydediliyor...
Giriş yapın
Kalan: 09:56:49
Görüntüle
hall-2, ilginç kızılpınar temizer
Observer Hall 2
Observer Hall 2
hall-2 aybüke sade
Hall-2 Metin Sönmez
Hall-2, Natela POPKHADZE
sevilerol
SEDEF ZİYANOK
A.TARHAN
A.TARHAN
Hall-2 Cemre Di...
Hall-2 Cemre Didem Eyipınar
Sesi aç
Videoyu Başlat
Katılımcılar
9
Sohbet
Ekranı paylaş
Reaksiyonlar
Uygulamalar
Beyaz Tahtalar
Daha fazla
4
Odadan Çık
TR
15:02
06.08.2024

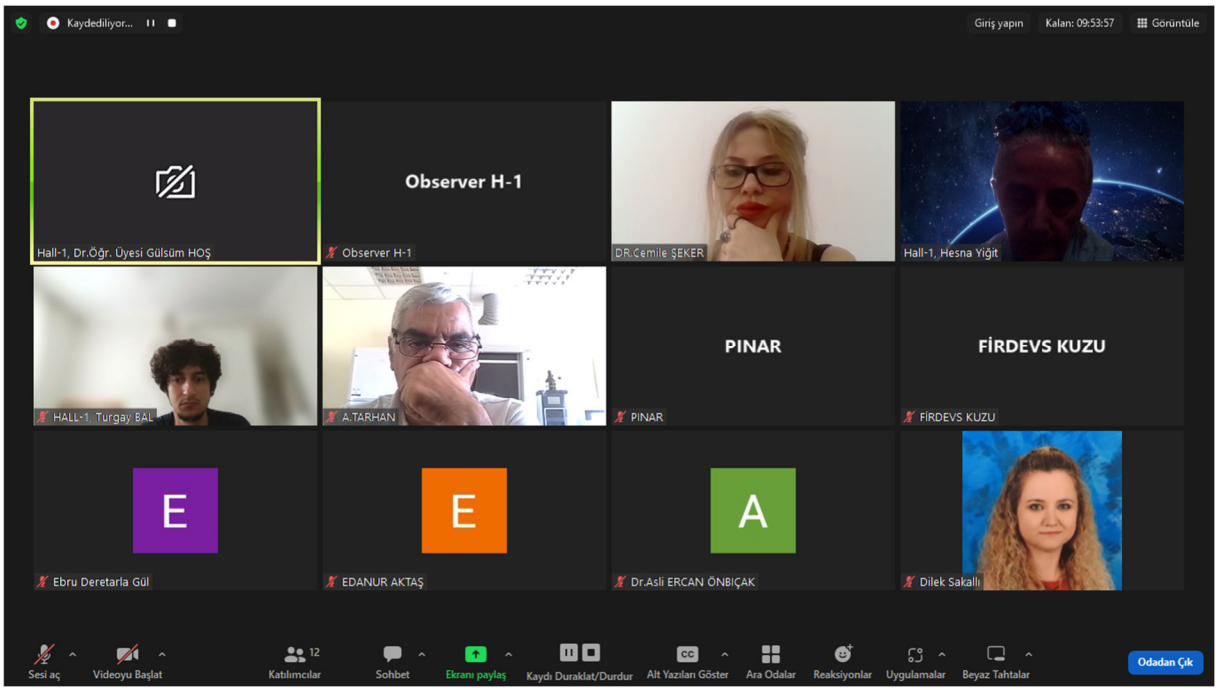

Zoom Toplantı - Hall-2
Kaydediliyor...
Giriş yapın
Kalan: 08:09:10
Görüntüle
hall-2, ilginç kızılpınar temizer
Observer Hall 2
Observer Hall 2
Seçkin Tekin
Hall-2, Natela POPKHADZE
Hall 2 - MELİSA NUR SAYMA
Hall-2 Sefer Meşe
Gökcan Halis
Canan Nalça
Canan Nalça
Hall2. Alp Atabay
Hall2. Alp Atabay
Havva Özyılmaz
Dr. Şenel Genç
Dr. Şenel Genç
Orçun Altınok
Orçun Altınok
Sesi aç
Videoyu Başlat
Katılımcılar
12
Sohbet
Ekranı paylaş
Reaksiyonlar
Uygulamalar
Beyaz Tahtalar
Daha fazla
2
Odadan Çık
TR
14:20
06.08.2024

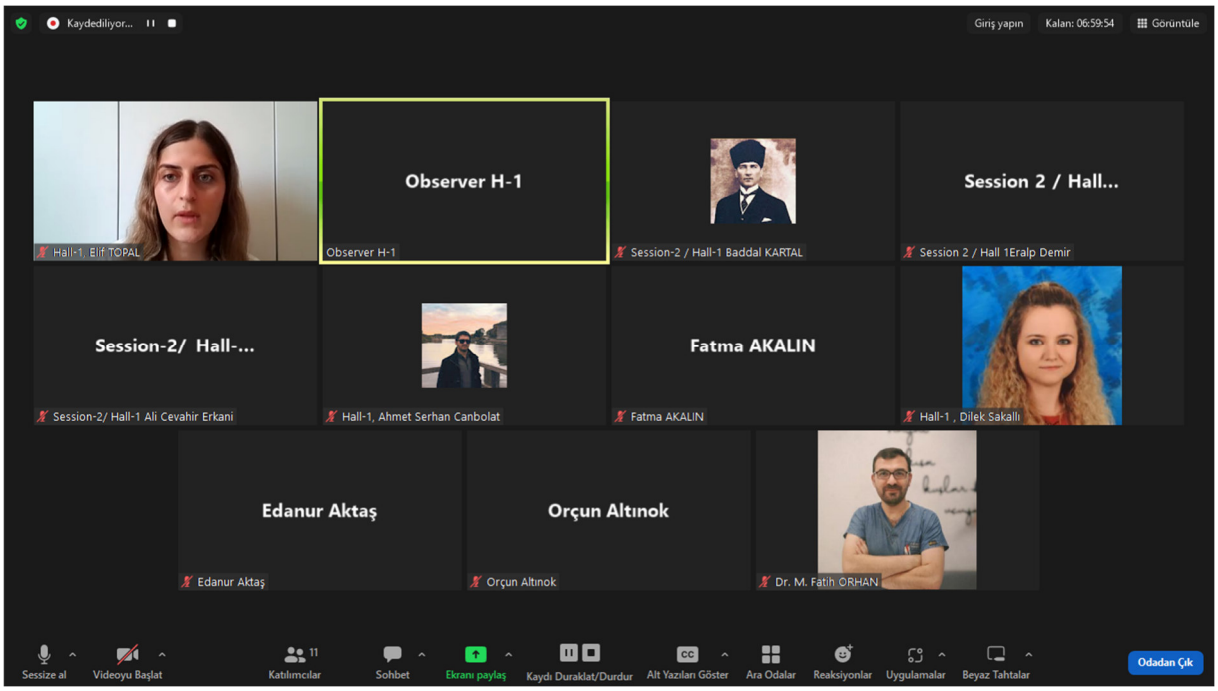

zoom Workplace
Конференция - Hall-4
Observer Hall 4
HALL 4 - JOHN
Hall-4 Dr. Murat BAYRAKTAR
HALL 4 - Intan Radina
HALL 4 - WAN ARMAN WAN OMAR
Hall 4 -Adam R...
Zohaib Hassan Sain - S(1), H(4)
HALL 4 - INTAN...
HALL 4 - LAILA...
HALL 4 - INTAN RADINA
HALL 4 - LAILA AJLAA
Участники (9)
Звук
Видео
Участники
Чат
Отреагировать
Поделиться
Приложения
Пауза/остановить запись
Сессионные залы
Дополнительно
Выйти из зала
Выключить звук для всех
Поиск
Athletics
11:57
06.08.2024


zoom Workplace
Конференция - Hall-4
Observer Hall 4
Session-2/Hall-4/Noémi Mózes
SESSION-2/ HALL-4, DR. AKINBOLA ABRAHAM IFEOLUWA
Dr.Samir
H4_Ranti Ekasari
Dr ABODOHOUI
session-2/Hall-...
session-2/Hall-4 Samson Ojedokun
Участники (7)
Звук
Видео
Участники
Чат
Отреагировать
Поделиться
Приложения
Пауза/остановить запись
Сессионные залы
Дополнительно
Выйти из зала
Выключить звук для всех
Поиск
37°C Sunny
14:30
06.08.2024


zoom Workplace
Конференция - Hall-5
Вход
Запись...
Осталось: 09:52:09
Вид
Участники (3)
Observ... (Соорганизатор, я)
H 5 Gheorghe Giurgiu
iPhone di dorina
Observer Hall-5
H 5 Gheorghe Giurgiu
Observer Hall-5
iPhone di dorina
Звук
Видео
Участники
Чат
Отреагировать
Поделиться
Приложения
Дополнительно
Выйти из зала
Выключить звук для всех
РУС
15:28
Вт 06.08.24

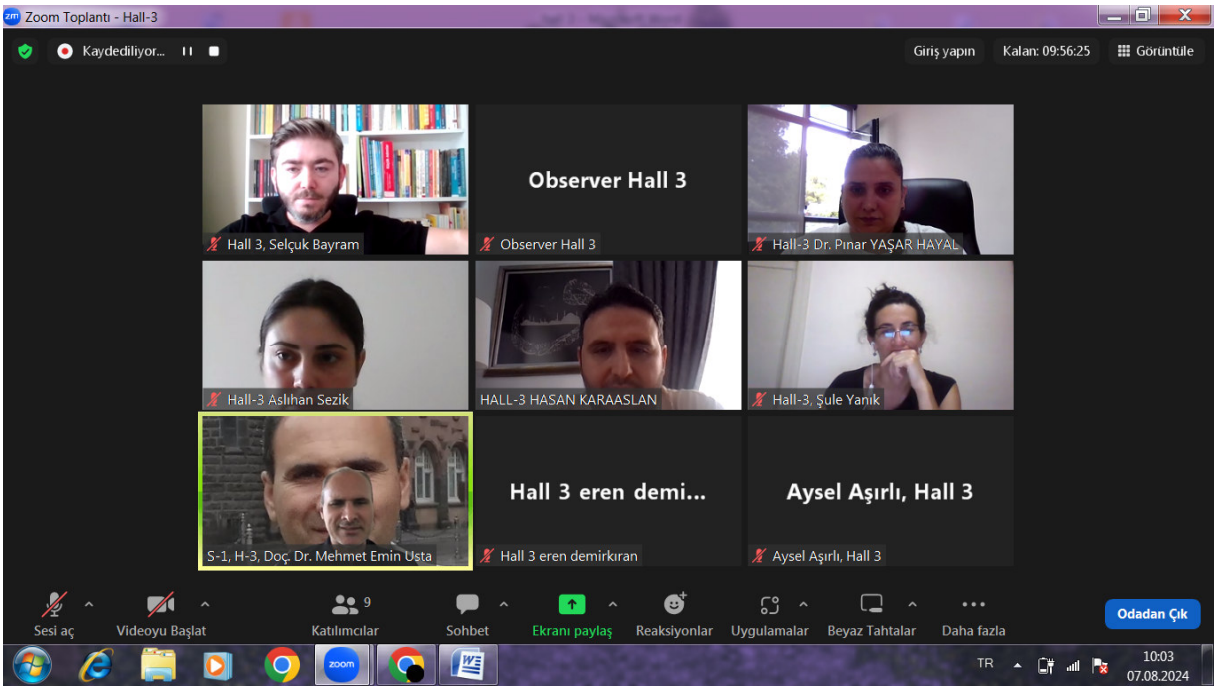

zoom Workplace
Конференция - Hall-5
Вход
Запись...
Осталось: 09:07:45
Вид
Участники (7)
Observ... (Соорганизатор, я)
h-5 Çağla Tulukçu Arkman
hall-5 Sefa KURT
HALL-5 YILDIZ
İbrahim Şevket Güleç
Şenel Genç
Yagmur İlhan
Observer Hall-5
HALL-5 YILDIZ
Observer Hall-5
h-5 Çağla Tulukçu Arkman
hall-5 Sefa KURT
İbrahim Şevket Güleç
Şenel Genç
Yagmur İlhan
Звук
Видео
Участники
Чат
Отреагировать
Поделиться
Приложения
Дополнительно
Выйти из зала
Выключить звук для всех
ENG
18:42
Вт 06.08.24

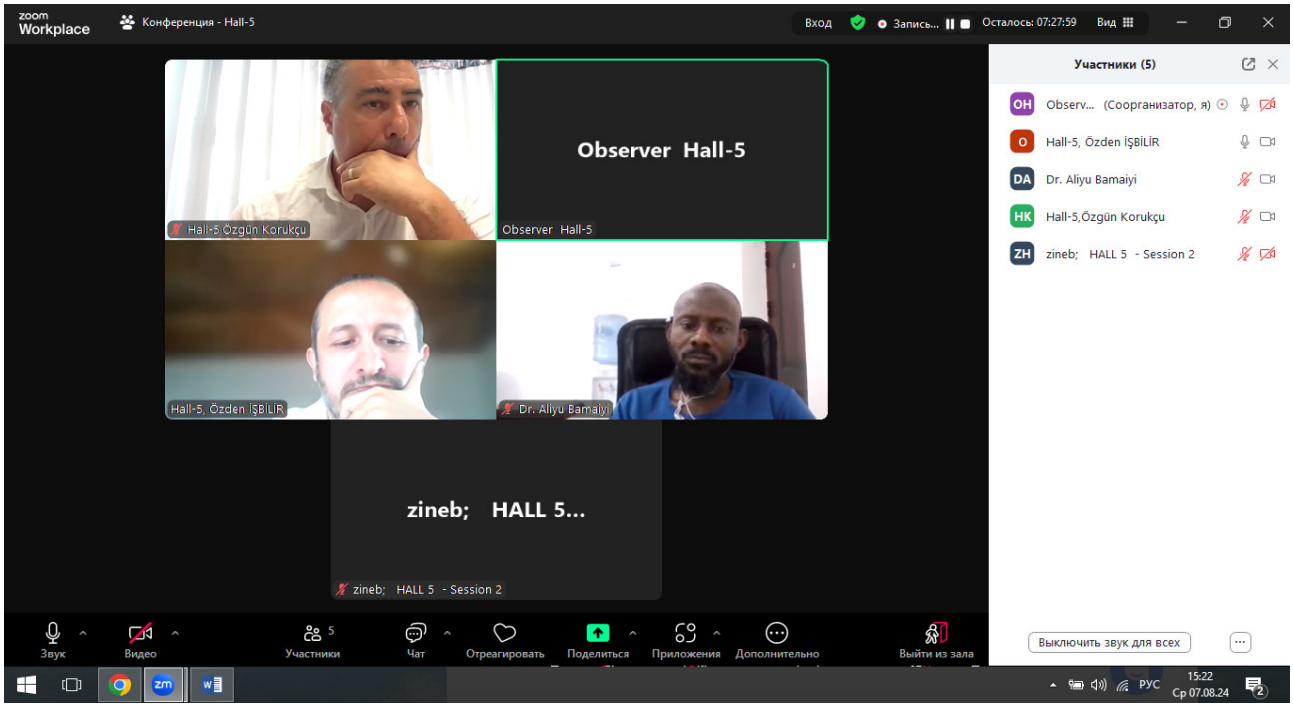

Kaydediliyor...
Giriş yapın
Kalan: 09:53:57
Görüntüle
Observer H-1
Hall-1, Dr.Öğr. Üyesi Gülsüm HOŞ
Observer H-1
DR.Cemile ŞEKER
Hall-1, Hesna Yiğit
HALL-1, Turgay BAL
A.TARHAN
PINAR
PINAR
FİRDEVS KUZU
FİRDEVS KUZU
E
E
A
Ebru Deretarla Gül
EDANUR AKTAŞ
Dr.Asli ERCAN ÖNBIÇAK
Dilek Sakallı
Sesi aç
Videoyu Başlat
Katılımcılar
Sohbet
Ekranı paylaş
Kaydı Duraklat/Durdur
Alt Yazıları Göster
Ara Odalar
Reaksiyonlar
Uygulamalar
Beyaz Tahtalar
Odadan Çık


Kaydediliyor...
Giriş yapın
Kalan: 06:59:54
Görüntüle
Hall-1, Elif TOPAL
Observer H-1
Observer H-1
Session-2 / Hall-1 Baddal KARTAL
Session 2 / Hall...
Session 2 / Hall 1Eralp Demir
Session-2/ Hall-...
Session-2/ Hall-1 Ali Cevahir Erkani
Hall-1, Ahmet Serhan Canbolat
Fatma AKALIN
Fatma AKALIN
Hall-1 , Dilek Sakallı
Edanur Aktaş
Edanur Aktaş
Orçun Altınok
Orçun Altınok
Dr. M. Fatih ORHAN
Sessize al
Videoyu Başlat
Katılımcılar
Sohbet
Ekranı paylaş
Kaydı Duraklat/Durdur
Alt Yazıları Göster
Ara Odalar
Reaksiyonlar
Uygulamalar
Beyaz Tahtalar
Odadan Çık

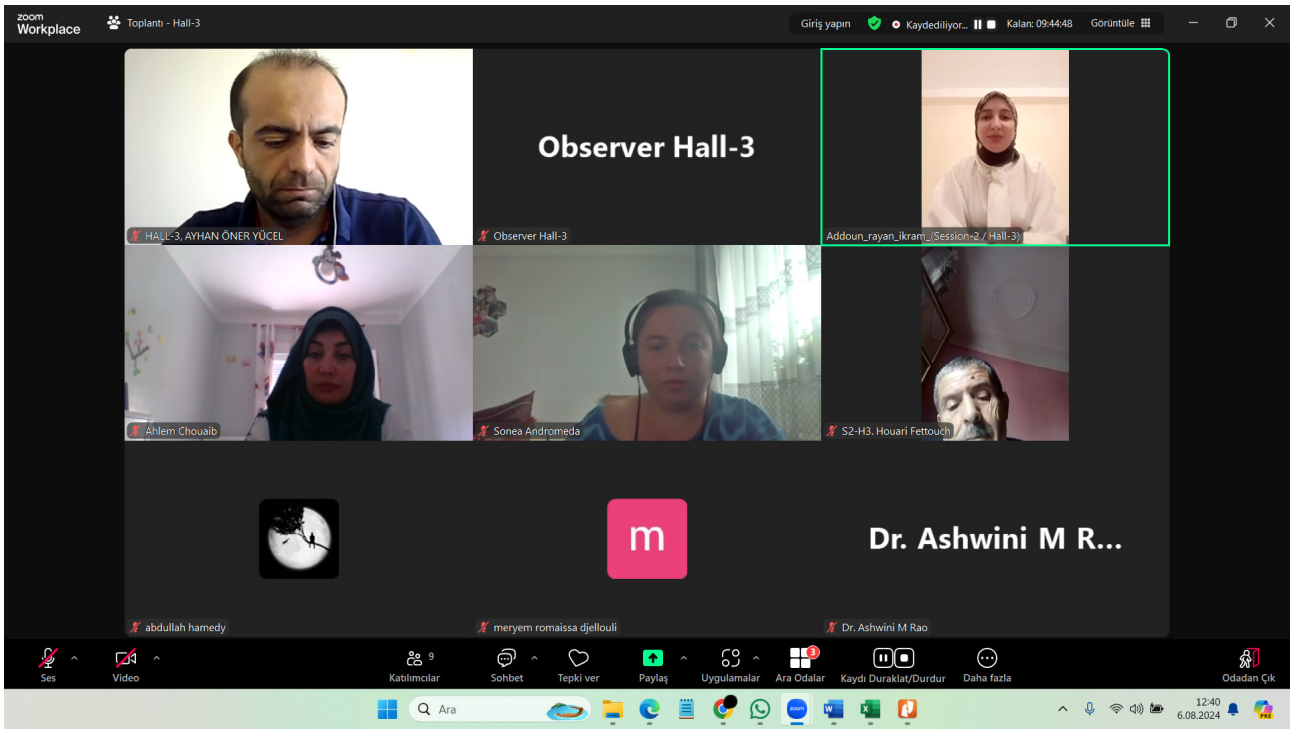

Zoom Toplantı - Hall-2
Kaydediliyor...
Giriş yapın
Kalan: 09:56:07
Görüntüle
H-2 Volkan Dede
Observer Hall-2
Observer Hall-2
Hall-2 Melek EKİNCİ
Hall 2 Mehmet Çelik
Hall-2 Doç. Dr. Aslı Bozdağ
Sesi aç
Videoyu Başlat
Katılımcılar
Sohbet
Ekranı paylaş
Kaydı Duraklat/Durdur
Alt Yazıları Göster
Ara Odalar
Reaksiyonlar
Uygulamalar
Beyaz Tahtalar
Odadan Çık
09:58
7.8.2024


Zoom Toplantı - Hall-2
Kaydediliyor...
Giriş yapın
Kalan: 07:29:25
Görüntüle
Fiza Bukhtawar phD scholar session-2, Hall-2
Observer Hall-2
Observer Hall-2
SESSION -2/ HALL- 2, Youssef ADNAN
FAMOROTI OLUWASEUN GRACE
FAMOROTI OLU...
Sesi aç
Videoyu Başlat
Katılımcılar
Sohbet
Ekranı paylaş
Kaydı Duraklat/Durdur
Alt Yazıları Göster
Ara Odalar
Reaksiyonlar
Uygulamalar
Beyaz Tahtalar
Odadan Çık
12:25
7.8.2024


Zoom Toplantı - Hall-3
Kaydediliyor...
Giriş yapın
Kalan: 09:56:25
Görüntüle
Observer Hall 3
Hall 3, Selçuk Bayram
Observer Hall 3
Hall-3 Dr. Pınar YAŞAR HAYAL
Hall-3 Aslıhan Sezik
HALL-3 HASAN KARAASLAN
Hall-3, Şule Yanık
S-1, H-3, Doç. Dr. Mehmet Emin Usta
Hall 3 eren demi...
Hall 3 eren demirkıran
Aysel Aşırlı, Hall 3
Aysel Aşırlı, Hall 3
Sesi aç
Videoyu Başlat
Katılımcılar
Sohbet
Ekranı paylaş
Reaksiyonlar
Uygulamalar
Beyaz Tahtalar
Daha fazla
Odadan Çık
TR
10:03
07.08.2024


zoom Workplace
Конференция - Hall-5
Вход
Запись...
Осталось: 07:27:59
Вид
Observer Hall-5
Hall-5 Özgün Korukçu
Observer Hall-5
Hall-5, Özden İŞBİLİR
Dr. Aliyu Bamaiyi
zineb; HALL 5...
zineb; HALL 5 - Session 2
Участники (5)
Observ... (Соорганизатор, я)
Hall-5, Özden İŞBİLİR
Dr. Aliyu Bamaiyi
Hall-5,Özgün Korukçu
zineb; HALL 5 - Session 2
Звук
Видео
Участники
Чат
Отреагировать
Поделиться
Приложения
Дополнительно
Выйти из зала
Выключить звук для всех
РУС
15:22
Ср 07.08.24


zoom Workplace
Toplantı - Hall-3
Giriş yapın
Kaydediliyor...
Kalan: 09:44:50
Görüntüle
Observer Hall-3
Sevda Aghayeva session 1, hall 3
Observer Hall-3
H3- M. SAIFULLAHI
Ananda Majumdar-H3
Ses
Video
Katılımcılar
Sohbet
Tepki ver
Paylaş
Uygulamalar
Ara Odalar
Kaydı Duraklat/Durdur
Daha fazla
Odadan Çık
Ara
10:10
6.08.2024


zoom Workplace
Toplantı - Hall-3
Giriş yapın
Kaydediliyor...
Kalan: 09:44:48
Görüntüle
HALL-3, AYHAN ÖNER YÜCEL
Observer Hall-3
Observer Hall-3
Addoun_rayan_ikram_(Session-2 / Hall-3)
Ahlem Chouaib
Sonea Andromeda
S2-H3. Houari Fettouch
m
Dr. Ashwini M R...
abdullah hamedy
meryem romaissa djellouli
Dr. Ashwini M Rao
Ses
Video
Katılımcılar
Sohbet
Tepki ver
Paylaş
Uygulamalar
Ara Odalar
Kaydı Duraklat/Durdur
Daha fazla
Odadan Çık
Ara
12:40
6.08.2024


Observer Hall-3
Hall-3, Orkan AKKOYUN
Observer Hall-3
Hatice Kübra Güneri
Assoc. Prof. Dr....
Prof. Dr. Süleyman KOZAT
Assoc. Prof. Dr. Mahmut KAYAR
Ara
16:38
6.08.2024


zoom Workplace
Toplantı - Hall-6
Giriş yapın
Kaydediliyor...
Kalan: 09:58:20
Görüntüle
Observer Hall-6
Hall-6, Meltem MAÇİT
Observer Hall-6
Iram Shahzadi
Ses
Video
Katılımcılar
Sohbet
Tepki ver
Paylaş
Uygulamalar
Ara Odalar
Kaydı Duraklat/Durdur
Daha fazla
Odadan Çık
Ara
09:56
7.08.2024

CONTENTS

AUTHORS	PRESENTATION TITLE	NO
Erşan Ömer YÜZER	EVALUATION OF THE LIGHT PERFORMANCE AND LIGHT POLLUTION OF OUTDOOR LIGHTING ELEMENTS ON THE SCALE OF HAKKÂRİ PROVINCE	1-8
Alper DÖNMEZ Gül Ebru ORHUN	STUDY OF THE POTENTIAL OF ANIMAL BIOMASS ENERGY RESOURCES OF ÇANAKKALE PROVINCE	9-10
Koray KARABULUT Yeliz ALNAK	EXAMINATION OF THE EFFECTS OF NATURAL AND FORCED CONVECTION ON IMPROVING HEAT TRANSFER IN THE CHANNEL IN TERMS OF DIFFERENT VARIABLES	11-23
Yeliz ALNAK Koray KARABULUT	RESEARCH OF MIXED CONVECTION EFFECTS IN HEAT TRANSFER FROM A HEATING ELECTRONIC ELEMENT PAIR	24-37
Musa AYDEMİR Hüseyin BENLİ	CALCULATION OF CABLE LOSSES IN SOLAR POWER PLANTS DEPENDING ON DIFFERENT PARAMETERS	38-47
Raman JAFAROV Necati KAYA	SPECTRAL RESPONSE OF POLYCRYSTALLINE AND MONOCRYSTALLINE SILICON PHOTOVOLTAIC CELLS IN REAL USE CONDITIONS DEPENDS ON THE ANGLE OF INCOMING SUNLIGHT	48-49
Volkan ALTUNAL	PERSISTENT OPTICALLY STIMULATED LUMINESCENCE FROM CaAl12O19 CERAMIC PELLETS	50-56
Volkan ALTUNAL Adnan ÖZDEMİR	EFFECT OF SILICON DOPING ON LUMINESCENCE PROPERTIES OF BeO CERAMICS	57-63
Melek GÖKBULUT	ANALYTICAL SOLUTION OF BOHR HAMILTONIAN WITH YUKAWA POTENTIAL FOR Z(5) MODEL	64-74
Bilal BEKALP	DIGITALIZATION OF RELIGION AND THE SELF	75
Zühal GÖKBEL	PERCEPTIONS OF PROPHET MUHAMMAD IN WESTERN DISCOURSE	76
Kazım ERTÜRK	OBJECTS AND MYTHOLOGICAL CHARACTERS ON PONTUS COINS	77-78

Mehmet CEYLAN	IN THE TRANSITION PERIOD FROM THE EAST BRONZE AGE TO THE MIDDLE BRONZE AGE KONYA'S RELATIONS WITH NEIGHBORING REGIONS	79-80
Yasemin CAN Birkan ŞENYÜZ	THE EUROPEAN IDENTITY OF THE ENLIGHTENMENT ERA AND ITS EFFECTS ON EUROPEAN CULTURE	81-82
Sevda Aghayeva Aydin gizi	HISTORICAL LAND OF AZERBAIJAN – ZANGAZUR	83-92
Aishat A. Yusuf A. O. Akanbi Eniola K. Ola-Alani Khadijat S. Ameen	EFFECTS OF REGGIO-EMILIA APPROACH IN TEACHING MEASUREMENT OF LENGTH TO PUPILS IN KWARA STATE, NIGERIA	93
Jibril Wushishi Ahmed Shatima Abdullahi	ENHANCING TECHNICAL EDUCATION THROUGH PROBLEM-BASED LEARNING: EXPLORING THE FACILITATOR'S INFLUENCE	94
Ferdinand Mara Jorida Çobaj Enkeleida Lleshi	ASSESSMENT OF PHYSICAL QUALITIES OF STUDENTS IN THE FIRST YEAR	95-101
Saifullahi M. Bashir A. U. Garba Shuaibu Osiboye M. O. Ahmed T.	EDUCATING FOR CREATIVITY AND 21ST-CENTURY SKILLS DEVELOPMENT: THE ROLE OF DESIGN-BASED LEARNING INSTRUCTIONAL STRATEGY	102-107
Saidu, I.	AI DRIVEN TEACHER EDUCATION: POLICY THRUST AND PRACTICE IN NIGERIA EDUCATION SYSTEM	108
Ananda Majumdar	EVERY BEAST OF THE EARTH AND EVERY BIRD OF THE HEAVEN: THE ANIMALS IN BYZANTINE	109-116
Ananda Majumdar	ECOFEMINISM IN ARCHITECTURE FOR SUSTAINABLE ENVIRONMENT AND GENDER EQUALITY	117-122
Murat BAYRAKTAR	SOCIO-ECONOMIC EFFECTS OF AGE DISCRIMINATION	123
Murat BAYRAKTAR	THE ROLE OF SOCIAL CAPITAL ON INNOVATION: FINDINGS FROM SELECTED OECD & BRICS COUNTRIES	124
Omar TADLAOUI Mohamed MACHROUHI	ARTIFICIAL INTELLIGENCE AT THE HEART OF MOROCCAN PUBLIC SECTOR REFORM: CHALLENGES AND PERSPECTIVES	125
Intan Radina Ahmad Laila Ajlaa Jamal Abd Mansor Herman Shah Anuar	ISSUES AND CHALLENGES IN OPERATION MANAGEMENT: PERSPECTIVES FROM NORTHERN MALAYSIA TERTIARY EDUCATION INDUSTRY	126

Zohaib Hassan Sain	CHALLENGES IN DOCTORAL PROGRAMS IN PAKISTAN: INVESTIGATING QUALITY ASSURANCE ISSUES IN THE QUALITY MANAGEMENT PHD	127
Zohaib Hassan Sain	CHATGPT FOR POSITIVE IMPACT? EXAMINING THE OPPORTUNITIES AND CHALLENGES OF LARGE LANGUAGE MODELS IN EDUCATION	128
Tetiana BURLAY	HUMAN-CENTRICITY AS A KEY PRINCIPLE FOR USING AI SAFELY	129
Volodymyr Mishchenko Ievgen Tishchenko	MECHANISMS OF DIGITALIZATION'S IMPACT ON ECONOMICDEVELOPMENT	130-135
Vasylyna PODLIESNA	LOCAL-GLOBAL CYCLES OF THE CAPITALIST WORLD-SYSTEM	136-142
Herman Shah Anuar Jonathan Putra Bin Laum Wan Arman Bin Wan Omar	ISSUES AND CHALLENGES IN OPERATION MANAGEMENTS: PERSPECTIVES FROM NORTHERN MALAYSIA FOOD & BEVERAGE INDUSTRY NICHE: VENTURING URBAN CAFE IN RURAL AREAS	143
Radoslav BALTEZAREVIĆ Ivana BALTEZAREVIĆ	ESSENTIAL ADVANTAGES OF A SUSTAINABLE BLUE ECONOMY	144-150
Mihaela-Georgiana Oprea Mihaela-Irma Vlădescu	BIBLIOMETRIC ANALYSIS OF THE INTERACTIONS BETWEEN POPULATION, MIGRATION AND ECONOMY: TRENDS AND PROSPECTS	151
Kareem, W. B. Muhammed B.M Abdulrahman, T.S Raji F.A Hassan A.M	TECHNOLOGY AND VOCATIONAL SKILLS: A WAY FORWARD TO YOUTH UNEMPLOYMENT IN NORTH CENTRAL NIGERIA	152-164
Muhammad Waseem Bari	UNMASKING THE IMPACT OF INTERNET ADDICTION DISORDER ON EMPLOYEE PERFORMANCE	165
Jaya Ganesh Thavarajah Munisah Krishansamy Herman Shah Anuar	CRITICAL SUCCESS FACTORS OF OPERATION MANAGEMENTS: PERSPECTIVES FROM NORTHERN MALAYSIA ELECTRIC & ELECTRONIC INDUSTRY	166
Kim-Hang TE Que-Nhu DUONG Nam-Khang Tri NGUYEN	IMMERSIVE EXPERIENCES: VIETNAMESE TOURISTS' INTEREST IN VIRTUAL REALITY TECHNOLOGY	167-176
Lim Chong Luen Chia Huai Kang Herman Shah Anuar	CRITICAL SUCCESS FACTORS OF OPERATION MANAGEMENT: PERSPECTIVES FROM NORTHERN MALAYSIA ENGINEERING INDUSTRY	177

Siti Anilah Ardenieti Panisha Ssri Herman Shah Anuar	ISSUES AND CHALLENGES IN OPERATION MANAGEMENT: PERSPECTIVES FROM THE NORTHERN MALAYSIA ACCOUNTING INDUSTRY	178
Tan Suan Ching Lee Che Keat Herman Shah Anuar	CRITICAL SUCCESS FACTORS OF OPERATION MANAGEMENT: PERSPECTIVES FROM NORTHERN MALAYSIA TOURISM INDUSTRY	179
Duygu Nur ÇOBANOĞLU İkranur FELEK	INVESTIGATION OF ANTIOXIDANT ACTIVITY OF BEE POLLEN EXTRACT ADDITIVE READY PACK TARHANA	180-186
Melike DURMUŞ Handan ÖZCAN	VITAMIN D IN PREGNANCY	187-189
Melike DURMUŞ Handan ÖZCAN	EPILEPSY AND PREGNANCY	190-192
Fatma Zehra KARAKURT Okan ÖZBAKIR	AGRICULTURAL SECTOR AND ACCIDENTS CAUSED BY MACHINERY	193-202
Nalan YALÇINKAYA SEZER Öznur TİRYAKİ	HOME ACCIDENTS AND MANAGEMENT IN 0-6 AGE GROUP	203-212
Nursel ALP DAL Gamze DENİZ	FACTORS AFFECTING GYNECOLOGICAL CANCER AWARENESS	213-221
Hilal Başak ÇAKIR Handan ÖZCAN	THE IMPACT OF PELVIC ORGAN PROLAPSE ON QUALITY OF LIFE	222-223
Hilal Başak ÇAKIR Handan ÖZCAN	PELVIC FLOOR DYSFUNCTION IN THE POSTPARTUM PERIOD PREVENTION MANAGEMENT	224-225
Alp ATABAY Nazlı Ferah AKINCI	THE IMPORTANCE OF ROSE WINDOWS IN CHURCHES AND THE INVENTORY OF ROSE WINDOW CHURCHES IN ISTANBUL	226-227
Canan NALÇA KISSABOYLU Yasemen SAY ÖZER	ANTAKYA AFTER THE EARTHQUAKE: DESTRUCTION OF SPACE AND MEMORY	228-241
İlknur GÜÇLÜ Havva ÖZYILMAZ	ERGANI HOUSING PRODUCTION TYPES AND HOUSING PROBLEMS	242-254
İlknur GÜÇLÜ İclal ALUÇLU	THE ROLE OF ARTIFICIAL INTELLIGENCE IN SPACE DESIGNS	255-285
Sefer MEŞE Gökhan DEMİRDÖĞEN	UNLOCKING BARRIERS AND DRIVERS: INTEGRATING BIM AND UAV TECHNOLOGIES FOR FATIGUE DETECTION	286-287

Seçkin TEKİN Emine Banu BURKUT Murat DAL	BIBLIOMETRIC ANALYSIS OF ACADEMIC STUDIES ON SMART CITIES AND ART	288-297
Gökcan HALİS Murat DAL	HISTORICAL AND FUNCTIONAL INVESTIGATION OF TUNCELI PROVINCE TANGIBLE CULTURAL HERITAGE EXAMPLES	298-305
Ayhan Öner YÜCEL	STRENGTHENING OF CONCRETE SAFETY BARRIERS USING CARBON FIBER REINFORCED POLYMER SHEETS	306-307
Abdullah HAMEDY Ertugrul ESMERAY	CULVERT BOX CONSTRUCTION STAGES, IMPORTANT PROBLEMS, SITE SELECTION CRITERIA AND SOLUTION SUGGESTIONS	308-316
Binyam Zigta	NUMERICAL STUDY OF PHYSIOLOGICAL BLOOD FLOW WITH STRETCHING CAPILLARY ON MHD MICROPOLAR FLUID	317
Rayan Ikram ADDOUN	STABILITY AND REGULARITY ANALYSIS OF NONLINEAR WAVE EQUATIONS WITH LOCALISED INTERNAL AND VENTCELL BOUNDARY CONDITIONS	318
Andromeda Sonea Pătrașcu	THE CONNECTION BETWEEN HX GROUPS AND C++ PROGRAMMING LANGUAGE	319
FETTOUCH Houari	ESTIMATES FOR SOLUTIONS OF DIFFERENTIAL EQUATIONS In Unit Disc	320
Ashwini M Rao Basavarajappa K S Mani K S Krishnakumar T K Sathisha A B	MATHEMATICAL ANALYSIS OF QUANTIFICATION OF POPULATION IN EPIDEMIC MODEL- - A REFERENCE TO INDUSTRIAL POLLUTION	321
CHOUAIB Ahlem	AVIAN PATHOGENIC ESCHERICHIA COLI ZOONOTIC RISK, ANTIBIOTIC RESISTANCE AND HOW TO PREVENT AND CONTROL	322
Ivan PAVLOVIC	PREVALENCE OF ANCYLOSTOMIDAE SP. IN PETS DOGS IN BELGRADE AREA	323
NTAGBU FOLASHADE GIFT MUHAMMAD H. G ABORISADE, W. T BAMIGBOYE, O. F	HAEMATOLOGICAL INDICES OF BROILER CHICKS FED PALM KERNEL OIL (PKO) SUPPLEMENTED FEED	324
Samir Sameer Hadi Al-Jabir Müge FIRAT	A STUDY ON THE IMMUNE RESPONSE TO Helicobacter pylori AND HISTOLOGICAL CHANGES IN WHITE MALE RATS	325-332

Ali Nadhim SHNDIWE KHIKANI Müge FIRAT Zaytoon Abdulrida IGHEWISH AL-KHAFAJI	CYTOMEGALOVIRUS INFECTION DURING PREGNANCY	333
Noémi Mózes Andrea Lehoczki Mónika Fekete János Tamás Varga	THE PREVENTIVE, CANCER RISK-REDUCING, AND THERAPEUTIC EFFECTS OF THE MEDITERRANEAN DIET	334-340
Mohana Radhai G Pradeepa T R Shivani	HEMOSYNC: REVOLUTIONIZING BLOOD BANK OPERATIONS	341
Ranti Ekasari Lilis Widiastuty Nasril Nasruddin Sudarsin Khaerun Mawartisna Azzahra Nurul Bahjah Hasyim	ANALYSIS OF LIGHTING FACTORS AND WORK STRESS IN FURNITURE WORKERS	342
Ishwar Mittal Rosy Dhall Mikul	EXPLORING FACTORS SHAPING HOSPITAL REPUTATION: INSIGHTS FROM INDIAN HEALTHCARE	343
Akinbola , Abraham IfeoluwaI Olufemi-Aworinde, Kehinde Joyce Akinbola, Ibukun Oluwatoyin Ojedokun ,Samson Aderemi	EVALUATION OF HAEMATOLOGICAL PARAMETERS IN DIFFERENT STAGES OF HIV POSITIVE PATIENTS PRESENTING IN SOUTHWEST NIGERIA	344
ABODOHOUI Orerien Olivier	IN-DEPTH APPRECIATION OF SOCIAL INEQUALITIES IN CHARLES DICKENS'S OLIVER TWIST	345
Svitlana Hanaba	THE PROBLEM OF SPIRITUALITY IN THE INFORMATION SOCIETY	346
Saima ARZEEN Naeema ARZEEN	WELL-BEING BEYOND BORDERS: SOCIAL SUPPORT AS A VITAL PREDICTOR FOR INTERNALLY DISPLACED PERSONS	347
Aimen Imran	SOCIAL MEDIA ADDICTION, COMMUNICATION PATTERN AND RELATIONSHIP SATISFACTION IN MARRIED INDIVIDUALS	348
Karim MAHAMANE KARIMOU	FAATUMATA BIIDAANI SIMBIRI: THE FEMME FATALE THAT RECOGNIZES THE VALUE OF MEN	349-364
Major Gheorghe GIURGIU med Manole COJOCARU	THE THERAPEUTIC EFFECTS OF DENIPLANT NUTRACEUTICALS ON THE GUT MICROBIOME IN PATIENTS WITH PSORIASIS	365
Major Gheorghe GIURGIU med Manole COJOCARU	GUT DYSBIOSIS IN DOGS WITH SPINAL CORD INJURY: IMPACT OF POLENOPLASMIN	366
K.R.Padma K.R.Don	HYDROGEL-BASED BIODEGRADABLE MEDICALLY VALUABLE BANDAGES MADE FROM DURIAN HUSK	367

Igor Pantić	GRADIENT BOOSTING ALGORITHM FOR SUPERVISED MACHINE LEARNING IN CELLULAR PHYSIOLOGY: POTENTIAL APPLICATIONS IN APOPTOSIS DETECTION	368
Igor Pantić Jovana Paunović Pantić Svetlana Valjarević Jelena Čumić Ana Ćosić	ARTIFICIAL INTELLIGENCE APPROACHES USING DISCRETE WAVELET TRANSFORM INDICATORS FOR DETECTING PHYSIOLOGICAL PHENOMENA	369
Mustafa AKBAYIR Aslıhan AKBAYIR	SEMIOLOGICAL ANALYSIS OF THE LEADER IMAGE CONSTRUCTION PROCESS IN POLITICS: THE EXAMPLE OF MAHINUR OZDEMIR GOKTAS AND KAMALA HARRIS	370-371
Ceren CANPOLAT	EFFECTIVE REMORSE UNDER TCK 221/4 - 2nd SENTENCE IN TERMS OF THE CRIME OF MEMBERSHIP IN AN ARMED TERRORIST ORGANIZATION	372-380
Ülkem Cansu AYGÜN KARAKOYUNLU	IN TURKISH CRIMINAL PROCEDURE LAW PROHIBITION, REFUSAL AND RECUSAL OF THE JUDGE	381-382
Simge EŞSİZ Yusuf FEDAİ	SUPPLIER SELECTION WITH EXPERT OPINION AND SWARA WEIGHTING: TOPSIS ANALYSIS	383-401
Faruk Gürsel KOÇAK Erişah ARICAN	THE ROLE OF CENTRAL BANKS IN THE IMPLEMENTATION OF MONETARY POLICIES AND ENSURING FINANCIAL STABILITY BANKING SECTOR RELATIONSHIP: AN APPLICATION	402-403
Bahar TAŞAR	INVESTIGATING BARRIERS AND DRIVERS TO ARTIFICIAL INTELLIGENCE ADAPTION IN SUSTAINABLE SUPPLY CHAIN MANAGEMENT	404-411
Z. Gönül BALKIR	THE CONCEPT OF JUSTICE IN LUHMANN	412-416
Z. Gönül BALKIR	THE INSTITUTION OF DUTY AS A SOCIAL FUNCTION IN DUGUIT'S SOCIOLOGY	417-423
Metin SÖNMEZ Mustafa GÜMÜŞ	INVESTIGATION OF BALANCE PARAMETERS IN BOXERS AND JUDOKAS	424-425
Cemre Didem EYİPINAR	THE EFFECT OF TAURINE ON AEROBIC CAPACITY: A REVIEW	426-430
Cemre Didem EYİPINAR	THE EFFECT OF RESVERATROL ON SPORTIVE PERFORMANCE: A REVIEW	431-436

Sedef ZİYANOK-DEMİRTAŞ	THERAPEUTIC EFFECTS OF KEFIR ON DIABETES	437
Ferit DOGAN	RADIOLOGICAL EVALUATION OF SPONDYLODISCITIS, MRI FINDINGS	438
İlginç KIZILPINAR TEMİZER	BIBLIOMETRIC ASSESSMENT OF BEE POLLEN RESEARCH: IN VIVO VERSUS IN VITRO INVESTIGATIONS	439-455
Eda Duygu İPEK Aybüke SADE Mukadder SUNAR	CORRELATION ANALYSIS OF MORPHOMETRIC MEASUREMENTS OF TIBIA EXTREMITAS DISTALIS	456-462
Sevil EROL Semra ÖZDEMİR Bahar Öztürk KURT Bircan DİNÇ	COMPARISON OF CELL VIABILITY OF CHLORPYRIPHOS AND ZINC APPLIED TO HEK 293 CELLS AT DIFFERENT DOSES AND DURATIONS WITH MTT AND XCELLigence METHODS	463-464
Firdevs Banu ÖZDEMİR Mehmet Üsame KARAOSMAN	DIAGNOSIS OF LUNG CANCER WITH VISUAL STUDIO USING ARTIFICIAL INTELLIGENCE	465-471
Orkan AKKOYUN Aylin RAZLIKLI Berkay ŞERAN Çetin TÖREMEN	NEW GENERATION DISHWASHER CAPSULE DETERGENT PRODUCT DEVELOPMENT	472-473
Alper USALP	DETERMINATION OF THE MOST SUITABLE REGION WHERE MECHANICAL AND CHEMICAL APPLICATIONS CAN BE APPLIED IN POLYESTER MELT SPINNING YARN PRODUCTION	474-480
Hatice Kübra GÜNERİ Mahmut KAYAR Nuray CEVİZ	NEGATIVE EFFECTS OF FASHION ON THE ENVIRONMENTAL, SOCIAL AND ECONOMIC DIMENSIONS AND IMPROVEMENT SUGGESTIONS	481-491
Süleyman KOZAT	RESPIRATORY SYSTEM DISEASES OF PSITTACINE BIRDS	492-503
Süleyman KOZAT	FEATHER PLUCKING IN PARROTS: ETIOLOGY - DIAGNOSIS-TREATMENT	504-510
İbrahimova Xoşqədəm Qonaq qızı	TRANSGENIC PLANTS, THE IMPORTANCE OF THEIR USE IN AGRICULTURE	511-518
Abdullayeva Təranə Qeyis qızı	MAIN DIRECTIONS OF GENE MODIFICATION OF ANIMALS	519-525

Sabina Khanam	SOY PRODUCTS PROCESSING AND FOOD ALLERGIES	526
Dhivya C R. Arunkumar	SOCIAL PARTICIPATION OF TURMERIC GROWERS IN ERODE DISTRICT OF TAMIL NADU	527
DEGLA Marius Hugues MOUZOUN Séraphin HOUESSOU G. Laurent	SPATIO-TEMPORAL EVOLUTION OF WATER SURFACES AT RAMSAR SITE 1017 (SOUTH-WEST OF BENIN)	528
Usman Kris Joko Suharjo Fahrurrozi Fahrurrozi Tunjung Pamekas Isnaini Asdiyah	THE EFFECTS OF GIBERRELIC ACID CONCENTRATION ON THE GROWTH AND YIELD OF THREE PEPPER IN TROPICAL AREAS OF INDONESIA	529
Alexander V. Lagerev Igor A. Lagerev Anna V. Makulina	MODELING OF HARVESTER DYNAMICS DURING LOGGING ON STEEP SLOPES	530
KHIARI Reguia TAREK Mokhnane ADJLANE Sabah	AGRICULTURAL TOURISM IN THE STATE OF BISKRA THE GREEN TREASURE INGREDIENTS AND INVESTMENT OPPORTUNITIES	531
Subhashish Dey	CONSEQUENCES DUE TO TRANSMUTATION OF AGRICULTURE LAND TO AQUACULTURE LAND USING GOOGLE EARTH ENGINE	532
Benyahia Amar	IMPACT OF INDUSTRIAL WASTE POWDERS FROM DIFFERENT SOURCES ON THE PROPERTIES OF CEMENT MORTAR	533
Serap Yağmur İLHAN	A REVIEW OF THESES AND ARTICLES ON MARCHES	534-555
Sefa KURT	AN EVALUATION ON THE BUCKETS DESCRIBED ON THE BRONZE BELT OF THE URARTIAN PERIOD	556-564
Çağla TULUKÇU ARKMAN	AN OUTLOOK ON USING OF THE PAPIER MACHE TECHNIQUE IN PUPPET DESIGN AND ARTISTS' PRODUCTIONS	565-575
İbrahim Şevket GÜLEÇ	THE CONTENT AND CATEGORIZATION OF ANTONIO CANO'S METHOD BOOKS	576-579
Yıldız GÜNER	THINKING IN PLASTER	580-586
Yıldız GÜNER	MILO OF CROTON	587-594
Şenel GENÇ	DIGITAL FASHION DESIGN AND DRAPING	595-596

Semra KOCATAŞ Edanur AKTAŞ	AN IMPORTANT SOCIAL PHENOMENON: WAR AND TERRORIST EVENTS AND THEIR EFFECTS ON PUBLIC HEALTH	597-602
Dilek SAKALLI Seher DİLEN Emine BALİ	DETERMINATION OF HEALTH WORKERS' ATTITUDES TOWARDS QUALITY STUDIES	603-604
Firdevs KUZU	REVIEW OF GRADUATE THESIS RELATED TO ETHICS IN NURSING IN TURKEY	605-610
Musayeva Aygün Cavanşir qızı	PREVENTION OF INTRAPERSONAL CONFLICTS AND THEIR RESOLUTION MECHANISM	611-614
Cemile ŞEKER Aslı Ercan ÖNBIÇAK Aslı KAYA Ahmet ERKASAP	THE ROLE OF TRANSFORMATIONAL LEADERSHIP PERCEPTION AND ARTIFICIAL INTELLIGENCE ANXIETY IN THE RELATIONSHIP BETWEEN RESISTANCE TO CHANGE AND ORGANIZATIONAL LEARNING IN HEALTH CARE PROFESSIONALS	615-616
Muhammed DENİZ Neslihan DURNA	THE EFFECT OF COLORING BY NUMBERS ACTIVITY ON PSYCHOLOGICAL WELL-BEING, STRATEGIES FOR COPING WITH EARTHQUAKE STRESS, ATTITUDES TOWARDS CLINICAL PRACTICES AND SATISFACTION IN NURSING STUDENTS SURVIVED BY THE EARTHQUAKE: A RANDOMIZED CONTROLLED EXPERIMENTAL STUDY	617-619
Muhammed DENİZ İlknur ÇİÇEK Yeliz AKKUŞ Semra ERDAĞI ORAL	THE EFFECT OF DISTRACTION WITH MIND GAMES IN SURGICAL NURSING CLINICAL PRACTICE ON CLINICAL STRESS, STRESS COPING BEHAVIORS AND SATISFACTION IN STUDENTS: QUASI-EXPERIMENTAL STUDY	620-622
Turgay BAL Hesna YİĞİT	TWO OLD DRUGS AS POTENTIAL INHIBITORS OF KPC TYPE CARBAPENEMASES: DIFLUNISAL AND DB01662	623-624
Gülsüm HOŞ Pınar POLAT Ebru DERETARLA GÜL	A QUALITATIVE STUDY ON THE INNOVATIVE BEHAVIOR OF PRESCHOOL TEACHERS	625-637
Mehmet ÇELİK Aslı BOZDAĞ	MAPPING ODOR DISTRIBUTION IN URBAN AREAS	638-644
Selma KIPÇAKBİTİK Aytekin EKİNCİALP	THE EFFECTS OF CHEMICAL AND ORGANIC FERTILIZER COMBINATIONS ON MACRO-MICRO NUTRIENT IN BELL PEPPER (Capsicum annuum L.) FRUITS	645-646
Selma KIPÇAK BİTİK Duygu ALPASLAN Tuba ERŞEN DUDU Nahit AKTAS	IN VITRO DETERMINE OF ANTIFUNGAL ACTIVITY OF NATURAL PARTICLES AGAINST PATHOGENIC PYTHIUM DEBARYANUM	647-654
Orhan DENGİZ İnci DEMİRAĞ TURAN Volkan DEDE	COMPARISON OF EROSION SENSITIVITY PARAMETERS OF SOILS FORMED ON THE PERIGLACIAL LANDFORMS OF CİN AND ILGAR MOUNTS	655-666
Ertan YILDIRIM Melek EKİNCİ Metin TURAN Selda ÖRS Halil İbrahim ÖZTÜRK	FULVIC ACID AS A BIOSTIMULANT IN TOMATO SEEDLING GROWTH	667-673
Melek EKİNCİ Ertan YILDIRIM Metin TURAN Selda ÖRS Halil İbrahim ÖZTÜRK	CONTRIBUTIONS OF AN ENZYME-CONTAINING BIOSTIMULANT TO TOMATO SEEDLING GROWTH	674-680

Abbas TARHAN	DETERMINATION OF ANTIOXIDANT AND ENZYME INHIBITION ACTIVITIES OF SOME DATE VARIETIES	681-682
Hasan KARAASLAN Mehmet Emin USTA Ümit DOĞAN	DETERMINATION OF ORGANIZATIONAL COMMITMENT LEVELS OF PRIMARY SCHOOL FIRST LEVEL (ELEMENTARY SCHOOL) TEACHERS (THE CASE OF SAKARYA PROVINCE)	683-698
Cansel BURUÇ	2024 SOCIAL STUDIES CURRICULUM ANALYSIS	699-700
Aysel AŞIRLI	INFLUENCE OF MORAL VALUES ON INNOVATION SKILLS	701-702
Aslıhan SEZİK Pınar YAŞAR HAYAL	TEACHING THE USE OF SANITARY NAPKINS TO ADOLESCENTS WITH AUTISM SPECTRUM DISORDER	703-722
Şule YANIK	HEARING LOSS INDIVIDUALS AND THE ROLE OF ARTIFICIAL INTELLIGENCE IN COMMUNICATION	723-734
Pınar YAŞAR HAYAL Selçuk BAYRAM	INVESTIGATION OF RESEARCH ON PARENT MEDIATED PRACTICES PREPARED FOR INDIVIDUALS WITH SPECIAL NEEDS	735-757
Eren DEMİRKIRAN	GRADUATE STUDENTS' ATTITUDES TOWARDS NEW MEDIA CONTENT IN THE POST TRUTH AGE	758-765
Eren DEMİRKIRAN	UNDERGRADUATE STUDENTS' USE OF SOCIAL MEDIA IN THE POST-TRUTH ERA	766-773
Görkem BİR	SEMIOLOGICAL ANALYSIS OF ADVERTISING: EXAMPLES FROM AWARD-WINNING COMMERCIALS	774
Naseem Akhter	IMPORTANCE OF HUMAN LIFE AND ITS PROTECTION: A JURISPRUDENTIAL PERSPECTIVE	775
Naseem Akhter	BALANCING WORK AND FAMILY LIFE	776
Salim Ayduz	THE AMAZING STORY OF MUSLIM AND AFRICAN SLAVE AYYUBA SULEIMAN DIALLO	777

Ramona MARINACHE Valentina MARINESCU	GLOCALISM AND HIBRIDITY OF INDIA'S POPULAR CULTURE IN ROMANIAN	778
Valentina MARINESCU Ramona MARINACHE	THE FASHION OF HEALTH DURING COVID19 PANDEMICS	779
Polya Yordanova	MAIN TYPES OF TOURISM IN SOUTHERN EUROPEAN COUNTRIES BASED ON NATURAL RECREATION RESOURCES AND ANTHROPOGENIC TOURISM RESOURCES	780-785
Zekirja Shabani	THE POPULATION OF THE TOWN OF VUSHTRRI IN THE MID-19th CENTURY	786
Natela Borisovna POPKHADZE	THOUGHTS ABOUT AMARNA LETTERS ON THE WEBSITE OF THE METROPOLITAN MUSEUM IN THE USA	787
Akinola Monday ALLAGBE Ayodele Adebayo ALLAGBE Théophile HOUNDJO	PORTRAYAL OF MALE IMPOTENCE AND STERILITY IN SELECTED NIGERIAN CONTEMPORARY FEMALE NOVELS	788-797
Marigonë Rizani-Shabani	STRESS, ANXIETY IN NURSES DURING THE COVID-19: A CASE STUDY IN KOSOVO	798
Khikani, A.N.S. Firat,M. Zaytoon Abdulrida Ighewish Al-Khafaji	MEASUREMENT OF HCMV-MIR-UL36-5P GENE EXPRESSION IN ABORTED WOMEN IN BABYLON	799-800
Shitu, S. Musa, M. O. Aliyu, M. Y.	MICROBIAL CONTAMINATION AND AFLATOXIN B1 LEVEL OF PALM WINE IN KADUNA SOUTH AND CHIKUN LOCAL GOVERNMENT OF KADUNA STATE, NIGERIA	801
Shitu, S. Gambo, J. B. Musa, M. O.	BACTERIAL PRODUCING BIOSURFACTANTS FROM SPENT LUBRICATING OIL POLLUTED SOIL	802
LADOUALI Zeyneb ABDENNOUR Cherif	IMPACT OF ENVIRONMENTAL STRESS ON REPRODUCTIVE BIOMARKERS IN BIVALVES DONAX TRUNCULUS	803
SALIHU IBRAHIM ALHASSAN WISDOM S. JAPHET MATHIAS A. CHIA INUWA S. USMAN	EFFECT OF THERMAL TREATMENTS ON PHYSICOCHEMICAL PROPERTIES AND HEAVY METAL CONCENTRATION IN GARDEN AND LEAD POLLUTED SOIL OF MADAKKA	804
Al-Amin Danladi Bello Aliyu Usman Bamaiyia Abdulrazaq Salaudeen Bashir Tanimu Khalid Sulaiman Aliyu Ishaq	OPTIMIZING STREAMFLOW PREDICTION FOR MAJOR WEST AFRICAN RIVER SYSTEM: LEVERAGING META-HEURISTIC ALGORITHMS AND CLIMATE DATA TIME LAG EFFECTS	805-824

Bamaiyi Usman Aliyu Al-Amin Danladi Bello Abdulaziz Ahmad Inusa Musa Bashir Tanimu Khalid Sulaiman	COUPLED NUMERICAL ANALYSIS OF GROUNDWATER AND TRAIN LOAD-INDUCED CAVITY COLLAPSE	825-839
Meltem MACIT Muhammed Abdur ROUF	PREPARATION AND EVALUATION OF TRANSFEROSOMES LOADED WITH MULTIPLE ANTIWRINKLE AGENT	840-841
Sejal Porwal Rishabha Malviya	INVESTIGATING HERBAL MEDICINE FOR RAPID WOUND HEALING IN DIABETICS	842
Deepak Kumar Rishabha Malviya	NOVEL APPROACHES TO PHARMACEUTICAL WASTE MANAGEMENT: IMPROVING DRUG RECOVERY	843
Iram Shahzadi Anam Shahzadi Ali Haider	EFFECTIVE CATALYTIC AND ANTIMICROBIAL PERFORMANCE OF MULTIPLE PHASE AGBR AND POLYACRYLIC ACID DOPED NICKEL OXIDE NANOSTRUCTURES WITH IN SILICO MOLECULAR DOCKING STUDY	844
Nigar Ahmedova Afaq Abdullayeva Gulnar Atakishiyeva Gulnara Babayeva Gunel Rustemova Namiq Shikhaliyev	IN SILICO PREDICTION OF CYTOTOXICITY FOR TUMOR AND NON-TUMOR CELL LINES OF 4-AZIDO-2-(4-METHOXYPHENYL)-5-(2-NITROPHENYL)-2H-1,2,3-TRIAZOLE	845-846
Nigar Ahmedova Afaq Abdullayeva, Gulnar Atakishiyeva İrada Ahmadova Abel Maharramov	BREAST CANCER CELL-LINE CYTOTOXICITY PREDICTION OF 4-AZIDO-2-(4-METHOXYPHENYL)-5-(2-NITROPHENYL)-2H-1,2,3-TRIAZOLE	847-848
Fatma AKALIN Mehmet Fatih ORHAN	CLASSIFICATION OF DIGITAL BLAST CELL IMAGES ENHANCED WITH THE PROPOSED IMAGE PROCESSING APPROACH USING MOBILENETV2 TRANSFER LEARNING ARCHITECTURE	849-858
Fatma AKALIN Mehmet Fatih ORHAN	CLASSIFICATION OF DIGITAL BLAST CELL IMAGES WITH IMPROVED THE HYBRID ACTIVATION FUNCTION TO BE APPLIED TO INCEPTIONV3 TRANSFER LEARNING ARCHITECTURE	859-866
Ali Cevahir ERKANİ Eralp DEMİR Baddal KARTAL Hakan Zafer KIZILKAYA Şenol ŞİRİN	INVESTIGATION OF SURFACE ROUGHNESS, CUTTING TEMPERATURE AND POWER CONSUMPTION WHEN TURNING Ti6Al4V ALLOY UNDER DRY, MQL, hBN CONDITIONS	867-878
Elif TOPAL Cengiz Görkem DENGİZ	DETERMINATION OF ADHESION PERFORMANCE OF 3D PRINTED PARTS BONDED WITH DIFFERENT ADHESIVES	879-887

Orçun ALTINOK Burak KURŞUN	EFFECT OF FIN PLACEMENT ON MELTING AND SOLIDIFICATION PERFORMANCE IN DOUBLE-TUBE ENERGY STORAGE WITH PHASE CHANGING MATERIAL	888-900
Ahmet Serhan CANBOLAT	IMPACT OF CLIMATE ON ENVIRONMENTALLY OPTIMUM INSULATION THICKNESS: EXAMINATION OF EMISSION TYPES AND INSULATION MATERIALS	901-915
Fouzia Benoudjit Sarra Deraï Hasna Elamrani	EVALUATION OF THE QUALITY OF A RELAXING HERBAL FOOT BALM FORMULATION	916
Artenisa Hoxha Glejdis Hajdini Armela Mazrreku Marilda Osmani Belinda Hoxha	ARTIFICIAL SWEETENERS IN FOOD AND THEIR IMPACT ON THE BODY: A REVIEW	917
H. El harouachi M. Elgettafi M. Loutou	EFFECT OF SALINE SOLUTIONS ON GEOPOLYMERS WITH VARYING NAOH CONCENTRATIONS	918
Youssef ADNAN Noureddine IDLAHOUSSAINE Brahim EL IBRAHIMI Nada Kheira SEBBAR Hassan OUACHTAK Abdelaziz AIT ADDI	A NOVEL HETEROCYCLIC COMPOUND AS AN EFFECTIVE CORROSION DEFENDER FOR CARBON STEEL IN ACIDIC MEDIUM	919
Fiza Bukhtawar Muhammad Usman Atta Ul Haq Muhammad Saeed Atif Saleem	OPTIMIZATION OF MULTI-STAGE MICELLAR-ENHANCED FLOCCULATION PROCESS FOR REMOVAL OF LEVOFLOXACIN HEMIHYDRATE IN WASTEWATER	920
Majekodunmi Racheal Adedayo Emeka Ngele Titilayo Elizabeth Adesokan	ANTIBIOTICS SUSCEPTIBILITY PATTERN AND BETA LACTAMASE PRODUCTION BY STAPHYLOCOCCUS AUREUS ISOLATED FROM LOCALLY PRODUCED YOGHURT SOLD ALONG TANKE ROAD, ILORIN, NIGRRIA	921-931
Majekodunmi Racheal Adedayo Grace Oluwaseun Famoroti	FERMENTATIVE PROPERTY AND BACTERIOCINOGENIC ACTIVITY OF LACTIC ACID BACTERIA ISOLATED FROM 'NUNU' AN INDIGENOUS NIGERIAN BEVERAGE	932-944
Serhii Lisovyi	ACCOUNTING DATA AS A SOURCE FOR DECISION-MAKING IN IT COMPANIES WITHIN SUSTAINABLE DEVELOPMENT	945
Bahijjah Abdallah	HYBRID BLOCKCHAIN SOLUTIONS FOR SUPPLY CHAIN MANAGEMENT: ENHANCING SECURE AND TRANSPARENT TRACEABILITY WITH ADVANCED PRIVACY MEASURES	946

Okafor, Chidozie Raymond Patrick Nwanga, Emeka Mathew	COMPUTATIONAL MODEL FOR AN ORGANIZED CRIME PREDICTION IN SOUTH-EAST NIGERIA	947
Onatere-Ubrurhe, Joyce Ogheneruona Ubrurhe, Ogheneochuko Chrisjoy Tobechukwu Ugworji Chima Uchegbu	INTERNET of THINGS (IoT) AND ITS ROLE IN ENSURING BUILDING SAFETY IN NIGERIA	948
Jogendra Kumar	ROUTING ALGORITHMS FOR LINK DISCONTINUITY AND OPTIMAL DATA DELIVERY IN VEHICULAR AD-HOC NETWORKS: A REVIEW	949
.Jogendra Kumar	DESIGNING A SCENARIO TO ENHANCE THE PERFORMANCE OF THE AODV ROUTING ALGORITHM FOR LINK DISCONTINUITY IN VEHICULAR AD-HOC NETWORKS	950
A.Rajeswari	IMAGE PROCESSING USING PYTHON	951
Meryem Romaissa DJELLOULI Sid Ahmed CHOUAKRI Abdelkrim GHAZ	Dynamic Resource Management in DVB-RCS2 Systems: AI-Based Optimization Strategies	952
Melisa Nur SAYMA Soner KIZIL	THE EXAMINATION of PAPER ASH as FORENSIC EVIDENCE	953
ARSENI Igor	PERSONS PROMOTING THE IMPLEMENTATION OF CIVIL JUSTICE IN THE CIVIL PROCEEDINGS OF THE REPUBLIC OF MOLDOVA	954-961
Geetika Gupta	EXPLODING THE MYTH OF SELF-SUFFICIENCY OF INDIAN VILLAGES	962
Sneha Singh	OLD WINE IN NEW BOTTLE: PRACTICE OF COMMUNITY MEDIATION IN INDIA	963
Halil Bajrami Blerona Bajrami Venet Shala Fadil Lekaj	MANAGEMENT OF TOURISM POTENTIALS AND DEVELOPMENT OF ECOTOURISM IN KOSOVO	964
Nguyen Huy Hoang	PERFECTING THE PROVISIONS OF VIETNAMESE LAW ON THE LEGAL CONSEQUENCES OF INVALID LEGAL ACTS DUE TO FORGERY	965-970
Nguyen Huy Hoang	TIME LIMIT FOR HANDLING FAKE LEGAL ACTS UNDER VIETNAMESE LAW	971-975
Arnab Mahajan Pubalika Bhattacharya Maitra	GOETHALS INDIAN LIBRARY AND RESEARCH SOCIETY, KOLKATA: AN EXPLORATIVE STUDY	976
Özden İŞBİLİR	NUMERICAL INVESTIGATION OF COOLING TECHNIQUES IN ORTHOGONAL CUTTING OF A MAGNESIUM ALLOY	977-988

Özden İŞBİLİR	NUMERICAL INVESTIGATION OF BALLISTIC PERFORATION OF AN ALUMINUM ALLOY	989-999
M. Özgün KORUKÇU Dr Muhsin KILIÇ	DETERMINATION OF OPTIMUM INSULATION THICKNESS BY USING MACHINE LEARNING	1000-1005
M. Özgün KORUKÇU Muhsin KILIÇ	NUMERICAL ANALYSIS OF FLOW OVER A WEDGE	1006-1014
Alhassan A. Yunusa Abdullahi A. Yassar Alhassan Mohammed	THE DEVELOPMENT OF PRACTICAL SKILLS ASSESSMENT SCALE FOR METAL WORK CUTTING PROCESS IN TECHNICAL COLLEGES IN NIGER STATE, NIGERIA	1015-1027
ORIE, C. JOHN	EFFECTS OF CAN BUS AND OBD- II CONNECTION SKILLS ON STUDENT PERFORMANCE IN AUTOMOBILE REPAIR: A COMPARATIVE STUDY	1028
Z. El Hamri M. Karaoui Maouhoubi M. Alami M. Assouag	THERMAL, RHEOLOGICAL, AND MECHANICAL PROPERTIES OF POLYSTYRENE (PS) COMPOSITES REINFORCED WITH SNAIL SHELL POWDER (SSP) BIOFILLER	1029
Z. El Hamri M. Karaoui M. Alami M. Assouag	INVESTIGATION OF TRIAZOLE'S CORROSION INHIBITION ON E24 STEEL IN 1M HCL THROUGH GRAVIMETRIC AND ELECTROCHEMICAL METHODS	1030-1031
Z. El Hamri M. Karaoui M. Alami M. Assouag	PHYSICO-CHEMICAL ANALYSIS OF SNAIL SHELL POWDER PREPARED THROUGH MECHANOCHEMICAL PROCESSING AND THERMAL TREATMENT	1032
Sabrina Roguai Abdelkader Djelloul	INVESTIGATION OF NI DOPING ON STRUCTURAL, MICROSTRUCTURAL, AND OPTICAL PROPERTIES OF TIN OXIDE FILMS VIA PSP METHOD	1033
Sabrina Roguai Abdelkader Djelloul	DEVELOPMENT OF COPPER OXIDE NANOPARTICLES FOR ENHANCED PHOTOCATALYTIC PERFORMANCE	1034
M. K. GANESHAN	THE ROLE OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN ENHANCING EMPLOYEE EXPERIENCE AND ENGAGEMENT	1035
Muhammed Cihat ALTIN Mehmet Salih MAMİŞ	EXPLORING MICROGRID ENERGY MANAGEMENT: A DETAILED REVIEW OF CONTROL STRATEGIES	1036-1055

K. Thamizhmaran	FUNDAMENTALS OF FILTERS	1056-1059
Nikola Bošković Marija Radmilović-Radjenović Branislav Radjenović	EFFICIACY OF MICROWAVE TUMOR ABLATION USING THREE ANTENNAS	1060
Nishu Rani Vijay Kumar Sunil Kumar	SYNTHESIS AND CHARACTERIZATION OF SM-DOPED SnO2 NANOSTRUCTURES FOR AQUEOUS AMMONIA SENSING APPLICATIONS	1061

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

EVALUATION OF THE LIGHT PERFORMANCE AND LIGHT POLLUTION OF OUTDOOR LIGHTING ELEMENTS ON THE SCALE OF HAKKARI PROVINCE

Lect. Erşan Ömer YÜZER
Hakkari University, Çölemerik V.H.S., Department of Electricity and Energy
ORCID: 0000-0002-9089-1358

ABSTRACT
People need lighting in dark environments to feel safer. Consequently, there is an increased need for lighting systems that provide artificial illumination. A quality lighting project is expected to deliver the required amount of light to the areas designated for illumination. In daily life, especially at night, many of the outdoor lighting systems we use for individual or collective transit are either insufficient, excessively bright, inefficient, or unnecessary. However, the improper and unplanned implementation of these systems can lead to energy losses and issues such as light pollution. In this study, simultaneous GPS coordinate acquisition and light measurement were conducted at 16 designated points on 7 different streets in the city center of Hakkari, where the human population is particularly dense in the evenings. In areas such as bus stops, shopping malls, hospitals, workplaces, and stores, providing adequate lighting is challenging. The primary sources of light pollution in these areas are billboards, security lighting, and light spill from buildings, which are the most significant factors contributing to light pollution. Measurements were recorded weekly with a lux meter from February to June, between 19:00-22:00, under different ground reflection conditions (snowy-wet and dry ground) to examine seasonal changes in light intensity. Based on the data obtained from these measurements, the light performance and light pollution in the measurement areas were evaluated.
Keywords: Lighting, Hakkari, lighting performance, light pollution, luxmeter.

INTRODUCTION
In today's conditions, where rapid technological changes occur in all sectors, including the lighting industry, deciding to replace existing products with the latest and best technology and implementing this decision can be quite challenging. The rapid development of lighting technology and the increasing importance of energy efficiency have led decision-makers to examine when to transition to more efficient lighting technologies and how long they plan to keep the products in operation (Dzombak, Kasikaralar and Dillon, 2020). Given the large volume of products purchased by street lighting customers, including municipalities and other public institutions, even small gains in energy efficiency can lead to significant potential energy savings and reductions in operating costs (Fiaschi, Bandinelli and Conti, 2012). Furthermore, when properly designed, lighting in a given area can support a sense of security, enhance comfort, define spaces, and contribute to the creation of neighborhood identities. However, if lighting is excessive or improperly implemented, it can result in energy waste and increased greenhouse gas emissions (Svechkina, Trop and Portnov, 2020).
Lighting can be categorized into two types: natural and artificial (Tülin, 2021). In modern times, designs are not often created to take full advantage of natural lighting, and it is quite challenging to find appropriate lighting systems among artificial lighting solutions. Uninformed and random lighting practices not only harm the ecological balance but also contribute to light pollution (Çetin, Gümüş and Özbudak, 2003). Light pollution is largely caused by improper external lighting (Gökçek, Gümüş, Bozdağ, Özlü and Savaş, 2018).

The artificial lighting used at the urban level primarily includes the main transportation arteries of the city, main streets, side streets, parks and gardens, building façade lighting, and advertising billboards, among others. While the proper use of fixtures in these areas can yield positive results, incorrect decisions can lead to light pollution (Erbil, 2022).
To prevent light pollution, it is necessary to avoid excessive lighting and to update existing technology by using energy-efficient equipment. With a similar objective, new regulations have been implemented in many parts of the world to control outdoor light pollution, and the impact of these regulations on light pollution has been studied. In this context, it is clear that products with lower energy consumption should be used in lighting systems, and they should be installed in such a way that light does not extend beyond the area intended to be illuminated (Yeşiltaş, Kurt and Turgut, 2023).

MATERIAL AND METHODS

The expectation from a quality lighting project is to direct the necessary amount of light to the areas that have been identified as targets for illumination. In our daily lives, especially at night, many of the outdoor lighting systems we use, either individually or collectively as transit routes, are inadequately or excessively bright, inefficient, or unnecessarily illuminated. An example of a lighting system contributing to this issue is shown in Figure 1.

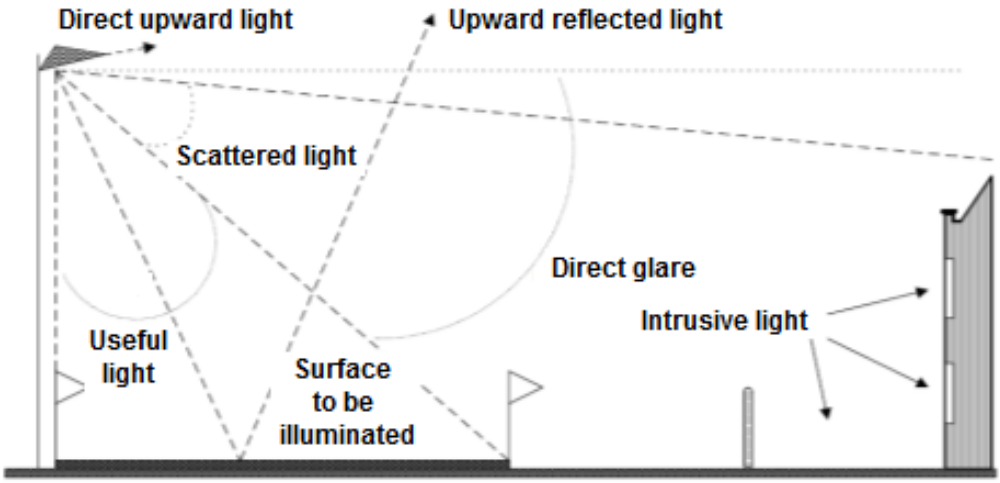


Figure 1. Example of a lighting system that contributes to light pollution [5]

In this study, light intensity measurements were conducted using a lux meter at 15 designated locations along İstiklal, Cumhuriyet, Bulvar, Çölemerik, Gençlik, Altay, and Pehlivan Streets, which are areas with high human activity both day and night in the city center of Hakkari. These measurements were taken at one-week intervals between February and May 2024. In addition, temperature and humidity values were also recorded at the measurement points. The lighting poles on the selected streets are of a decorative type, with an approximate distance of 80 meters between each pole. There are two types of pole models, both of which provide lighting for the road and the sidewalk. Figure 2 shows images of some of the lighting poles in the illuminated areas, along with the lux meter used for light measurements.



Figure 2. Lighting area and lux meter used for light measurement

The primary objective of light intensity measurements conducted in the designated areas is to determine the amount of luminous flux falling on a specific surface area. The most common measurement technique for this purpose is to measure the light intensity on a horizontal plane. In this study, illuminance measurements were carried out at various points within the specified region. The measurements were taken between 7:00 PM and 10:00 PM, and the exact time of measurement (hour, minute, and second) was recorded. The measurements were conducted at locations such as bus stops, in front of hospitals, entrances to shopping malls/passages, and parks. On the streets where measurements were conducted, lighting poles were located at approximately 70-meter intervals along the sidewalks and central medians. Light intensity measurements were taken at 100-meter intervals at specific points along each street. The light measurements were conducted approximately 1 meter above the ground, with the measuring device held parallel to the surface. The coordinates of the measurement points in the city center of Hakkari were recorded using GPS, and the existing illuminance levels were obtained in lux (lx) using a Konica Minolta T-10A digital light meter. Figure 3 presents the study area, the locations of the measurement points, and an example of a measured area.



Figure 3. Map of the study area and locations of measurement points, along with an example of a measurement site.

FINDINGS AND DISCUSSION

In this study, simultaneous GPS coordinate recording and light measurements were conducted at 15 designated points on seven different streets in the city center of Hakkari, where human activity is particularly high in the evening. The selected points included bus stops and areas with a high concentration of shopping malls, hospitals, businesses, and stores, where providing uniform lighting is challenging. Key sources of light pollution in these areas include billboards, security lighting, and light spilling from buildings, which are the most significant contributors to light pollution. At the designated coordinates, light intensity measurements were taken and recorded at one-week intervals between February and May, during periods when the ground was snowy, wet, and dry, covering winter, spring, and summer seasons. The dates, ambient temperature, humidity, and light intensity values for the relevant measurement points on the studied streets are presented in Figures 4-10.

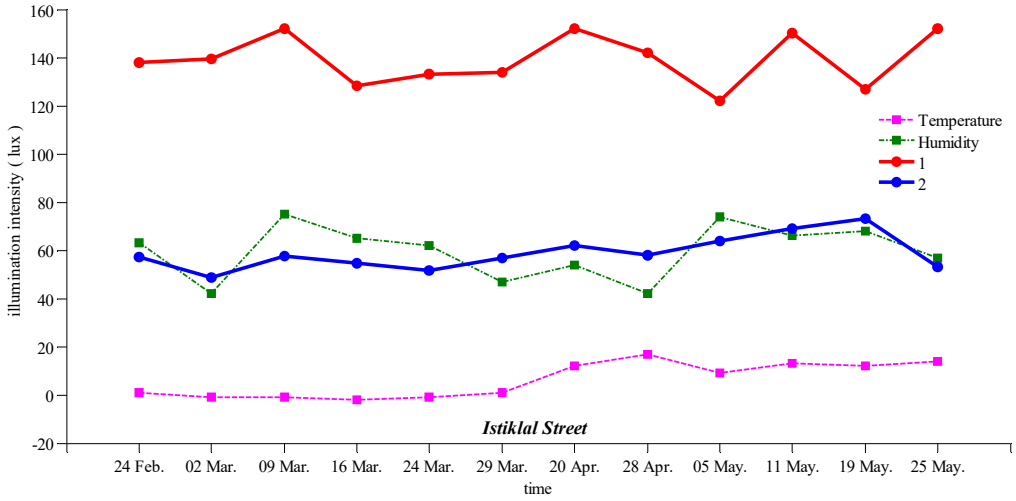


Figure 4. Temperature, humidity, and light intensity values for measurement points on İstiklal Street

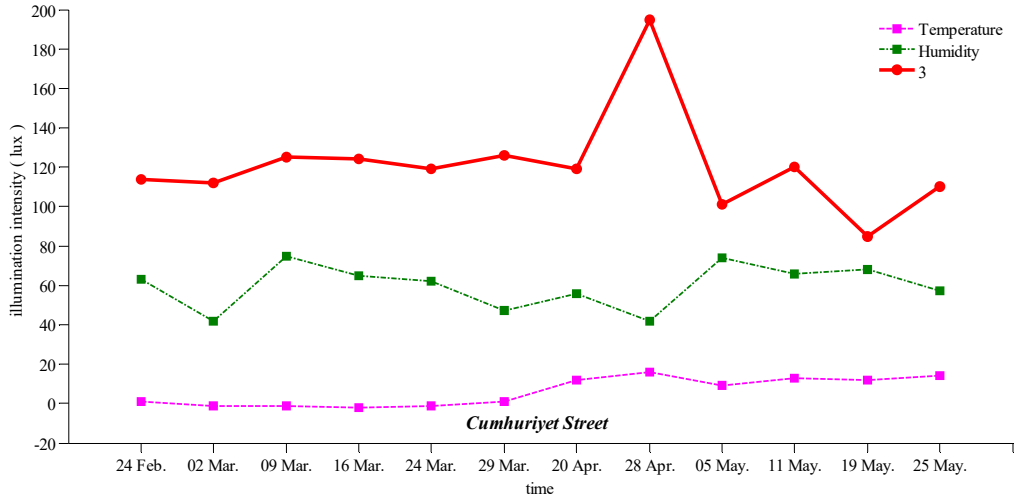


Figure 5. Temperature, humidity, and light intensity values for measurement points on Cumhuriyet Street

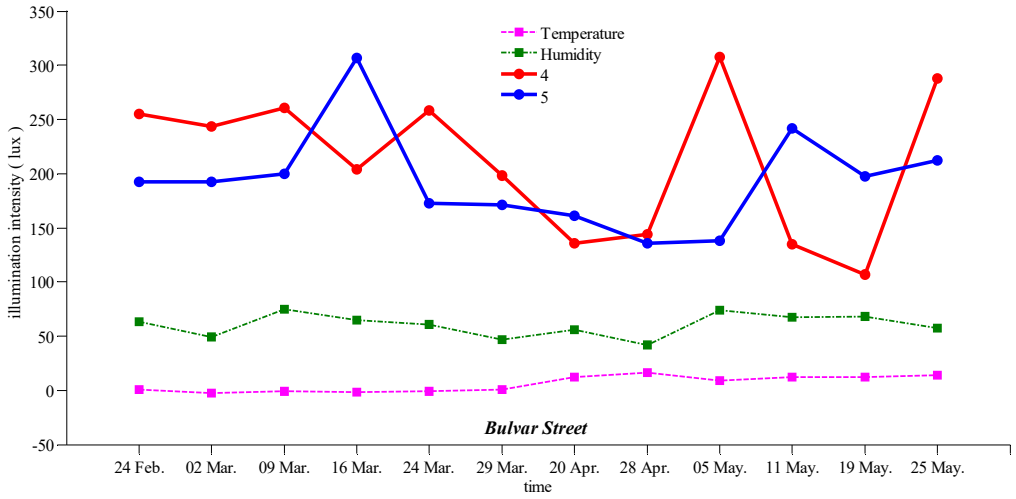


Figure 6. Temperature, humidity, and light intensity values for measurement points on Bulvar Street

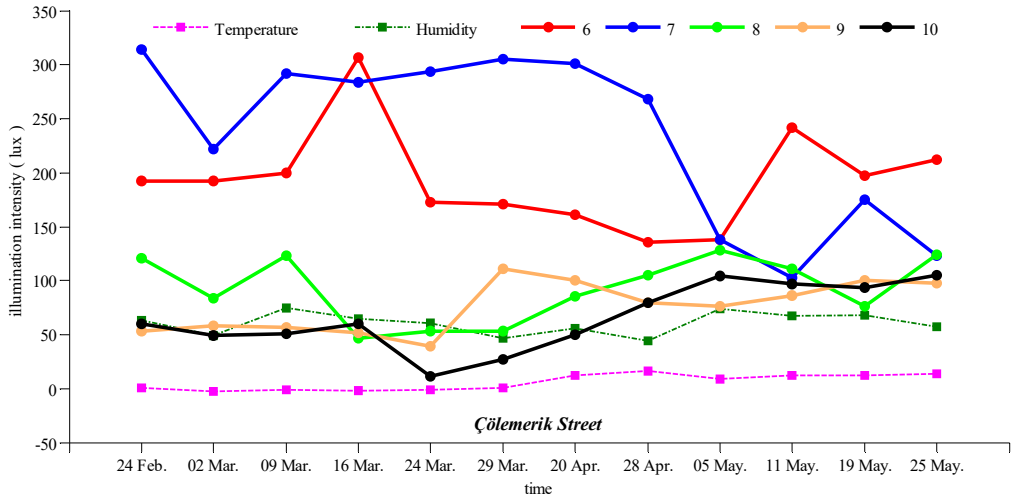


Figure 7. Temperature, humidity, and light intensity values for measurement points on Çölemerik Street

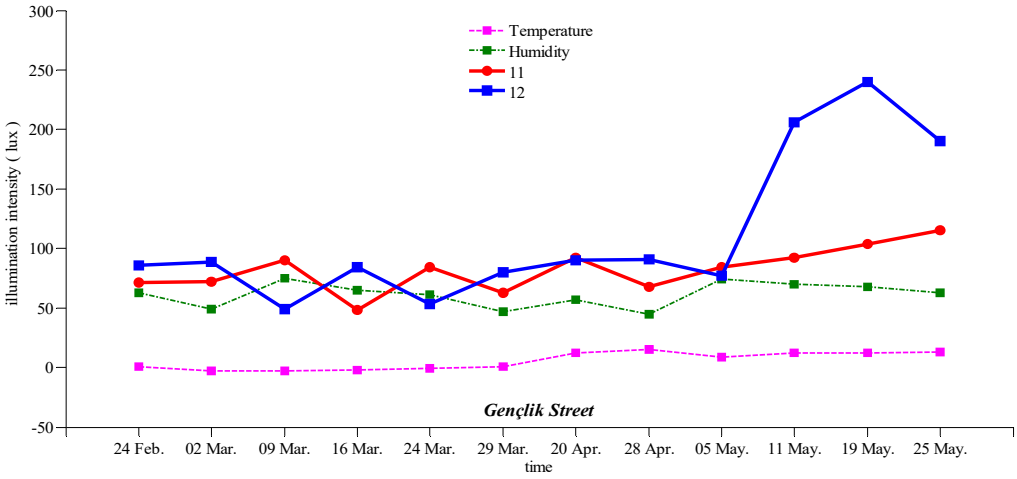


Figure 8. Temperature, humidity, and light intensity values for measurement points on Gençlik Street

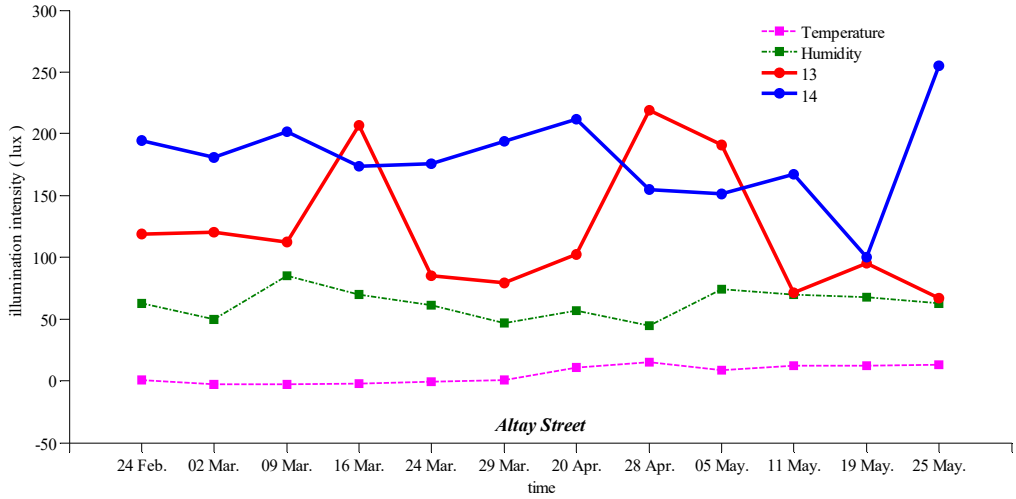


Figure 9. Temperature, humidity, and light intensity values for measurement points on Altay Street

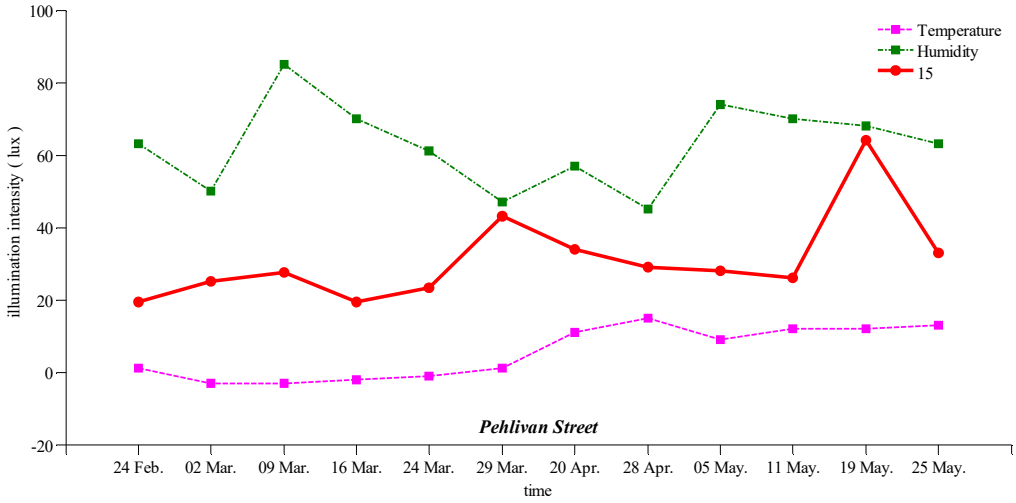


Figure 10. Temperature, humidity, and light intensity values for measurement points on Pehlivan Street

The results obtained from the light intensity measurements at various points were evaluated in terms of their optimal variation. In the city center of Hakkari, illuminance was measured at 15 locations, revealing values ranging from 25 to 310 lux. The highest light measurements (50-310 lux) were recorded in Bulvar and Çölemerik Streets due to the high number of lighting fixtures and billboards, as well as the use of projectors and the concentration of businesses in these areas. In contrast, light measurements were lower (20-65 lux) in side streets and other areas without billboards (e.g., Pehlivan, Gençlik Streets). In areas where lighting measurements were taken, particularly in the central medians where the lighting poles are tall, the ground-level illumination intensity values were found to be appropriate. This is due to the fact that the fixtures mounted on the poles are approximately 25-30 meters above the ground, and the light level decreases as it approaches the ground. Variability in the measured light intensity levels in some areas is attributed to conditions on the ground, such as snow, water and dust.

Considering the characteristic features of lamps, the use of LED lamps instead of high-pressure sodium vapor lamps with transparent glass tubes emitting bright yellow light in urban road, street, and square lighting is seen as a correct approach to prevent light pollution. In our developing country, it is crucial to raise public awareness to mitigate light pollution, which significantly contributes to energy consumption, through the implementation of appropriate lighting systems. A significant portion of light pollution arises from the lighting practices of business owners. Therefore, it is necessary to impose regulations related to urban lighting and to raise awareness among business owners and the public in this regard.

CONCLUSION

The performance of lighting and the resulting light pollution in urban areas and other environments cannot be ignored. In fact, this issue represents a significant environmental problem and is a factor contributing to the depletion of limited energy resources. A properly designed lighting system and the selection of appropriate lighting devices can address security concerns, enhance the aesthetics of the illuminated area, and prevent economic losses. This study involved measurements to assess the performance of recently updated lighting fixtures and the light pollution they caused on the busiest streets in the city center of Hakkari. The measurements revealed that, particularly on Bulvar Street, certain points on Çölemerik Street, as well as Gençlik and Altay Streets, light intensity was high on some dates, while in side streets, especially those without billboards, the intensity was lower. These findings are illustrated in the graphs provided in Figures 4-10. Although light intensity varied on certain dates and some areas showed high light intensity measurements, these variations are not significant due to their lack of consistency over time.

To prevent light pollution in areas with high levels of pollution, proper planning for effective lighting is essential. This includes measures such as directing light away from the sky and focusing it on the intended area, using sources that provide more light per unit of energy, and ensuring that unnecessary lighting on billboards and advertisements is turned off after midnight using timers. Additionally, street and roadway lighting should be turned off after a certain hour in a way that does not pose a security risk.

Thanks and Information Note

This work was supported by Research Fund of the Hakkari University. Project Number: FM24BAP1. The authors would like to express their gratitude to the Hakkari University Scientific Research Projects Commission for their support.

REFERENCES

Çetin, F. D., Gümüş, B., Özbudak, Y. B., (2003). Mimarlık, D. Ü. M. M. F., & Elektrik, D. Ü. M. M. F. Işık kirliliği problemi ve Diyarbakır ölçeğinde incelenmesi.

Dzombak, R., Kasikaralar, E., & Dillon, H. E. (2020). Exploring cost and environmental implications of optimal technology management strategies in the street lighting industry. *Resources, Conservation & Recycling: X*, *6*, 100022.

Erbil, Z. C. (2022). Dış mekân aydınlatmasında enerji verimliliğinin Kelebekler Vadisi Parkı (Konya) örneğinde irdelenmesi.

Fiaschi, D., Bandinelli, R., & Conti, S. (2012). A case study for energy issues of public buildings and utilities in a small municipality: Investigation of possible improvements and integration with renewables. *Applied energy*, *97*, 101-114.

Gökçek, Ö. B., Gümüş, M. G., Bozdağ, A., Özlü, S., & Savaş, C. (2018). Niğde ili kent merkezinde aydınlatmadan kaynaklanan ışık kirliliğinin incelenmesi. *Niğde Ömer Halisdemir Üniversitesi Mühendislik Bilimleri Dergisi*, *7*(2), 514-521.

Svechkina, A., Trop, T. ve Portnov, BA (2020). Geceleri sokaklarda yürürken kendinizi güvende hissetmek için ne kadar aydınlatma gerekiyor? *Sürdürülebilirlik*, 12 (8), 3133.

Tülin, A. V. C. U. (2021). Kentlerin Aydınlatılması Bağlamında Işık Kirliliği Sorunsalı ve İzmir Büyükşehir ve İlçe Belediyelerinin Yaklaşımları. *Bitlis Eren Üniversitesi Sosyal Bilimler Dergisi*, *10*(2), 72-80.

Yeşiltaş, H. K., Kurt, Z., & Turgut, Y. Ş. (2023). Çukurova Üniversitesi Balcalı Kampüsünde Işık Kirliliği Ölçümleri. *Çukurova Üniversitesi Mühendislik Fakültesi Dergisi*, *38*(2), 359-373.

ÇANAKKALE İLİNİN HAYVANSAL BİYOKÜTLE ENERJİ KAYNAKLARININ POTANSİYELİNİN İNCELENMESİ

Alper DÖNMEZ
Çanakkale Onsekiz Mart Üniversitesi, Lisansüstü Eğitim Enstitüsü, Enerji Kaynakları ve Yönetimi
ORCID: 0009-0009-9742-1509

Doç. Dr. Gül Ebru ORHUN
Çanakkale Onsekiz Mart Üniversitesi, Fen-Edebiyat Fakütesi, Enerji Kaynakları ve Yönetimi
ORCID: 0000-0002-9902-5421

Özet
Nüfusun hızla artması, endüstrinin büyümesi ve teknolojinin gelişmesinin sonucunda enerjiye olan ihtiyacımız da paralel olarak artmaktadır (Al,2021). Günümüzde enerji ihtiyacının büyük bir kısmı hala doğal gaz, taş kömürü, linyit kömürü ve petrol gibi yenilenemeyen fosil yakıtlardan karşılanmaktadır (Yılmaz,2012). Güncel sorunlarımızın başında gelen, iklim değişikliği ve çevre kirliliğinin en büyük yaratıcılarından olan bu üretim biçimine son yıllarda yenilenebilir enerji kaynakları alternatif oluşturmuştur. Yenilenebilir enerji kaynaklarından olan biyokütle, önemli alternatiflerden biridir (Kuang ve ark. 2016). Biyokütle kaynakları içinde en eski ve en yaygın olanı, kullanımı ateşin keşfine kadar uzanan odundur. Günümüzde biyokütle enerjisi, kömür ve petrolden sonra dünyanın en büyük üçüncül enerji kaynağıdır ve dünya nüfusunun yarısından fazlası tarafından birincil enerji kaynağı olarak kullanılmaktadır (Öztürk ve Ekinci, 2016:18). Biyogazın oluşumunu sağlayan anaerobik çürütme süreci, organik maddelerin metan üretimi için serbest oksijenin olmadığı ortamlarda gerçekleştiği ve çeşitli organik atıkların arıtılmasında yaygın olarak kullanılan kanıtlanmış bir atık enerji teknolojisidir (Zhang, Hu ve Lee, 2016:110). Bu bilgiler ışığında yenilenebilir enerji kaynakları açısından yüksek potansiyele sahip olan Çanakkale ilinin, önemli ekonomik faaliyetlerinden biri olan hayvansal üretimin biyokütle enerjisi açısından değerlendirilmesi amaçlanmıştır. Bu amaç çerçevesinde yapılan çalışma ile bölge ve ülkeye çevresel sürdürülebilirlik, ekonomi ve sosyal refah düzeyini arttıracağı düşünülmektedir. Yapılan çalışmalar için Türkiye Biyokütle Enerji Potansiyeli Atlası'ndan (BEPA) küçükbaş, büyükbaş ve kanatlı kümes hayvanı verileri alınmıştır. Teorik hesaplamalar için gerekli olan formüller Aşçı'nın ortaya koyduğu ve ulusal literatürde kabul görmüş formüllerinden yararlanılmıştır (Aşçı,2018). Analizler çerçevesinde Çanakkale ilinin küçükbaş, büyükbaş ve kanatlı kümes hayvanlarına yönelik olarak, elde edilebilecek potansiyel biyokütle enerjisi hesaplanmıştır.
Anahtar Kelimeler: Biyokütle, Çanakkale, Küçükbaş Hayvan, Büyükbaş Hayvan, Kanatlı Kümes Hayvanı

STUDY OF THE POTENTIAL OF ANIMAL BIOMASS ENERGY RESOURCES OF ÇANAKKALE PROVINCE

ABSTRACT
It is aimed to evaluate animal production, which is one of the important economic activities of Çanakkale province, which has a high potential in terms of renewable energy resources, in terms of biomass energy. It is thought that the study carried out within the framework of this purpose will increase the level of environmental sustainability, economy and social welfare in the region and country.

For the studies carried out, bigwig, sheep and goats and poultry data were taken from the Turkey Biomass Energy Potential Atlas (BEPA). The formulas required for theoretical calculations were used from the formulas put forward by Aşçı and accepted in the national literature (Aşçı,2018). Within the framework of the analyses, the potential biomass energy that can be obtained for the bigwig, sheep and goats and poultry of Çanakkale province was calculated.
Keywords: Biomass, Çanakkale, Shepp and Goats, Bigwig, Poultry

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

DOĞAL VE ZORLANMIŞ TAŞINIM ETKİLERİNİN KANALDAKİ ISI TRANSFERİNİ İYİLEŞTİRMEDEKİ ETKİLERİNİN FARKLI DEĞİŞKENLER AÇISINDAN İRDELENMESİ

Doç. Dr. Koray KARABULUT
Sivas Cumhuriyet Üniversitesi, Sivas Teknik Bilimler Meslek Yüksekokulu, Elektrik ve Enerji Bölümü
ORCID: 0000-0001-5680-0988

Dr. Öğr. Üyesi Yeliz ALNAK
Sivas Cumhuriyet Üniversitesi, Teknoloji Fakültesi, İmalat Mühendisliği Bölümü
ORCID: 0000-0003-4383-3806

ÖZET
Boyutları küçülen elektronik elemanların soğutulmasının iyileştirilmesi, çalışma güvenliğinin sağlanması ve yüksek performanslı ürünler geliştirilmesi açısından gereklidir. Uygulamada birçok elektronik bileşenden ısı transferinin gerçekleştirilmesi durumunda ısı yayan bileşen serileri eğimli veya dikey paralel plaka kanallarına konumlandırılmaktadır. Bu çalışmada, dikey bir kanalın sol yüzeyinde bir adet eşkenar üçgen şekilli engel elemanının karışık taşınım ile ısı transferi ve kanal içerisindeki akış karakteristikleri sayısal olarak değerlendirilmiştir. Akışın kanal içerisindeki ısınmış engel elemanına daha iyi yönlendirilmesi ve karışık taşınım etkisinin artırılması amacıyla kanal içerisine üst giriş kısmından 30^o ve 45^o açılı akış yönlendirici kanatçık yerleştirilmiştir. Sayısal inceleme, zamandan bağımsız, laminer ve iki boyutlu olarak süreklilik, momentum ve enerji denklemlerinin Ansys-Fluent bilgisayar programı kullanılarak çözülmesiyle gerçekleştirilmiştir. Eşkenar üçgen şekilli elektronik elemana sabit ısı akısı uygulanırken, kanalın diğer yüzeyleri ve akış yönlendirici ise adyabatiktir. Kanalda kullanılan su akışkanı sıkıştırılamaz olup, kanala giriş sıcaklığı 293 K' dir. Çalışmada kullanılan Reynolds sayısı (Re) değeri 500, değiştirilmiş Richardson sayısı (Ri*) aralığı 50-200, AGM (Akış Geçiş Mesafesi) ise 3,33 ve 4 olarak çalışılmıştır. Çalışmadan elde edilen sonuçlar, literatürdeki deneysel ve sayısal sonuçlarla kıyaslanmış ve sonuçların birbirleriyle tutarlı oldukları belirlenmiştir. Sonuçlar, Ri* sayısına göre farklı AGM oranları için kanala yerleştirilen açılı akış yönlendiricinin ısınmış engelin ortalama Nu sayıları (Nu_m) ve ortalama yüzey sıcaklıkları (T_s) üzerindeki etkisinin değişimleri olarak incelenmiştir. Ayrıca, 3,33 ve 4 akış geçiş mesafesi oranları dikkate alınarak Ri*=50 ve 200 için kanatçıksız ve kanatçıklı durumlarda kanaldaki karışık taşınımın hız-akım çizgisi ve sıcaklık konturu dağılımları görselleştirilmiştir. AGM=4 ve Ri*=200' de kanatçıksız duruma göre Nu_m sayılarının 30^o ve 45^o kanatçık açıları için sırasıyla %4,65 ve %18,92 daha düşük oldukları elde edilen sonuçlardan çıkarılmıştır.

Anahtar Kelimeler: Karışık taşınım, Akış yönlendirici kanatçık, Akış geçiş mesafesi, Richardson sayısı (Ri)

EXAMINATION OF THE EFFECTS OF NATURAL AND FORCED CONVECTION ON IMPROVING HEAT TRANSFER IN THE CHANNEL IN TERMS OF DIFFERENT VARIABLES

ABSTRACT

Improving the cooling of electronic components with reduced dimensions is essential for ensuring operational safety and developing high-performance products. In practice, in the case of heat transfer from many electronic components, the series of heat-dissipating components are positioned in inclined or vertical parallel plate channels. In this study, the heat transfer by mixed convection of an equilateral triangular-shaped obstacle element on the left surface of a vertical channel and the flow characteristics in the channel were numerically evaluated. To better direct the flow to the heated obstacle element in the channel and to increase the mixed convection effect, 30º and 45º angled flow director fins were placed in the channel from the upper inlet. The numerical investigation was performed by solving the steady, laminar and two-dimensional continuity, momentum and energy equations using the Ansys-Fluent computer program. Constant heat flux is applied to the equilateral triangular electronic element, while the other surfaces of the channel and the flow diverter are adiabatic. The water fluid used in the channel is incompressible and the inlet temperature of the channel is 293 K. The Reynolds number (Re) value used in the study was 500, the modified Richardson number (Ri*) range was 50-200, and the FPD (Flow Passage Distance) was 3.33 and 4. The results obtained from the study were compared with experimental and numerical results in the literature and it was determined that the results were consistent with each other. The results were analysed as variations of the effect of the angled flow director placed in the channel on the mean Nu numbers (Nu_m) and mean surface temperatures (T_s) of the heated obstacle for different FPD ratios according to the Ri* number. In addition, the velocity-streamlines and temperature contour distributions of mixed convection in the duct were visualised for Ri*=50 and 200 for the cases without and with fins considering flow passage distance ratios of 3,33 and 4. It is deduced from the results obtained that the Nu_m numbers were 4.65% and 18.92% lower for 30º and 45º fin angles, respectively, for FPD=4 and Ri*=200 compared to the case without fins.

Keywords: Mixed convection, Flow director fin, Flow passage distance, Richardson number (Ri)

GİRİŞ

Son zamanlarda tüm dünya ülkelerine yayılmakta olan çevre ve iklim değişikliği politikasıyla birlikte kirliliğin bertaraf edilmesi, azaltılması ve önlenmesi, doğal kaynakların çevreye ve ekolojik dengeye zarar vermeyecek şekilde kullanımının temin edilerek sürdürülebilir kalkınmanın sağlanabilmesi amacıyla özellikle enerji sektöründe hızlı bir şekilde köklü değişiklikler yapılması planlanmaktadır. Bu amaçla enerjinin etkin bir biçimde kullanılmasıyla ısı ve akış uygulamalarında yeni yaklaşımlarla geliştirilmiş ekipmanların verimliliklerinin artırılarak, işletme maliyetleri düşük, doğaya duyarlı ve güvenliği yüksek ürünler geliştirilmesi çalışmaları yoğunlaşmıştır (Alnak ve Karabulut, 2024).

Uygulamada birçok elektronik bileşenin soğutulması durumunda ısı yayan bileşen dizileri dikey veya eğimli paralel plaka kanallarına yerleştirilmektedir. Elektronik bileşenlerin soğutulması, daha hızlı, daha küçük ve daha güvenilir sistemlerin gelişmesinin sağlanması bakımından oldukça önemlidir. Böylece, cihazdan elde edilen verimlilik artarken; bu durum zaman ve maddi açıdan kazanç elde edilmesine sebep olacaktır.

Bununla birlikte, kanal içi akış ve ısı transferi uygulamalarında doğal ve zorlanmış taşınımın birlikte uygulandığı karışık taşınım uygulamaları son zamanlarda araştırmacılar ve uygulamacılar tarafından yoğun olarak değerlendirilen tasarımlar arasında yer almaktadır. Karışık taşınımla ısı transferi üzerine yapılan araştırmalar, ısı eşanjörleri, kimyasal işleme ekipmanları, güneş enerjisi toplayıcılarının ve elektronik soğutma vb. gibi uygulamalar birçok mühendislik alanında giderek daha fazla ilgi görmektedir. Böylece, ısınmış olan bileşenler tarafından etrafındaki akışkan ile olan sıcaklık farkına dayalı olarak gerçekleşen doğal taşınımla olan ısı transferinin engellenmeden zorlanmış taşınımla desteklenerek ısı transferi artırılabilmektedir.

Literatürde bir kanalda karışık taşınımla ısı transferi birçok araştırmacı tarafından incelenmiştir. Bunlardan birinde, ısı kaynağı içeren bir kanal için laminer zorlanmış akışın, doğal, karışık ve zorlanmış taşınım bölgeleri boyunca kaldırma kuvveti kaynaklı doğal konveksiyon hareketi üzerindeki etkileri Choi ve Ortega (1993) tarafından sayısal olarak incelenmiştir. Sonuçlar, ısı kaynağının ortalama Nusselt (Nu) sayısının eğim açısına büyük ölçüde bağlı olduğunu göstermiştir. Papanicolaou ve Jaluria (1993), yalıtılmış ve sabit değerde bir ısı kaynağı içeren dikdörtgensel bir sistemdeki karışık taşınımı incelemişlerdir. Auletta ve ark. (2001), dik olarak konumlanmış ve simetrik olarak ısıtılan aşağı yönlü akışı olan bir kanalda adyabatik olarak genişlemenin ısı transferi üzerindeki etkilerini sayısal olarak analiz etmişlerdir. Yapılan analizler sonucunda kanaldaki uzama ve genişleme miktarlarına göre ısı transferinde %10-20 arasında bir artış olduğunu belirlemişlerdir. Eğimli bir kanalda laminer akış şartlarında birbirine eş iki ısı kaynağının karışık taşınımla soğutulması Boutina ve Bessaih (2011) tarafından değerlendirilmiştir. Isı kaynağı ölçüleri ve aralarındaki uzaklığın yanında kanal eğiminin de ısı transferine belirgin etkileri olduğu saptanmıştır. Forooghi ve Hooman (2013) türbülanslı akışın olduğu iki dalgalı plaka arasında kaldırma kuvvetlerinin de etkisini dikkate alarak ısı transferini sayısal olarak irdelemişlerdir. Çalışmalarında kaldırma kuvvetlerinin ısı transferi üzerinde değişen etkisini gözlemlemişlerdir. Hamouche ve Bessaih (2008), laminer akış şartlarında yatay olarak yerleştirilmiş bir kanalda elektronik bileşenlerin karışık ısı taşınımı ile soğutulmasını incelemek üzere yerleştirilen iki adet çıkıntıdan oluşan ısı kaynağının ısı transferi performansını sayısal olarak değerlendirmişlerdir. Buna göre, elektronik bileşenlerin birbirleri arasındaki mesafenin, boylarının ve genişliklerinin değişiminin ısı transferini artırıcı yönde etki edebildiğini belirlemişlerdir. Jang ve Yan (2004), sayısal olarak dikey dalgalı bir yüzey boyunca karışık ısı taşınımı ve kütle transferini araştırmışlardır. Mevcut analiz için sonlu farklar yöntemi kullanılmıştır. Kaldırma kuvveti oranı N, genlik-dalga boyu oranı α ve değiştirilmiş Richardson (Ri*) sayısı (Gr/Re^2) bu problem için önemli parametreler olarak belirlenmiştir. Çalışmada, kaldırma kuvveti oranı N ve dalgalı yüzeyin boyutsuz genliğinin yerel Nu sayısı ve yerel Sherwood (Sh) sayısı üzerindeki etkileri ayrıntılı olarak incelenmiştir.

Bu çalışmada, tek eşkenar üçgen geometrili ısınmış elektronik engel bileşenin karışık taşınım akışıyla soğutulması sayısal olarak incelenmiştir. Sayısal inceleme, zamandan bağımsız, laminer ve iki boyutlu olarak süreklilik, momentum ve enerji denklemlerinin Ansys-Fluent bilgisayar programının kullanılarak çözülmesiyle gerçekleştirilmiştir. Üst tarafından su girişi olan ve üst giriş kısmından sağ tarafında 30^o ve 45^o açılı akış yönlendirici kanatçıklı ve dikey akışlı olarak tasarlanmış bir kanal içerisine yerleştirilen eşkenar üçgen şekilli elektronik elemana sabit ısı akısı (882,373 W/m^2-3529,49 W/m^2) uygulanırken, kanalın diğer yüzeyleri ve akış yönlendirici ise adyabatiktir. Kullanılan su akışkanı sıkıştırılamaz olup, kanala giriş sıcaklığı 293 K' dir. Çalışmada kullanılan Reynolds sayısı (Re) değeri 500, değiştirilmiş Richardson sayısı (Ri*) aralığı 50-200, AGM (Akış Geçiş Mesafesi) aralığı ise 3,33 ve 4 olarak tasarlanmıştır.

Ri* sayısına bağlı olarak farklı AGM oranları için kanala yerleştirilen açılı kanatçığın, engelin ortalama Nu sayıları (Nu_m) ve ortalama yüzey sıcaklıkları (T_s) üzerindeki etkisinin değişimleri incelenmiştir. Ayrıca, incelenen iki farklı AGM, Re=500 ve Ri* sayısının 50 ve 200 değerleri için kanatçıksız ve kanatçıklı durumlarda hız-akım çizgisi ve sıcaklık konturu dağılımları görselleştirilerek detaylı bir şekilde incelenmiştir.

SAYISAL YÖNTEM

Kanalın üst girişinden üniform olarak sabit u_o hızı ile gönderilen akışkan akımı sonucu meydana gelen zorlanmış taşınım ile ısınmış olan elektronik elemandan kaldırma kuvvetinin etkisiyle oluşan doğal taşınım akımlarıyla birlikte karışık taşınım oluşmaktadır. Kanalın sağ üst girişinden itibaren yerleştirilen akış yönlendirici kanatçık ile hem akışkanın ısınmış elektronik engel elemanına doğru yönlendirilmesi; hem de kanalın orta kısmında akışın hızlandırılarak zorlanmış taşınım hareketleriyle daha iyi bir karışık taşınım akımı oluşturulması planlanmıştır.

Kanaldaki karışık taşınımlı ısı transferinin çözümünde Ansys-Fluent programı kullanılmıştır. Ayrıklaştırma yöntemi olarak momentum denklemleri için "Second Order Upwind" yöntemi tercih edilmiştir. Sayısal çözümlerin yakınsaması için yakınsama kriteri momentum denklemi için 10^{-6} ve enerji denklemi için 10^{-7} olarak alınmıştır.

Bu çalışmada ele alınan akışın, zamandan bağımsız, sıkıştırılamaz, iki boyutlu ve laminer olduğu kabul edilmiştir. Çalışmada, dikey olarak konumlandırılan kanalda yer çekimi kuvveti aşağı yönlü olarak modellenirken; kaldırma kuvvetinin etkisi de hesaba katılmıştır.

Kartezyen koordinatlarda zamandan bağımsız, sıkıştırılamaz akış için süreklilik, momentum ve enerjinin korunumu denklemleri aşağıda verilmiştir (Özdemir ve ark., 2023).

Süreklilik denklemi

$$\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}=0 \tag{1}$$

Momentum denklemi

$$\rho\left(u\frac{\partial u}{\partial x}+v\frac{\partial v}{\partial y}\right)=-\frac{\partial P}{\partial x}+\mu\nabla^2 u \tag{2}$$

$$\rho\left(u\frac{\partial u}{\partial x}+v\frac{\partial v}{\partial y}\right)=-\frac{\partial P}{\partial y}+\mu\nabla^2 v-\rho g \tag{3}$$

Enerji denklemi

$$u\frac{\partial T}{\partial x}+v\frac{\partial T}{\partial y}=\alpha\left[\frac{\partial^2 T}{\partial x^2}+\frac{\partial^2 T}{\partial y^2}\right] \tag{4}$$

Çalışmada kullanılan boyutsuz sayılardan değiştirilmiş Grashof sayısı (Gr*), Richardson sayısı (Ri*) ve Reynolds sayısı (Re) aşağıdaki eşitliklerde sunulmuştur.

$$Gr^*=\frac{g\beta\dot{q}D^4}{k\nu^2} \tag{5}$$

$$Ri^*=\frac{Gr^*}{Re^2} \tag{6}$$

$$Re=\frac{u_o D}{\nu} \tag{7}$$

Burada, g yerçekimi ivmesi (m/s^2), β ısıl genleşme katsayısı (1/K), $\dot{q}$ ısı akısı (W/m^2), k ısı iletim katsayısı (W/mK), υ kinematik viskozite (m^2/s)' dir.

Elektronik engel elemanların yüzeylerindeki ortalama ısı taşınım katsayısı Eş. (8), Nusselt sayısı (Nu) ise Eş. (9) vasıtasıyla hesaplanacaktır.

$$h=\frac{\dot{q}}{(T_e-T_o)} \tag{8}$$

Nu sayısı, taşınımla ısı geçişinin iletimle ısı geçişine oranı olarak değerlendirilir.

$$-k\left(\frac{\partial T}{\partial n}\right)_s = h(T_e - T_o) \text{ ve } Nu = \frac{h\,2a}{k} \quad (9)$$

Ortalama ısı taşınım katsayısı (h_m)

$$h_m = \frac{1}{2a}\int_0^{2a} hda \quad (10)$$

Ortalama Nu sayısı (Nu_m) Eş. 8 ile hesaplanmaktadır.

$$Nu_m = \frac{\dot{q}D}{k(T_e - T_o)} = \frac{h_m 2a}{k} \quad (11)$$

Bu eşitliklerde, $\dot{q}$ ısı akısı, u_o dikey kanalın üst kısmından giren akışkanın hızı (m/s), T_e ısınmış engelin ortalama sıcaklığı iken T_o, su akışkanının kanal girişindeki sıcaklığıdır (K). a, ısınmış eşkenar üçgen şekilli elektronik elemanın akışkanla temasta olan yüzeyinin karakteristik uzunluğu (m) ölçüsü iken; u ve v kartezyen koordinatlarda akışkanın x ve y yönlerindeki hızlarıdır (m/s). k akışkanın ısı iletim katsayısı (W/mK), h yüzey üzerindeki yerel ısı taşınım katsayısı (W/m^{2}K), n ise yüzeye dik yöndür.

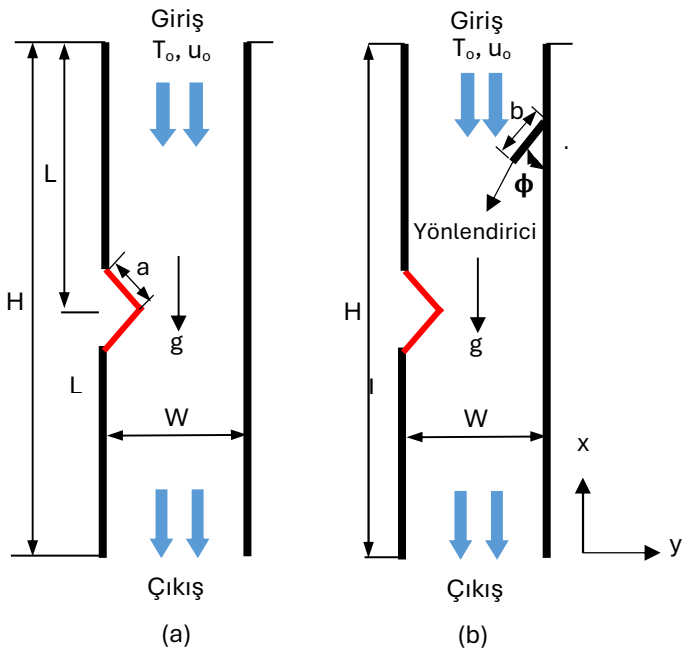
Akış Geçiş Mesafesi (AGM), kanal genişliğinin kanatçık uzunluğuna oranı olup aşağıdaki gibi ifade edilmektedir.

$$AGM = \frac{W}{b} \quad (12)$$

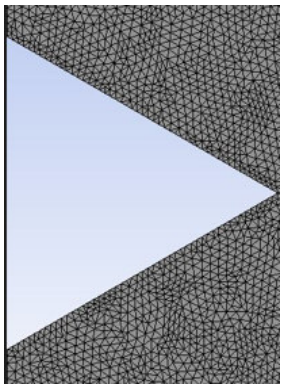
Burada, W kanal genişliği (m) ve b ise akış yönlendirici kanatçık uzunluğudur (m).

SAYISAL HESAPLAMA ALANI

Sayısal çözümlemede kullanılan hesaplama alanı Şekil 1 (a) ve (b)' de gösterilmektedir. Şekil 1 (a)' da akış yönlendirici kanatçığın olmadığı ve Şekil 1 (b)' de ise dikdörtgen kesitli kanalın sağ taraf dikey yüzeyiyle farklı **ϕ** açısı yapan yönlendiricinin olduğu kanal kesiti sunulmaktadır. Çalışmada yapılan kabuller ve sınır şartları Tablo 1' de verilmektedir. Ayrıca, dikdörtgen kesitli dikey kanalın, birbirine paralel dik sol yüzeyine yerleştirilmiş olan eşkenar üçgen şekilli ve sabit ısı akısına sahip bir elektronik elemana çalışmada uygulanacak sınır koşulları Şekil 1 üzerinde de belirtilirken; kanallara ve kanatçığa ait boyutsal ölçüler Tablo 2' de sunulmaktadır. Bununla birlikte, sayısal hesaplamalarında kullanılan tetragonal (düzgün dörtyüzlü) ağ yapısı Şekil 2' de gösterilmektedir.



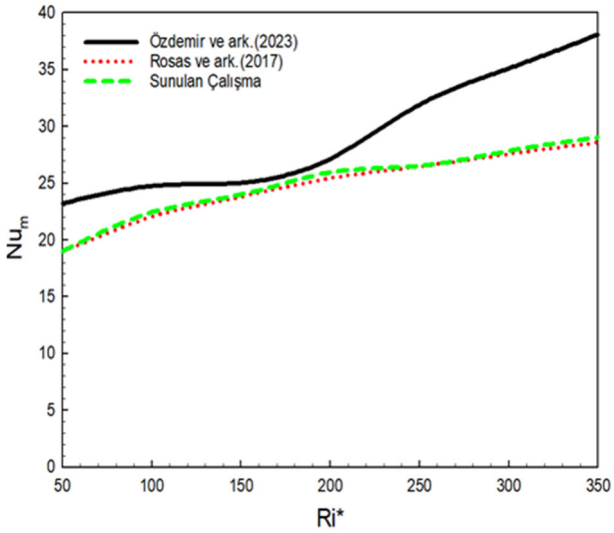
Şekil 1. Dikey kanalda karışık taşınımlı akış geometrisi (a) Yönlendiricisiz (b) Yönlendirici kanatçıklı



Şekil 2. Çalışmada kullanılan ağ yapısı şeklinin görselleştirilmesi

SONUÇLARIN DOĞRULANMASI

Çalışmanın sonuçları, Rosas ve ark. (2017)' nın deneysel çalışması ile Özdemir ve ark. (2023) tarafından sonlu hacimler yöntemini kullanan FloEFD paket programıyla elde ettikleri sayısal sonuçlarla Şekil 3 'de görüldüğü gibi karşılaştırılmıştır. Çalışmada kullanılan dikey kanalın yüksekliği 1,8 m ve genişliği ise 0,05 m iken; yarı silindirik engel üst kanal girişinden itibaren 1 m aşağıda tasarlanmıştır. Özdemir ve ark. (2023)' nın sayısal çalışmasıyla olan farklılıkların ağ sayısı ve yapısına bağlı olarak özellikle yüksek Ri* sayılarında oluşan girdap bölgelerinden kaynaklandığı düşünülmektedir. Sunulan çalışma ile Rosas ve ark. (2017)' nın deneysel çalışmasının birbirleriyle oldukça uyumlu oldukları belirlenmiştir. Bu nedenle, çalışmanın doğru ve kabul edilebilir olduğu sonucuna ulaşılmıştır.



Şekil 3. Çalışmanın sonuçlarının doğrulanması

Tablo 1. Çalışmada yapılan kabuller ve sınır şartları

a)	Sürekli, iki boyutlu ve laminer akış hacmi kullanılmıştır
b)	Sıkıştırılamaz akışkan olarak su kullanılmıştır
c)	Akışkanın ısıl özellikleri sabit olup, sıcaklıktan bağımsızdır
d)	Dikey kanalın ve yönlendirici kanatçıkların yüzeyleri adyabatiktir
e)	Kanalın çıkış basıncı, atmosfer basıncına eşit olarak alınmıştır ($P_ç=P_{atm}$)
f)	Kanalın çıkışındaki sıcaklık farkının ihmal edilebilecek kadar az miktarda olduğu kabul edilerek $\partial T/\partial y=0$ olarak belirlenmiştir
g)	Kanal, kanatçık ve üçgen yüzeylerinde kaymama sınır şartı olduğu ve bu nedenle bahsedilen yüzeylerde tüm hız bileşeni değerlerinin sıfır olduğu kabul edilmiştir.
h)	Üçgen engel yüzeylerine kanaldaki Re ve Ri* sayılarına bağlı olarak Gr* sayısına karşılık gelen sabit ısı akısı uygulanmıştır.
i)	Akışkanın kanala giriş sıcaklığı 293 K' dir.
j)	Su için çalışılan Re=500' de akışkan giriş hızı 0,010048 m/s' dir.
k)	Kanal girişinde "velocity inlet" ve çıkışında ise "pressure outlet" sınır şartı geçerlidir.
l)	Dikey kanala aşağı yönlü yerçekimi ivmesi uygulanmıştır

Tablo 2. Dikey kanala ve kanatçığa ait boyutsal ölçüler

Değişken	**Ölçü (mm)**
D	25
L	1000
W	50
H	1800
a	25
b	15 ve 25
ϕ	30º-45º

Sonuçların ağ sayısından bağımsızlığını sağlamak amacıyla engelin ortalama Nu sayısının (Nu_m) ağ sayısıyla değişimi incelenerek en uygun ağ sayısı belirlenmiştir. Bu amaçla, Nu sayısının Ri* sayısına bağlı olarak ağ sayısıyla değişimi Tablo 3' de verilmiştir.

Buna göre, 842285 adet ağ sayısının 1062252 adet ağ sayısıyla kıyaslandığında Nu_m sayısı değişimi %0,1' den daha az olduğundan 842285 adet ağ sayısının yönlendirici kanatçıksız kanal için yeterli olduğu sonucuna varılmıştır.

Tablo 3. Engelin ortalama Nu sayısının (Nu_m) ağ elemanı sayısına bağlı olarak Ri* sayısıyla değişimi

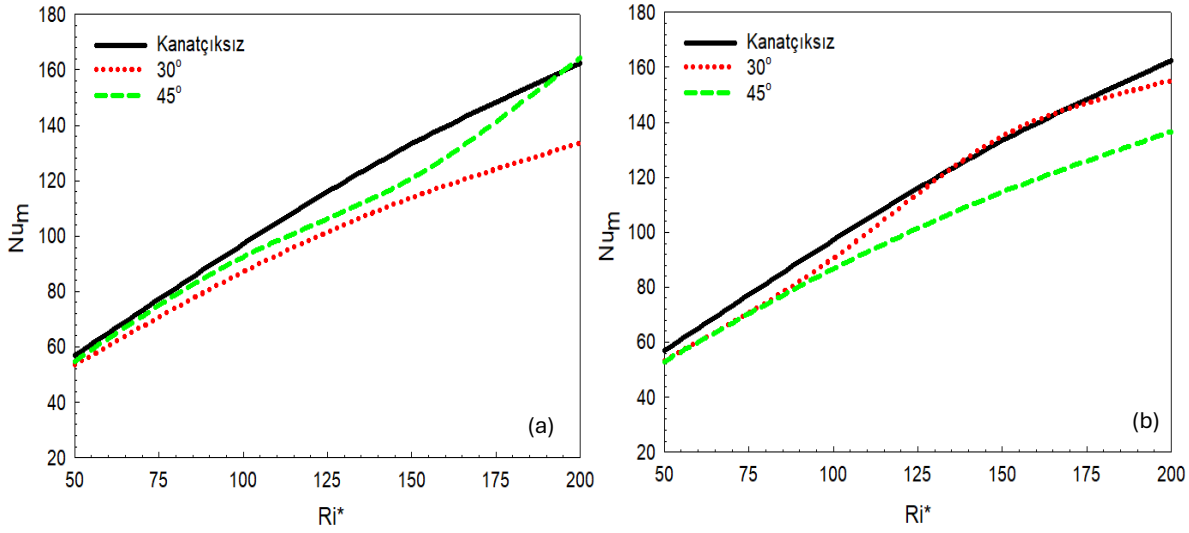
Ağ sayısı	**Ri*=50-Nu_m**	**Ri*=100-Nu_m**	**Ri*=150-Nu_m**
289071	2,82144	5,602417	8,247801
643624	2,88058	5,610262	8,257397
842285	2,88104	5,610547	8,257454
1062252	2,88105	5,610551	8,257425

ARAŞTIRMA VE BULGULAR

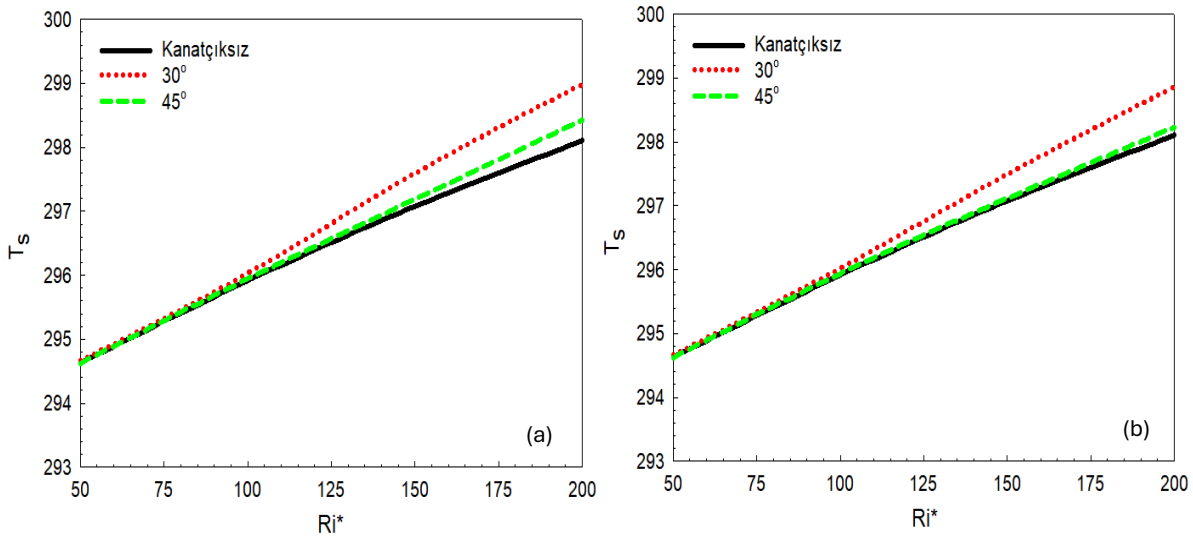
Şekil 4' de Re=500' de dikey olarak konumlandırılmış kanalda bulunan eşkenar üçgen şeklindeki engel elemanının ortalama Nu sayısının (Nu_m), Ri* ve akış yönlendirici kanatçık açısına (30^o ve 45^o) bağlı olarak değişimleri akış geçiş mesafesini (AGM) de dikkate alarak gösterilmiştir. Kanala kanatçık eklendiğinde engelin etrafında meydana gelen doğal taşınıma bağlı kaldırma kuvvetlerinin oluşturduğu girdaplar kanatçıksız duruma göre azalmaktadır. Çünkü, kanatçıkla zorlanmış taşınım akışı engele yönlendirilirken; doğal taşınım girdapları baskılanmaktadır. Bu durum da Nu_m sayısının azalmasına sebep olmaktadır. AGM=3,33 olduğunda Ri*=150 için Nu_m değeri, kanatçıksız duruma göre 45^o ve 30^o yönlendirici açılarında sırasıyla %10,29 ve %16,9 daha az olmaktadır. AGM değeri 4' e çıkarıldığında ise kanaldaki doğal ve zorlanmış taşınım hareketlerinin engel üzerindeki etkilerine bağlı olarak Ri*=200' de kanatçıksız duruma göre Nu_m sayılarının 30^o ve 45^o kanatçık açıları için sırasıyla %4,65 ve %18,92 daha düşük oldukları belirlenmiştir.

Dikey kanal boyunca ısınmış üçgen engelin ortalama yüzey sıcaklığı değişimleri (T_s), Ri* sayısına bağlı olarak Re sayısının 500 değeri için (a) AGM=3,33 ve (b) AGM=4 değerlerinde ve farklı kanatçık açılarında karşılaştırmalı olarak Şekil 5' de değerlendirilmiştir. Ri* sayısının artışıyla engel çevresinde oluşan girdap hareketlerinin, kanala eklenen kanatçıkla akışın dikey kanal yüzeylerine yönlenmesi ve yüksek Re sayısına (Re=500) bağlı olarak baskılanmasıyla engelden olan ısı transferi azalmaktadır. Bunun yanı sıra, AGM=4 için sıcaklık değerleri AGM=3' den bir miktar az olsa da kanatçık eklenmiş kanallarda engelin ortalama yüzey sıcaklığının (T_s) kanatçıksız kanallardan daha yüksek olduğu görülmektedir.

Şekil 6' da Ri* sayısının 50 ve 200 olduğu değerlerde Re=500 için dikey kanallar boyunca kanatçıksız ve farklı kanatçık açılı durumlarda (30^o ve 45^o) ve AGM=3,33 ve 4' de hız-akım konturu dağılımları verilmektedir. Ri* sayısının 50 ve 200 değerlerinde eşkenar üçgen engelin üst kısmında oluşan kaldırma kuvveti kaynaklı girdaplar, kanalın üst kısmından gelen zorlanmış taşınım hareketinin yönünü değiştirmektedir. Kanala kanatçık eklendiğinde AGM' nin 3,33 olduğu durumda her iki Ri* sayısı için de zorlanmış taşınım hareketi, doğal taşınım girdaplarını baskılayarak akışın hareketini engele doğru yönlendirebilirken; AGM=4 olduğunda kanatçık uzunluğu azaldığından doğal taşınım kaynaklı girdaplar bu yönlenmeyi yenerek karışık taşınım hareketini sönümlemektedir. Bu nedenle, kanatçıksız duruma göre engel etrafındaki girdap hareketinin büyüklüğü ve etkisi azalmaktadır.

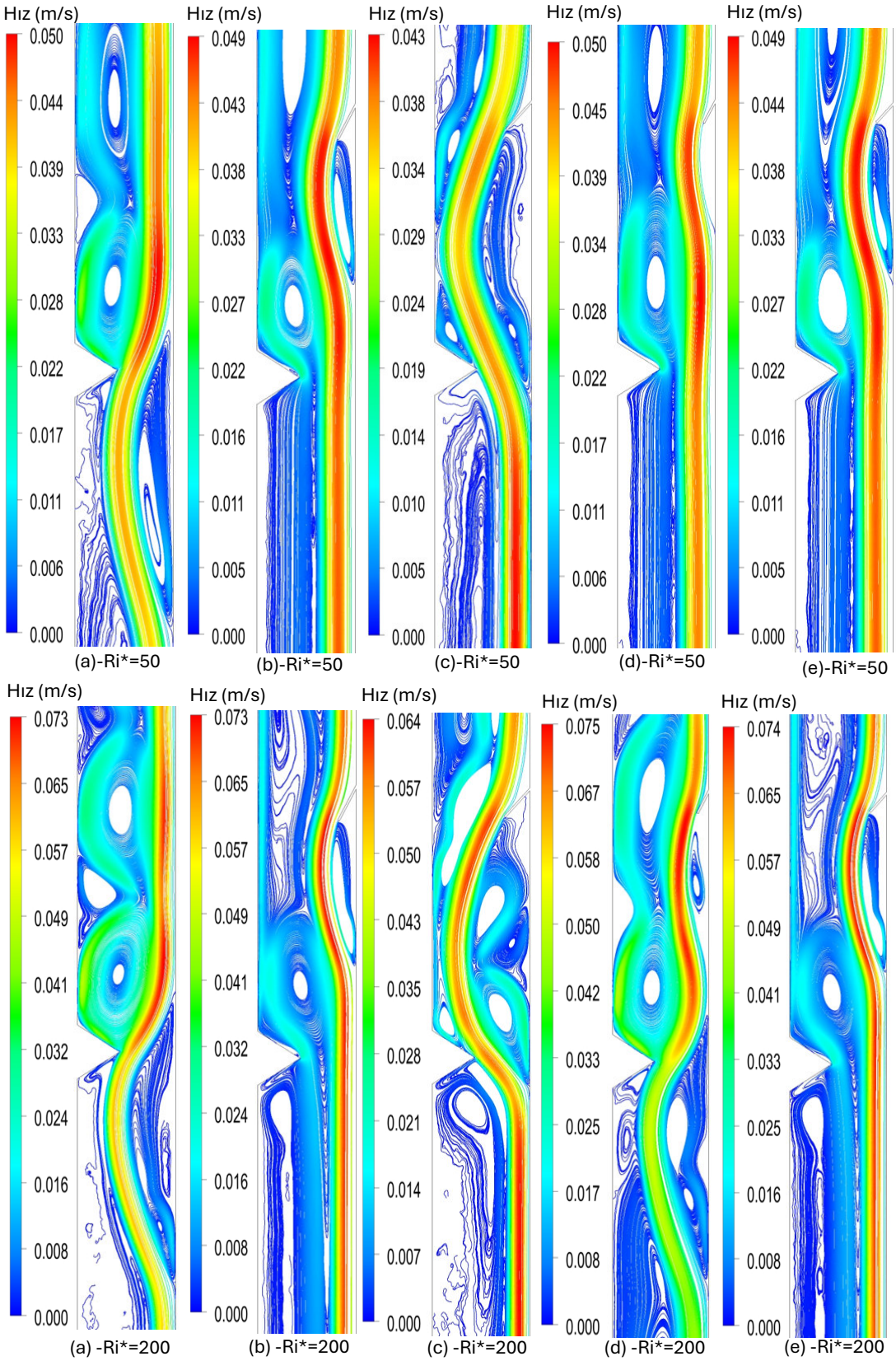


Şekil 4. Ortalama Nu sayısının (Nu_m) Ri* sayısı, kanatçık açısı ve AGM oranına göre değişimi (a) AGM=3,33 (b) AGM=4

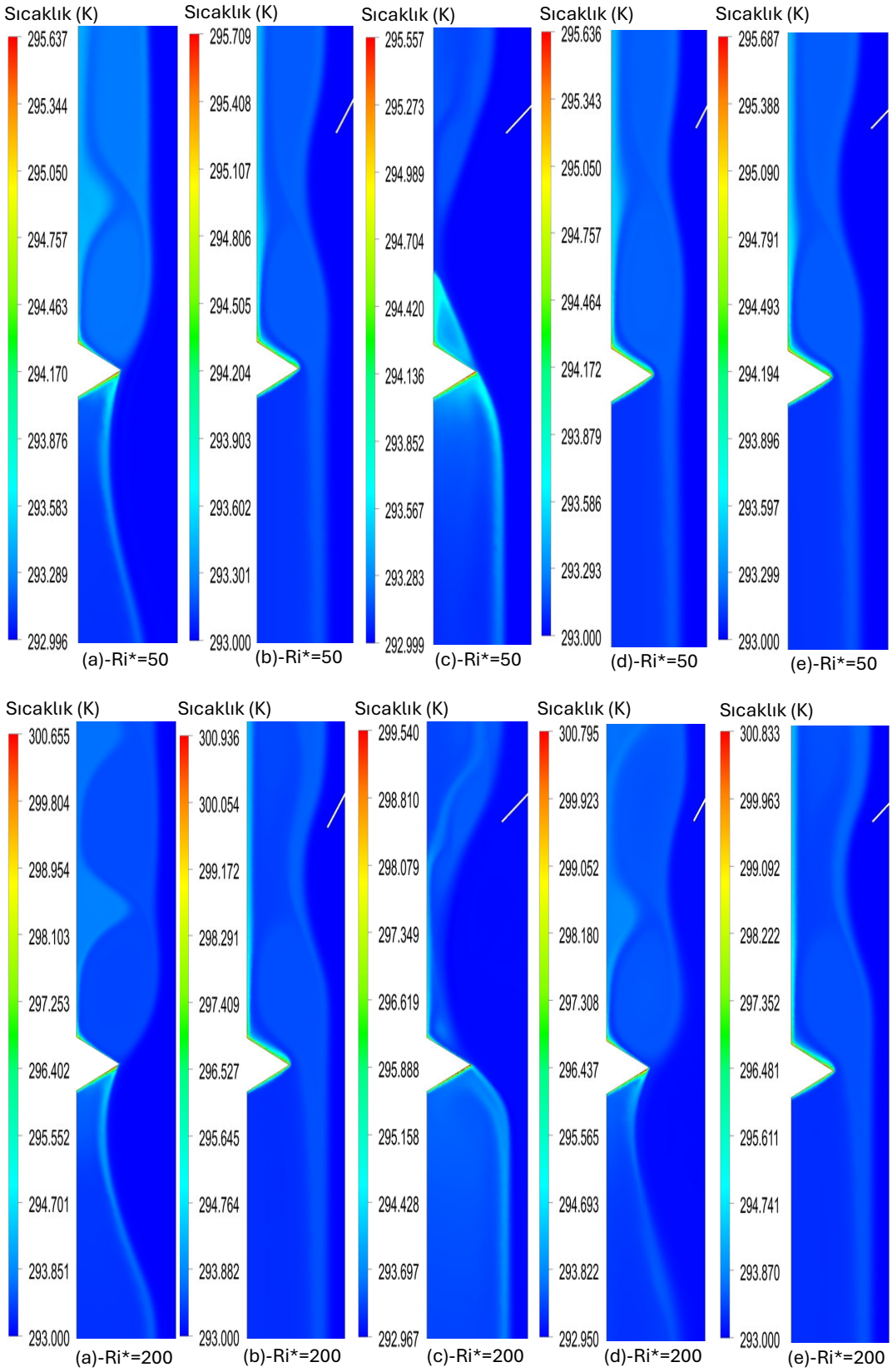


Şekil 5. Engelin ortalama yüzey sıcaklığının (T_s) Ri* sayısı, kanatçık açısı ve AGM oranına göre değişimi (a) AGM=3,33 (b) AGM=4

Karışık taşınımlı dikey kanallar boyunca sıcaklık konturu dağılımları Ri* sayısının iki farklı değeri olan 50 ve 200 için Re=500' de akış geçiş mesafesi oranları olan 3,33 ve 4 dikkate alınarak Şekil 7' de sergilenmektedir. Kanatçıksız durumlarda her iki Ri* sayısı için de engel etrafındaki akışkan sıcaklığının düşük olması engelin düşük yüzey sıcaklığına sahip olmasını sağlamaktadır. Bununla birlikte, kanallara kanatçık eklendiğinde akışın engel etrafında oluşturduğu girdap hareketlerine bağlı olarak girdabın yoğunluğunun ve şiddetinin düşük olduğu durumlarda engel yüzeylerinde sıcaklıklar artmaktadır. Ri*=200' de özellikle 30° açılı kanatçıklı durumlarda engel etrafındaki akışkandaki ısınma 45°' den daha fazladır ki; bu durum da engel yüzeyinden olan ısı transferini azaltıcı bir etki göstermektedir.



Şekil 6. Hız-akım çizgisi konturu dağılımları Ri*=50 ve 200 ve Re=500 için (a) kanatçıksız kanal (b) **ϕ**=30º, AGM=3,33 (c) **ϕ**=45º, AGM=3,33 (d) **ϕ**=30º, AGM=4 (e) **ϕ**=45º, AGM=4



Şekil 7. Sıcaklık konturu dağılımları Ri*=50 ve 200 ve Re=500 için (a) kanatçıksız kanal (b) **ϕ**=30º, AGM=3,33 (c) **ϕ**=45º, AGM=3,33 (d) **ϕ**=30º, AGM=4 (e) **ϕ**=45º, AGM=4

GENEL SONUÇLAR VE DEĞERLENDİRME

Dikey bir kanal içerisinde ısınmış engel elemanından olan ısı transferini kanaldaki karışık taşınım etkilerini dikkate alarak inceleyen bu çalışmada ulaşılan sonuçlar aşağıdaki şekilde özetlenebilir:

- Kanala kanatçık eklendiğinde engelin etrafında meydana gelen doğal taşınıma bağlı kaldırma kuvvetlerinin oluşturduğu girdaplar kanatçıksız duruma göre azalmaktadır. Bu durum da Nu_m sayısının azalmasına sebep olmaktadır.

-AGM=3,33 olduğunda Ri*=150 için Nu_m değeri, kanatçıksız duruma göre 45^o ve 30^o yönlendirici açılarında sırasıyla %10,29 ve %16,9 daha az olmaktadır.

-AGM değeri 4' e çıkarıldığında kanaldaki doğal ve zorlanmış taşınım hareketlerinin engel üzerindeki etkilerine bağlı olarak Ri*=200' de kanatçıksız duruma göre Nu_m sayılarının 30^o ve 45^o kanatçık açıları için sırasıyla %4,65 ve %18,92 daha düşük oldukları belirlenmiştir.

- Ri* sayısının artışıyla engel çevresinde oluşan girdap hareketlerinin, kanala eklenen kanatçıkla akışın dikey kanal yüzeylerine yönlenmesi ve yüksek Re sayısına (Re=500) bağlı olarak baskılanmasıyla engelden olan ısı transferi azalmaktadır.

-AGM=4 için sıcaklık değerleri AGM=3' den bir miktar az olsa da kanatçık eklenmiş kanallarda engelin ortalama yüzey sıcaklığının (T_s) kanatçıksız kanallardan daha yüksek olduğu görülmektedir.

Hız-akım çizgisi konturu dağılımları incelendiğinde;

-Ri* sayısının 50 ve 200 değerlerinde eşkenar üçgen engelin üst kısmında oluşan kaldırma kuvveti kaynaklı girdaplar, kanalın üst kısmından gelen zorlanmış taşınım hareketinin yönünü değiştirmektedir.

-Kanala kanatçık eklendiğinde AGM' nin 3,33 olduğu durumda her iki Ri* sayısı için de zorlanmış taşınım hareketi, doğal taşınım girdaplarını baskılayarak akışın hareketini engele doğru yönlendirebilirken; AGM=4 olduğunda kanatçık uzunluğu azaldığından doğal taşınım kaynaklı girdaplar bu yönlenmeyi yenerek karışık taşınım hareketini sönümlemektedir. Bu nedenle, kanatçıksız duruma göre engel etrafındaki girdap hareketinin büyüklüğü ve etkisi azalmaktadır.

- Sıcaklık konturu dağılımları incelendiğinde;

- Kanatçıksız durumlarda her iki Ri* sayısı için de engel etrafındaki akışkan sıcaklığının düşük olması engelin düşük yüzey sıcaklığına sahip olmasını sağlamaktadır.

-Kanallara kanatçık eklendiğinde akışın engel etrafında oluşturduğu girdap hareketlerine bağlı olarak girdabın yoğunluğunun ve şiddetinin düşük olduğu durumlarda engel yüzeylerinde sıcaklıklar artmaktadır.

-Ri*=200' de özellikle 30^o açılı kanatçıklı durumlarda engel etrafında akışkandaki ısınma 45^o' den daha fazladır ki; bu durum da engel yüzeyinden olan ısı transferini azaltıcı bir etki göstermektedir.

TEŞEKKÜR

Bu çalışma, Sivas Cumhuriyet Üniversitesi Bilimsel Araştırma Projeleri (CÜBAP) birimi tarafından STBMYO-2024-005 proje numarası ile desteklenmiştir.

KAYNAKÇA

Alnak, D.E., Karabulut, K. Investigation of heat transfer increment in electronic system surfaces by different air jet impingement applications, Journal of Engineering Thermophysics, 33 (1), 161-185, (2024).

Auletta A., Manca O., Morrone B., Naso V., Heat transfer enhancement by the chimney effect in a vertical isoflux channel, International Journal of Heat and Mass Transfer, 44 (22), 4345–4357, (2001).

Boutina L., Bessaih R., Numerical simulation of mixed convection air cooling of electronic components mounted in an inclined channel, Applied Thermal Engineering, 31 (11-12), 2052-2062, (2011).

Choi, C.Y., Ortega, A. Mixed convection in an inclined channel with a discrete heat source, International Journal of Heat and Mass Transfer 36, 3119-3134, (1993).

Forooghi P., Hooman K., Effect of buoyancy on turbulent convection heat transfer in corrugated channels a numerical study, International Journal of Heat and Mass Transfer, 64, 850–862, (2013).

Hamouche, A., Bessaïh, R. Mixed convection air cooling of electronic components mounted in a horizontal channel, International Journal of Theoretical and Applied Mechanics 3, 53-64, (2008).

Jang J.H., Yan W.M., Mixed convection heat and mass transfer along a vertical wavy surface, International Journal of Heat and Mass Transfer, 47 (3), 419-428, (2004).

Papanicolaou, E., Jaluria, Y. Mixed convection from a localized heat source in a cavity with conducting walls: a numerical study, Numerical Heat Transfer, Part A (23), 463-484, (1993).

Rosas, I.Y., Trevino, C., Martinez-Suastegui, L. Experimental study of mixed convection heat transfer in a vertical channel with a one-sided semicylindrical constriction with prescribed heat flux, International Journal of Heat and Fluid Flow, 67, 155-167, 2017.

Özdemir, S., Kılıç, M., Çalışır, T., Başkaya, Ş. Numerical investigation of enhancing mixed convection heat transfer by using semicylindrical obstacles in a vertical channel, Journal of the Faculty of Engineering and Architecture of Gazi University, 38 (3), 1805-1820, (2023).

ISINMIŞ ELEKTRONİK ELEMAN ÇİFTİNDEN OLAN ISI TRANSFERİNDE KARIŞIK TAŞINIM ETKİLERİNİN ARAŞTIRILMASI

Dr. Öğr. Üyesi Yeliz ALNAK
Sivas Cumhuriyet Üniversitesi, Teknoloji Fakültesi, İmalat Mühendisliği Bölümü
ORCID: 0000-0003-4383-3806

Doç. Dr. Koray KARABULUT
Sivas Cumhuriyet Üniversitesi, Sivas Teknik Bilimler Meslek Yüksekokulu, Elektrik ve Enerji Bölümü
ORCID: 0000-0001-5680-0988

ÖZET
Elektronik ekipmanlardan olan ısı transferinin artırılması, boyutların küçültülerek güvenilirlik seviyesi yüksek sistemlerinin geliştirilmesi bakımından önem arz etmektedir. Pratikte elektronik elemanların birçoğunun ısı transferinin artırılması durumunda ısı yayan bileşen dizileri dikey veya eğimli paralel plaka kanallarına yerleştirilmektedir. Bu çalışmada, dikey bir kanal içerisinde kanalın sol tarafında üst üste iki eşkenar üçgen şekilli engel elemanının doğal ve zorlanmış taşınımın birleşik etkileriyle soğutulması ve kanal içerisindeki akış özellikleri sayısal olarak araştırılmıştır. Akışın kanal içerisindeki ısınmış engel elemanlarına daha iyi yönlendirilmesi ve karışık taşınım etkisinin artırılması amacıyla kanalın sağ taraf üst giriş kısmından 45^o ve 60^o açılı akış yönlendirici kanatçık yerleştirilmiştir. Sayısal araştırma, zamandan bağımsız, laminer ve iki boyutlu olarak süreklilik, momentum ve enerji denklemlerinin Ansys-Fluent bilgisayar programı kullanılarak çözülmesiyle gerçekleştirilmiştir. Eşkenar üçgen şekilli elektronik elemanlara sabit ısı akısı uygulanırken, kanalın diğer yüzeyleri ve akış yönlendirici ise adyabatiktir. Kanalda kullanılan su akışkanı sıkıştırılamaz olup, kanala giriş sıcaklığı 293 K' dir. Çalışmada kullanılan Reynolds sayısı (Re) değeri 1000, değiştirilmiş Richardson sayısı (Ri*) aralığı 50-200, AGM (Akış Geçiş Mesafesi) ise 2 ve 4 olarak tasarlanmıştır. Çalışmadan elde edilen sonuçlar, literatürdeki deneysel ve sayısal sonuçlarla karşılaştırılmış ve sonuçların birbirleriyle tutarlı oldukları görülmüştür. Sonuçlar, Ri* sayısına bağlı olarak farklı AGM oranları için kanala yerleştirilen açılı akış yönlendiricinin ısınmış engellerin toplam ortalama Nu sayıları (Nu_m) ve kanaldaki ortalama akışkan sıcaklıkları (T_m) üzerindeki etkilerinin değişimleri olarak değerlendirilmiştir. Ayrıca, Ri* sayısının 50 ve 200 değerlerinde farklı AGM oranları ve akış yönlendirici kanatçık açısı etkisi dikkate alınarak kanaldaki karışık taşınımın hız-akım çizgileri ve sıcaklık konturu dağılımları üzerindeki etkileri görselleştirilerek detaylı bir şekilde incelenmiştir. Sonuçlar, Re=1000 için Ri*=150 ve AGM=4' de kanatçıksız dikey kanala göre 60^o ve 45^o açılı kanatçıklı kanallarda Nu_m sayısı değerinin sırasıyla %13 ve %5,58 azalış sergilediğini göstermiştir.

Anahtar Kelimeler: Doğal ve zorlanmış taşınım, Karışık taşınım, Akış yönlendirici kanatçık, Akış geçiş mesafesi, Richardson sayısı (Ri)

RESEARCH OF MIXED CONVECTION EFFECTS IN HEAT TRANSFER FROM A HEATING ELECTRONIC ELEMENT PAIR

ABSTRACT

Increasing the heat transfer from electronic equipment is important for developing high-reliability systems by reducing the dimensions. In practice, arrays of heat-dissipating components are placed in vertical or inclined parallel plate channels to increase the heat transfer of most electronic components. In this study, the cooling of two equilateral triangular-shaped obstacle elements on the left side of the channel in a vertical channel with the combined effects of natural and forced convection and the flow characteristics in the channel were numerically investigated. To better direct the flow to the heated obstacle elements in the channel and to increase the mixed convection effect, 45° and 60° angled flow director fin were placed from the right side upper inlet of the channel. The numerical investigation was carried out by solving the steady, laminar and two-dimensional continuity, momentum and energy equations using the Ansys-Fluent computer program. Equilateral triangular-shaped electronic elements are subjected to constant heat flux, while the other surfaces of the channel and flow director are adiabatic. The water fluid used in the channel is incompressible and the inlet temperature of the channel is 293 K. The Reynolds number (Re) value used in the study is 1000, the modified Richardson number (Ri*) range is 50-200, and the FPD (Flow Passage Distance) has been designed as 2 and 4. The results obtained from the study were compared with experimental and numerical results in the literature and the results were found to be consistent with each other. The results were evaluated as variations of the effects of the angled flow director placed in the channel for different FPD ratios depending on the Ri* number on the total average Nu numbers of heated obstacles (Nu_m) and the mean fluid temperatures in the channel (T_m). In addition, the effects of mixed convection in the channel on the velocity-streamlines and temperature contour distributions were visualised and studied in detail by considering the effect of different FPD ratios and flow-director fin angle at Ri* number values of 50 and 200. The results showed that for Re=1000 for Ri*=150 and FPD=4, the Nu_m number value decreased by 13% and 5.58% for the channels with 60° and 45° angled fins, respectively, compared to the vertical channel without fins.

Keywords: Natural and forced convection, Mixed convection, Flow director fin, Flow passage distance, Richardson sayısı (Ri)

GİRİŞ

Günümüzde yenilenebilir enerji arzı, kömür, petrol ve doğalgaz gibi diğer yenilenemeyen enerji kaynaklarındaki kıtlık nedeniyle büyük bir ilgi görmektedir. Bununla birlikte, yenilenebilir enerji kaynaklarına göre kullanım oranı daha yüksek olan ve azalan kullanılabilirliklerinin ötesinde yenilenemeyen kaynaklar çevreyi kirletme ve aynı zamanda maliyetleri artırma işlevi görmektedirler. Bu amaçla, enerjinin verimli kullanılmasıyla ısı ve akış uygulamalarındaki yeni yaklaşımlarla geliştirilmiş ekipmanların verimliliklerinin artırılarak, işletme maliyetleri düşük, doğaya duyarlı ve güvenliği yüksek ürünler geliştirilmesi çalışmaları yoğunlaşmıştır (Alnak ve Karabulut, 2024).

Elektronik elemanların kullanılmaları sonucunda ısınmaları sonucu sıcaklıklarının artması nedeniyle soğutulmaları gerekmektedir. Bu amaçla, elektronik elemanlar ısı yayan bileşen dizileri şeklinde dikey veya eğimli paralel plaka kanallarına konumlandırılmaktadır. Elektronik bileşenlerin soğutulması, daha hızlı, daha küçük ve daha güvenilir sistemlerin gelişmesinin sağlanması bakımından oldukça önemlidir. Böylece, cihazdan elde edilen verimlilik artarken; bu durum zaman ve maddi açıdan kazanç elde edilmesine sebep olacaktır.

Bununla birlikte, kanal içi akış ve ısı transferi uygulamalarında doğal ve zorlanmış taşınımın birlikte uygulandığı karışık taşınım uygulamaları son zamanlarda araştırmacılar ve uygulamacılar tarafından yoğun olarak değerlendirilen tasarımlar arasında yer almaktadır. Karışık taşınımla ısı transferi üzerine yapılan araştırmalar, ısı eşanjörleri, kimyasal işleme ekipmanları, güneş enerjisi toplayıcılarının ve elektronik soğutma vb. gibi uygulamalar birçok mühendislik alanında giderek daha fazla ilgi görmektedir. Böylece, ısınmış olan bileşenler tarafından etrafındaki akışkan ile olan sıcaklık farkına dayalı olarak gerçekleşen doğal taşınımla olan ısı transferinin engellenmeden; zorlanmış taşınımla desteklenerek ısı transferi artırılabilmektedir.

Literatürde kanalda karışık taşınımla ısı transferi birçok araştırmacı tarafından incelenmiştir. Bunlardan birinde, ısı kaynağı içeren bir kanal için laminer zorlanmış akışın, doğal, karışık ve zorlanmış taşınım bölgeleri boyunca kaldırma kuvveti kaynaklı doğal konveksiyon hareketi üzerindeki etkileri Choi ve Ortega (1993) tarafından sayısal olarak incelenmiştir. Sonuçlar, ısı kaynağının ortalama Nusselt (Nu) sayısının eğim açısına büyük ölçüde bağlı olduğunu göstermiştir. Papanicolaou ve Jaluria (1993), yalıtılmış ve sabit değerde bir ısı kaynağı içeren dikdörtgensel bir sistemdeki karışık taşınımı değerlendirmişlerdir. Auletta ve ark. (2001), dik olarak konumlanmış ve simetrik olarak ısıtılan aşağı yönlü akışı olan bir kanalda adyabatik olarak genişlemenin ısı transferi üzerindeki etkilerini sayısal olarak analiz etmişlerdir. Yapılan analizler sonucunda kanaldaki uzama ve genişleme miktarlarına göre ısı transferinde %10-20 arasında bir artış olduğunu belirlemişlerdir. Eğimli bir kanalda laminer akış şartlarında birbirine eş iki ısı kaynağının karışık taşınımla soğutulması Boutina ve Bessaih (2011) tarafından değerlendirilmiştir. Isı kaynağı ölçüleri ve aralarındaki uzaklığın yanında kanal eğiminin de ısı transferine belirgin etkileri olduğu saptanmıştır. Jang ve Yan (2004), sayısal olarak dikey dalgalı bir yüzey boyunca karışık ısı taşınımı ve kütle transferini araştırmışlardır. Mevcut analiz için sonlu farklar yöntemi kullanılmıştır. Kaldırma kuvveti oranı N, genlik-dalga boyu oranı α ve değiştirilmiş Richardson (Ri*) sayısı (Gr/Re^2) bu problem için önemli parametreler olarak belirlenmiştir. Çalışmada, kaldırma kuvveti oranı N ve dalgalı yüzeyin boyutsuz genliğinin yerel Nu sayısı ve yerel Sherwood (Sh) sayısı üzerindeki etkileri ayrıntılı olarak incelenmiştir. Zhang ve ark. (2022), dikey olarak konumlandırılmış daralan-genişleyen bir kanalda akış yönünde ve akışa ters yöndeki akış için karışık konveksiyonun etkisini sayısal olarak değerlendirmişlerdir. Bir diğer çalışmada, Lee ve ark. (2021) açılı kanatçıklara sahip bir kanaldaki doğal ve karışık konveksiyonun ısı kuyusunun tasarım parametrelerindeki durumunu sayısal olarak araştırmışlardır. Wetzel ve Wagner (2019) ise farklı Grashof (Gr) sayılarını dikkate alarak dik bir kanal içerisinde karışık konveksiyonun sayısal simülasyonunu gerçekleştirmişlerdir.

Bu çalışmada, sol dikey yüzeyinde eşkenar üçgen geometrili iki adet ısınmış elektronik engel elemanı bulunan kanalda karışık taşınım akışıyla elemanlardan olan ısı transferi sayısal olarak değerlendirilmiştir. Sayısal inceleme, zamandan bağımsız, laminer ve iki boyutlu olarak süreklilik, momentum ve enerji denklemlerinin Ansys-Fluent bilgisayar programının kullanılarak çözülmesiyle gerçekleştirilmiştir. Kanalın üst kısmından su girişi olan ve yine aynı yöndeki giriş kısmından 45^o ve 60^o açılı olarak akış yönlendirici kanatçığın akışı yönlendirdiği kanaldaki eşkenar üçgen şekilli elektronik elemanlara sabit ısı akısı (3529,49 W/m^2-14117,96 W/m^2) uygulanırken, kanalın diğer yüzeyleri ve akış yönlendiriciler ise adyabatiktir. Kullanılan su akışkanı sıkıştırılamaz olup, kanala giriş sıcaklığı 293 K' dir. Çalışmada kullanılan Reynolds sayısı (Re) değeri 1000, değiştirilmiş Richardson sayısı (Ri*) aralığı 50-200, AGM (Akış Geçiş Mesafesi) oranı ise 2 ve 4 olarak tasarlanmıştır.

Richardson sayısına bağlı olarak farklı AGM oranlarında kanala yerleştirilen açılı kanatçığın, engellerin toplam ortalama Nu sayıları (Nu_m) ve kanal boyunca ortalama akışkan sıcaklıkları (T_m) üzerindeki etkilerinin değişimleri araştırılmıştır. Ayrıca, incelenen iki farklı AGM ve Ri*=50 ve 200 için kanatçıksız ve kanatçıklı durumlarda hız-akım çizgisi ve sıcaklık konturu dağılımları görselleştirilerek detaylı bir şekilde incelenmiştir.

SAYISAL YÖNTEM

Kanalın üst kısmından üniform olarak sabit u_o hızı ile giriş yapan akışkan sonucu meydana gelen zorlanmış taşınım ile ısınmış olan elektronik elemanlardan kaldırma kuvvetinin etkisiyle oluşan doğal taşınım akımlarıyla birlikte karışık taşınım akımları oluşmaktadır. Kanalın sağ üst girişinden itibaren yerleştirilen akış yönlendirici kanatçık ile hem akışkanın ısınmış elektronik engel elemanına doğru yönlendirilmesi; hem de kanalın orta kısmında akışın hızlandırılarak zorlanmış taşınım hareketleriyle daha iyi bir karışık taşınım akımı oluşturulması planlanmıştır.

Kanaldaki karışık taşınımlı ısı transferinin çözümünde Ansys-Fluent programından yararlanılmıştır. Ayrıklaştırma yöntemi olarak momentum denklemleri için "Second Order Upwind" yöntemi tercih edilmiştir. Sayısal çözümlerin yakınsaması için yakınsama kriteri momentum denklemi için 10^{-6} ve enerji denklemi için 10^{-7} olarak alınmıştır.

Bu çalışmada ele alınan akışın, zamandan bağımsız, sıkıştırılamaz, iki boyutlu ve laminer olduğu kabulü yapılmıştır. Çalışmada, dikey olarak yerleştirilen kanalda yer çekimi kuvveti aşağı yönlü olarak tasarlanırken; kaldırma kuvvetinin etkisi de dikkate alınmıştır.

Kartezyen koordinatlarda zamandan bağımsız, sıkıştırılamaz akış için süreklilik, momentum ve enerjinin korunumu denklemleri aşağıda verilmiştir (Özdemir ve ark. (2023)).

Süreklilik denklemi

$$\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}=0 \tag{1}$$

Momentum denklemi

$$\rho\left(u\frac{\partial u}{\partial x}+v\frac{\partial v}{\partial y}\right)=-\frac{\partial P}{\partial x}+\mu\nabla^2 u \tag{2}$$

$$\rho\left(u\frac{\partial u}{\partial x}+v\frac{\partial v}{\partial y}\right)=-\frac{\partial P}{\partial y}+\mu\nabla^2 v-\rho g \tag{3}$$

Enerji denklemi

$$u\frac{\partial T}{\partial x}+v\frac{\partial T}{\partial y}=\alpha\left[\frac{\partial^2 T}{\partial x^2}+\frac{\partial^2 T}{\partial y^2}\right] \tag{4}$$

Çalışmada kullanılan boyutsuz sayılardan değiştirilmiş Grashof sayısı (Gr*), Richardson sayısı (Ri*) ve Reynolds sayısı (Re) aşağıdaki eşitliklerde sunulmuştur.

$$Gr^*=\frac{g\dot{q}\beta D^4}{k\nu^2} \tag{5}$$

$$Ri^*=\frac{Gr^*}{Re^2} \tag{6}$$

$$Re=\frac{u_o D}{\nu} \tag{7}$$

Burada, g yerçekimi ivmesi (m/s^2), β ısıl genleşme katsayısı (1/K), $\dot{q}$ ısı akısı (W/m^2), k ısı iletim katsayısı (W/mK), υ kinematik viskozite (m^2/s)' dir.

Elektronik engel elemanların yüzeylerindeki ortalama ısı taşınım katsayısı Eş. (8), Nusselt sayısı (Nu) ise Eş. (9) vasıtasıyla hesaplanacaktır.

$$h=\frac{\dot{q}}{(T_e-T_o)} \tag{8}$$

Nu sayısı, taşınımla ısı geçişinin iletimle ısı geçişine oranı olarak değerlendirilir.

$$-k\left(\frac{\partial T}{\partial n}\right)_s = h(T_e - T_o) \text{ ve } Nu = \frac{h\,2a}{k} \quad (9)$$

Ortalama ısı taşınım katsayısı (h_m)

$$h_m = \frac{1}{2a}\int_0^{2a} hda \quad (10)$$

Ortalama Nu sayısı (Nu_m) Eş. 8 ile hesaplanmaktadır.

$$Nu_m = \frac{\dot{q}D}{k(T_e - T_o)} = \frac{h_m 2a}{k} \quad (11)$$

Bu eşitliklerde, $\dot{q}$ ısı akısı, u_o dikey kanalın üst kısmından giren akışkanın hızı (m/s), T_e ısınmış engelin ortalama sıcaklığı iken T_o, su akışkanının kanal girişindeki sıcaklığıdır (K). a akışkanla temasta olan eşkenar üçgen şekilli yüzeyin karakteristik uzunluğu (m) ölçüsü iken; u ve v kartezyen koordinatlarda akışkanın x ve y yönlerindeki hızlarıdır (m/s). k akışkanın ısı iletim katsayısı (W/mK), h yüzey üzerindeki yerel ısı taşınım katsayısı (W/m^{2}K), n ise yüzeye dik yöndür.

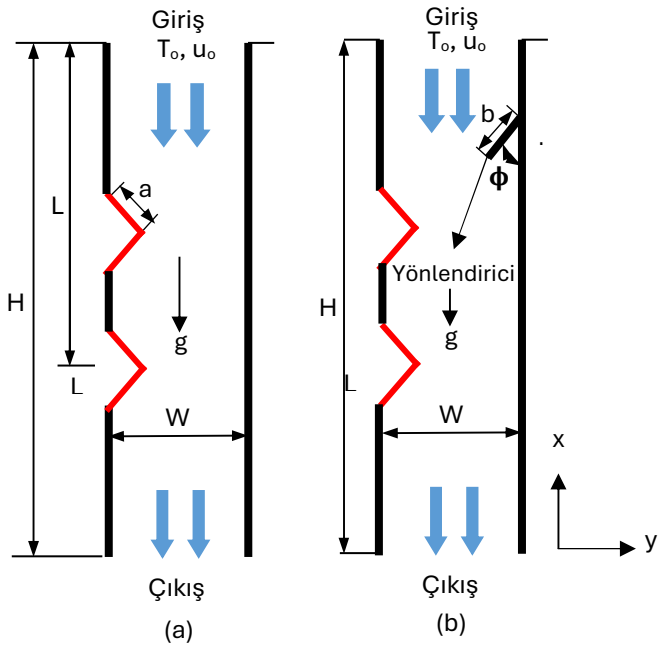
Akış Geçiş Mesafesi (AGM), kanal genişliğinin kanatçık uzunluğuna oranı olup aşağıdaki gibi ifade edilmektedir.

$$AGM = \frac{W}{b} \quad (12)$$

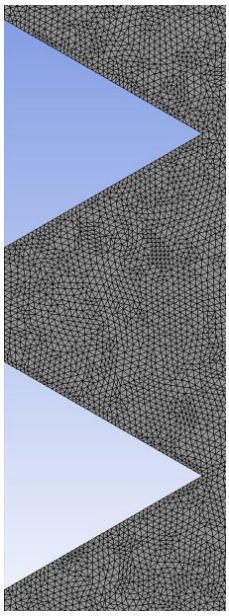
Burada, W kanal genişliği (m) ve b ise akış yönlendirici kanatçık uzunluğudur (m).

SAYISAL HESAPLAMA ALANI

Sayısal çözümlemede kullanılan hesaplama alanı Şekil 1 (a) ve (b)' de gösterilmektedir. Şekil 1 (a)' da akış yönlendirici kanatçığın olmadığı ve Şekil 1 (b)' de ise dikdörtgen kesitli kanalın sağ taraf dikey yüzeyiyle farklı **ϕ** açısı yapan yönlendiricinin olduğu kanal kesiti sunulmaktadır. Çalışmada yapılan kabuller ve sınır şartları Tablo 1' de verilmektedir. Ayrıca, dikdörtgen kesitli dikey kanalın, birbirine paralel dik sol yüzeyine yerleştirilmiş olan eşkenar üçgen şekilli ve sabit ısı akısına sahip bir elektronik elemana çalışmada uygulanacak sınır koşulları Şekil 1 üzerinde de belirtilirken; kanallara ve kanatçığa ait boyutsal ölçüler Tablo 2' de sunulmaktadır. Bununla birlikte, sayısal hesaplamalarında kullanılan tetragonal (düzgün dörtyüzlü) ağ yapısı Şekil 2' de gösterilmektedir.



Şekil 1. Dikey kanalda sol yüzeyinde eşkenar üçgen engel çiftli karışık taşınımlı akış geometrisi (a) Yönlendirici kanatçıksız (b) Açılı yönlendirici kanatçıklı



Şekil 2. Çalışmada kullanılan ağ yapısı şeklinin görselleştirilmesi

Tablo 1. Çalışmada yapılan kabuller ve sınır şartları

a)	Sürekli, iki boyutlu ve laminer akış hacmi kullanılmıştır
b)	Sıkıştırılamaz akışkan olarak su kullanılmıştır
c)	Akışkanın ısıl özellikleri sabit olup, sıcaklıktan bağımsızdır
d)	Dikey kanalın ve yönlendirici kanatçıkların yüzeyleri adyabatiktir
e)	Kanalın çıkış basıncı, atmosfer basıncına eşit olarak alınmıştır ($P_ç=P_{atm}$)
f)	Kanalın çıkışındaki sıcaklık farkının ihmal edilebilecek kadar az miktarda olduğu kabul edilerek $\partial T/\partial y=0$ olarak belirlenmiştir
g)	Kanal, kanatçık ve eşkenar üçgen yüzeylerinde kaymama sınır şartı olduğu ve bu nedenle bahsedilen yüzeylerde tüm hız bileşeni değerlerinin sıfır olduğu kabul edilmiştir.
h)	Üçgen engel yüzeylerine kanaldaki Re ve Ri* sayılarına bağlı olarak Gr* sayısına karşılık gelen sabit ısı akısı uygulanmıştır.
i)	Akışkanın kanala giriş sıcaklığı 293 K' dir.
j)	Su için çalışılan Re=1000' de akışkan giriş hızı 0,020096 m/s' dir.
k)	Kanal girişinde "velocity inlet" ve çıkışında ise "pressure outlet" sınır şartı geçerlidir.
l)	Dikey kanala aşağı yönlü yerçekimi ivmesi uygulanmıştır

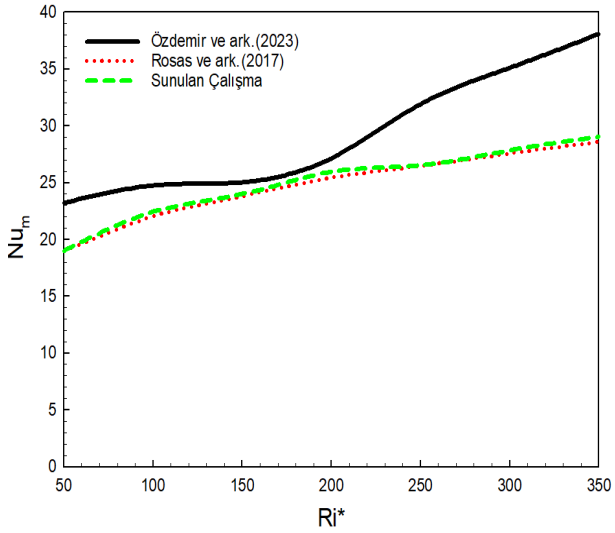
Tablo 2. Dikey kanala ve kanatçığa ait boyutsal ölçüler

Değişken	**Ölçü (mm)**
D	25
L	1000
W	50
H	1800
a	25
b	25 ve 12,5
ϕ	45° ve 60°

SONUÇLARIN DOĞRULANMASI

Çalışmanın sonuçları, Rosas ve ark. (2017)' nın deneysel çalışması ile Özdemir ve ark. (2023) tarafından sonlu hacimler yöntemini kullanan FloEFD paket programıyla elde ettikleri sayısal sonuçlarla Şekil 3 'de görüldüğü gibi karşılaştırılmıştır. Çalışmada kullanılan dikey kanalın yüksekliği 1,8 m ve genişliği ise 0,05 m iken; yarı silindirik engel üst kanal girişinden itibaren 1 m aşağıda tasarlanmıştır. Özdemir ve ark. (2023)' nın sayısal çalışmasıyla olan farklılıkların ağ sayısı ve yapısına bağlı olarak özellikle yüksek Ri* sayılarında oluşan girdap bölgelerinden kaynaklandığı düşünülmektedir. Sunulan çalışma ile Rosas ve ark. (2017)' nın deneysel çalışmasının birbirleriyle oldukça uyumlu oldukları belirlenmiştir

Sonuçların ağ sayısından bağımsızlığını sağlamak amacıyla engelin ortalama Nu sayısının (Nu_m) ağ sayısıyla değişimi incelenerek en uygun ağ sayısı belirlenmiştir. Bu amaçla, Nu sayısının Ri* sayısına bağlı olarak ağ sayısıyla değişimi Tablo 3' de verilmiştir. Buna göre, 864184 adet ağ elemanı sayısının 1089870 adet ağ sayısıyla karşılaştırıldığında Nu_m sayısı değişimi %0,1' den daha az olduğundan; 864184 adet ağ elemanı sayısının akış yönlendirici kanatçıksız kanal için yeterli olduğu sonucuna varılmıştır.



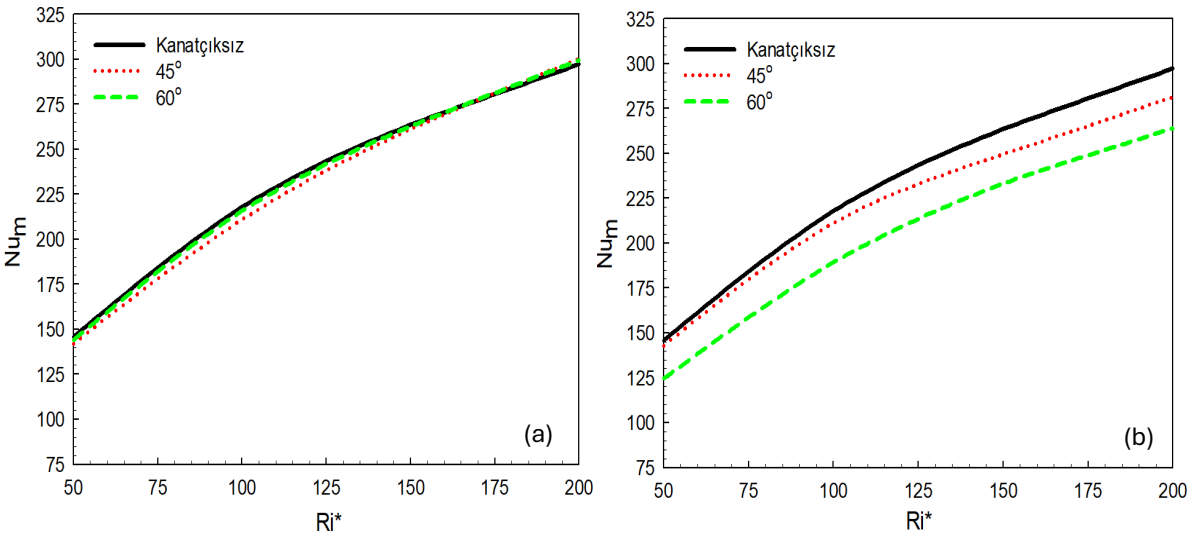
Şekil 3. Çalışmanın sonuçlarının doğrulanması

Tablo 3. Engelin ortalama Nu sayısının (Nu_m) ağ elemanı sayısına bağlı olarak Ri* sayısıyla değişimi

Ağ sayısı	**Ri*=50-Nu_m**	**Ri*=100-Nu_m**	**Ri*=150-Nu_m**	**Ri*=200-Nu_m**
296586	2,84524	5,542147	8,147842	10,58475
660358	2,86051	5,558578	8,148538	10,59916
864184	2,86142	5,558741	8,145724	10,59947
1089870	2,87145	5,558745	8,145724	10,59987

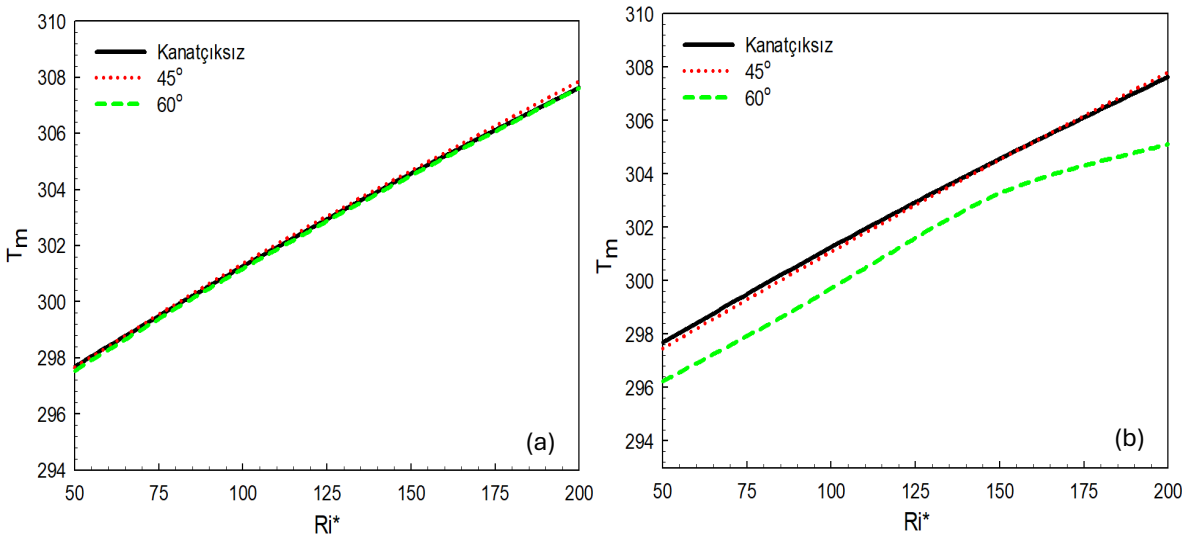
ARAŞTIRMA VE BULGULAR

Şekil 4' de sol dikey yüzeyinde ikili eşkenar üçgen şeklinde ısınmış engel bulunan bir kanalda toplam ortalama Nu sayısının (Nu_m), Ri* sayısına, akış geçiş mesafesine (AGM) ((a) AGM=2 ve 4) ve kanalın sağ üst tarafına eklenen akış yönlendirici kanatçıkların açısına (ϕ=45° ve 60°) bağlı olarak değişimi Re=1000 için kanalın üst tarafından gelen akışkana bağlı olarak gösterilmektedir. Ri* sayısının artışıyla artan Gr sayısına bağlı olarak kaldırma kuvvetlerinin artışıyla her iki AGM oranı için de Nu_m sayısı artmaktadır. Akışkanı engel yüzeylerine yönlendirmek amacıyla kanalın sağ üst kısmına kanatçık yerleştirildiğinde; doğal taşınım nedeniyle engeller etrafında ve aralarında oluşan girdaplar, yerçekimi yönünde hareket eden ve kanalın üst kısmından gelen zorlanmış akışla baskılanmaktadır. Bu durum da engeller etrafında akışkan hareketini kısıtlayarak akışkanın ısınmasına neden olarak ısı transferini azaltmaktadır. AGM' nin 2 olduğu yani kanatçığın uzun olduğu durum için kanatçıklı kanallarda kanatçıksıza göre Nu_m sayısının azalma oranı düşük iken; AGM=4 olduğunda kanatçığın akışı doğal taşınım nedeniyle oluşan girdaplar nedeniyle ikili engele yönlendirebilme yeteneği azalmaktadır. Özellikle açı 60° olduğunda engeller etrafında meydana gelen yoğun girdap hareketleri, Nu_m sayısının kanatçıksız duruma göre daha da azalmasını sağlamaktadır. Re=1000 için Ri*=150 ve AGM=4' de kanatçıksız dikey kanala göre 60° ve 45° açılı kanatçıklı kanallarda Nu_m sayısı değerleri sırasıyla %13 ve %5,58 azalış sergilemektedir.



Şekil 4. Toplam ortalama Nu sayısının (Nu_m) Ri* sayısı, kanatçık açısı ve AGM oranına göre değişimi (a) AGM=2 (b) AGM=4

Art arda sıralı sabit ısı akılı iki eşkenar üçgen engelli dikey bir kanalda akan akışkanın ortalama akışkan sıcaklığının (T_m) değişimi, Ri* sayısı, AGM oranı ve yönlendirici kanatçık açısına bağlı olarak Şekil 5' de verilmektedir. AGM (Akış Geçiş Mesafesi) oranının 2 olduğu durumda akışkan sıcaklıkları birbirine oldukça yakın iken; 4 olduğunda engel aralarında oluşan girdaplar nedeniyle zorlanmış akışın engellerden uzaklaşacak şekilde kanalda yönlenmesi kanatçıksız duruma göre akışkan sıcaklıklarının daha düşük değerlerde olmasına sebep olmuştur. Ri* sayısının artışıyla doğal taşınım kaynaklı kaldırma kuvvetlerinin baskın gelmesi özellikle 60° açılı kanatçıklı kanallarda akışkan sıcaklığının daha da düşmesine sebebiyet vermektedir.

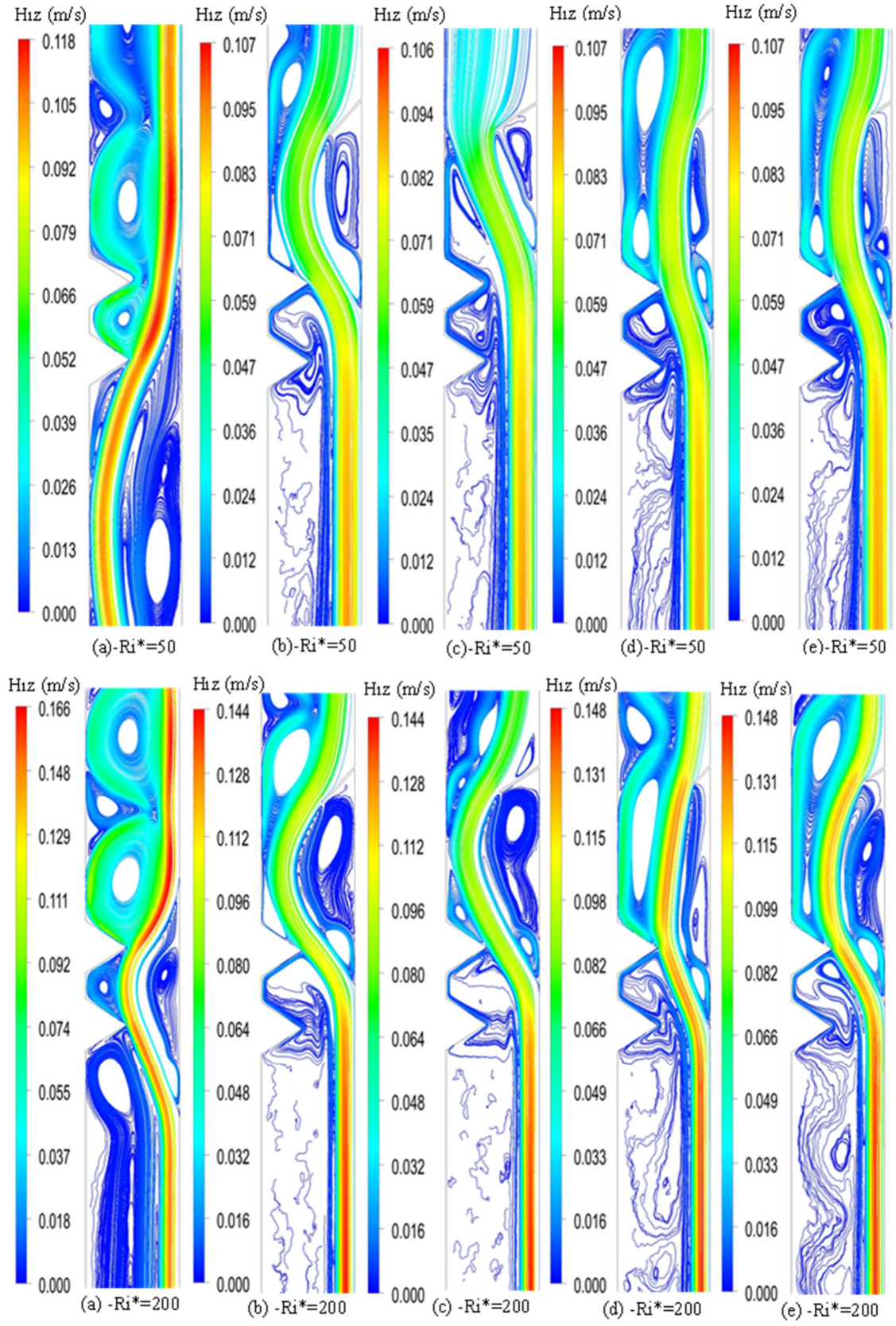


Şekil 5. Kanal boyunca ortalama akışkan sıcaklığının (T_m) Ri* sayısı, kanatçık açısı ve AGM oranına göre değişimi (a) AGM=2 (b) AGM=4

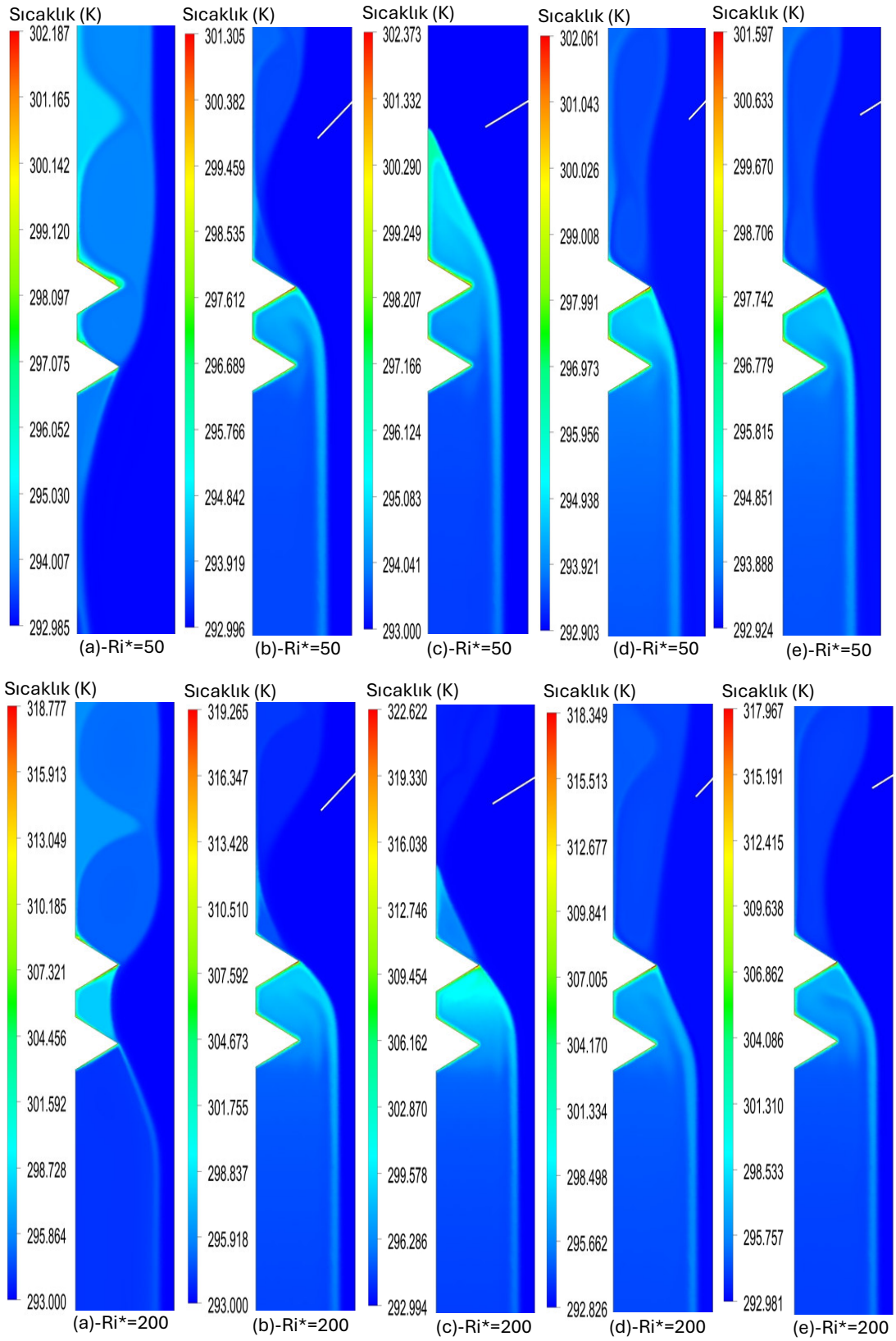
Şekil 6' da Re=1000' de Ri* sayısının 50 ve 200 değerleri ve ϕ=45° ve 60° yönlendirici kanatçık açıları ve AGM=2 ve 4 için hız-akım çizgisi konturu dağılımları sergilenmektedir.

Hız-akım konturu dağılımlarında kanal içerisinde engeller etrafında oluşan girdap bölgelerinin görselleştirilmesi daha açık ve net bir şekilde gerçekleştirilebilmektedir. Kanatçıksız durumda her iki Ri* sayısı için de yerçekimi yönündeki zorlanmış taşınım akımları engellere doğru yönelebilmektedir. Ancak, kanala kanatçık eklendiğinde akış yönlendirmesinin engele doğru daha iyi ve etkili bir biçimde olması beklenirken; düşük Ri* (Ri*=50) sayısında dahi engel aralarında oluşan doğal taşınım kaynaklı girdap hareketleri zorlanmış akış hareketinin engele olan etkisini azaltmaktadır. AGM=4 için 45^o kanatçık açısı yanında özellikle 60^o açıda engeller arasındaki girdap hareketleri şiddetlenmektedir. Ri* sayısının 200 olduğu değerdeki hız-akım konturu dağılımlarına bakıldığında; doğal taşınım kaynaklı girdapların kapladıkları alan açısından büyüdükleri ancak zorlanmış akış içerisindeki hız artışları nedeniyle şiddetlerinin Ri*=50 ile kıyaslandığında azaldıkları görülmektedir. Bununla birlikte, AGM=4 için 60^o kanatçık açılı durumda diğer kanatçık açılarına göre kanal sonuna doğru girdap hareketlerinin artışı dikkat çekmektedir. Bu nedenle, özellikle alt engel etrafında akışkan hareketliliğinde azalma oluşmakta ve bu durum da akışkana olan ısı transferini olumsuz yönde etkilemektedir.

Re=1000 için Ri* sayısının 50 ve 200 değerlerinde kanatçıksız ve üst sağ taraf yüzeyine 45^o ve 60^o açılarında kanatçık yerleştirilmiş dikey kanalların 2 ve 4 AGM oranlarında sıcaklık konturu dağılımları Şekil 7’ de verilmektedir. Her iki Ri* sayısı için kanatçıksız durumda engellerden akışkana olan ısı transferi sonucu akışkanın sıcaklığı artmaktadır. Bununla birlikte, kanala kanatçık eklendiğinde AGM=2 için her iki açı ve Ri* sayısı değerlerinde de kanaldaki akışkan sıcaklıkları yüksek iken; AGM değeri 4’ e çıkarıldığında özellikle Ri*=200 değeri için doğal taşınım akımlarının zorlanmış taşınım akımlarına üstünlük sağlayamaması nedeniyle engelden olan ısı transferi azaldığından kanaldaki akışkan sıcaklığı da düşmektedir. Bu durum, kanaldaki ısı transferinin artırılması açısından engeller etrafındaki kaldırma kuvveti kaynaklı akışkan hareketleri azaltılmadan; zorlanmış akışı da teşvik edici Re sayısı değerlerinin belirlenmesinin gerekli olduğunu kanıtlamaktadır.



Şekil 6. Hız-akım çizgisi konturu dağılımları Ri*=50 ve 200 ve Re=1000 için (a) kanatçıksız kanal (b) **ϕ**=45º, AGM=2 (c) **ϕ**=60º, AGM=2 (d) **ϕ**=45º, AGM=4 (e) **ϕ**=60º, AGM=4



Şekil 7. Sıcaklık konturu dağılımları Ri*=50 ve 200 ve Re=1000 için (a) kanatçıksız kanal (b) **ϕ**=45º, AGM=2 (c) **ϕ**=60º, AGM=2 (d) **ϕ**=45º, AGM=4 (e) **ϕ**=60º, AGM=4

GENEL SONUÇLAR VE DEĞERLENDİRME

Isınmış eşkenar üçgen engellerin olduğu dikey bir kanalda doğal ve zorlanmış taşınımın oluşturduğu akış hareketleriyle ısı transferinin incelendiği bu çalışmadan elde edilen sonuçlar aşağıdaki gibi özetlenebilir:

-Ri* sayısının artışıyla artan Gr sayısına bağlı olarak kaldırma kuvvetlerinin artışıyla her iki AGM oranı için de Nu_m sayısı artmaktadır.

-Akışkanı engel yüzeylerine yönlendirmek amacıyla kanalın sağ üst kısmına kanatçık yerleştirildiğinde; doğal taşınım nedeniyle engeller etrafında ve aralarında oluşan girdaplar yerçekimi yönünde hareket eden ve kanalın üst kısmından gelen zorlanmış akışla baskılanmaktadır.

-Bu durum da engeller etrafında akışkan hareketini kısıtlayarak akışkanın ısınmasına neden olarak ısı transferini azaltmaktadır.

-AGM' nin 2 olduğu yani kanatçığın uzun olduğu durum için kanatçıklı kanallarda kanatçıksıza göre Nu_m sayısının azalma oranı düşük iken; AGM=4 olduğunda kanatçığın akışı doğal taşınım nedeniyle oluşan girdaplar nedeniyle ikili engele yönlendirebilme yeteneği azalmaktadır.

-Özellikle yönlendirici kanatçık açısı 60^o olduğunda engeller etrafında meydana gelen yoğun girdap hareketleri, Nu_m sayısının kanatçıksız duruma göre daha da azalmasını sağlamaktadır.

-Re=1000 için Ri*=150 ve AGM=4' de kanatçıksız dikey kanala göre 60^o ve 45^o açılı kanatçıklı kanallarda Nu_m sayısı değeri sırasıyla %13 ve %5,58 azalış sergilemektedir.

- AGM (Akış Geçiş Mesafesi) oranının 2 olduğu durumda akışkan sıcaklıkları birbirine oldukça yakın iken; 4 olduğunda kanatçıksız duruma göre akışkan sıcaklıkları daha düşük değerlerde olmaktadır.

-Ri* sayısının artışıyla doğal taşınım kaynaklı kaldırma kuvvetlerinin baskın gelmesi özellikle 60^o açılı kanatçıklı kanallarda akışkan sıcaklığının daha da düşmesine sebebiyet vermektedir.

Sonuç olarak; kanaldaki ısı transferinin artırılması açısından engeller etrafındaki kaldırma kuvveti kaynaklı akışkan hareketleri azaltılmadan; zorlanmış akışı da teşvik edici Re sayısı değerlerinin belirlenmesi gereklidir.

TEŞEKKÜR

Bu çalışma, Sivas Cumhuriyet Üniversitesi Bilimsel Araştırma Projeleri (CÜBAP) birimi tarafından STBMYO-2024-005 proje numarası ile desteklenmiştir.

KAYNAKÇA

Alnak, D.E., Karabulut, K. Investigation of heat transfer increment in electronic system surfaces by different air jet impingement applications, Journal of Engineering Thermophysics, 33 (1), 161-185, (2024).

Auletta A., Manca O., Morrone B., Naso V., Heat transfer enhancement by the chimney effect in a vertical isoflux channel, International Journal of Heat and Mass Transfer, 44 (22), 4345–4357, (2001).

Boutina L., Bessaih R., Numerical simulation of mixed convection air cooling of electronic components mounted in an inclined channel, Applied Thermal Engineering, 31 (11-12), 2052-2062, (2011).

Choi, C.Y., Ortega, A. Mixed convection in an inclined channel with a discrete heat source, International Journal of Heat and Mass Transfer 36, 3119-3134, (1993)

Jang J.H., Yan W.M., Mixed convection heat and mass transfer along a vertical wavy surface, International Journal of Heat and Mass Transfer, 47 (3), 419-428, (2004).

Lee J.S., Ha M.Y., Min J.K., Numerical study on the mixed convection around inclined-pin fins on a heated plate in vertical channels with various bypass ratios, Case Studies in Thermal Engineering, 27, 101310, (2021).

Papanicolaou, E., Jaluria, Y. Mixed convection from a localized heat source in a cavity with conducting walls: a numerical study, Numerical Heat Transfer, Part A (23), 463-484, (1993).

Rosas, I.Y., Trevino, C., Martinez-Suastegui, L. Experimental study of mixed convection heat transfer in a vertical channel with a one-sided semicylindrical constriction with prescribed heat flux, International Journal of Heat and Fluid Flow, 67, 155-167, (2017).

Özdemir, S., Kılıç, M., Çalışır, T., Başkaya, Ş. Numerical investigation of enhancing mixed convection heat transfer by using semicylindrical obstacles in a vertical channel, Journal of the Faculty of Engineering and Architecture of Gazi University, 38 (3), 1805-1820, (2023).

Wetzel T., Wagner C., Buoyancy-induced effects on large-scale motions in differentially heated vertical channel flows studied in direct numerical simulations, International Journal of Heat and Fluid Flow, 75, 14-26, (2019).

Zhang W., Wei Y., Yu P., Zhu Z., Numerical investigation on buoyancy-driven flow over a circular cylinder in a channel with nonparallel walls, Numerical Heat Transfer, Part A: Applications, 82 (6), 299-316, (2022).

GÜNEŞ ENERJI SANTRALLERINDE FARKLI PARAMETRELERE BAĞLI OLARAK KABLO KAYIPLARININ HESAPLANMASI

Musa AYDEMİR
Fırat Üniversitesi, Fen Bilimleri Enstitüsü, Ekobilişim Anabilim Dalı
ORCID: 0000-0002-4915-863X

Prof. Dr. Hüseyin BENLİ
Fırat Üniversitesi, Teknik Bilimler Meslek Yüksekokulu, Otomotiv Teknikerliği Programı
ORCID: 0000-0002-4057-8750

ÖZET
Güneş enerji santralleri (GES), yenilenebilir enerji kaynakları arasında önemli bir yer tutar ve sürdürülebilir enerji üretimi açısından büyük potansiyele sahiptir. Güneş enerjisi, çevre dostu ve sürdürülebilir bir enerji kaynağı olarak hızla artan enerji talebine cevap verebilecek önemli bir alternatiftir. GES, güneş panelleri aracılığıyla güneş ışığını elektrik enerjisine dönüştürerek bu enerji kaynağından yararlanmayı mümkün kılar. Ancak, güneş enerjisinin verimli bir şekilde kullanılması, sistemde meydana gelen enerji kayıplarının minimize edilmesini gerektirir. Bu kayıpların önemli bir kısmı, elektrik enerjisinin güneş panellerinden enerji depolama veya dağıtım noktalarına iletimi sırasında kablolar üzerinde meydana gelir. GES'lerin verimli çalışabilmesi için sistemdeki tüm bileşenlerin, özellikle elektrik enerjisinin taşınmasında kritik rol oynayan kabloların, optimal bir şekilde tasarlanması ve kullanılması gereklidir. Kablo kayıpları, güneş enerji santrallerinin toplam verimliliğini etkileyen önemli faktörlerden biridir. Kablo kayıplarının minimize edilmesi için aşağıdaki temel önerileri içermektedir:
Kablo Uzunluğu: Kablo uzunluğunun azaltılması, direnci ve dolayısıyla enerji kayıplarını düşürür.
Kesit Alanı: Daha büyük kesit alanına sahip kablolar kullanmak, direnç değerini düşürerek kayıpları azaltır.
Malzeme Seçimi: Düşük dirençli malzemeler kullanmak, enerji kayıplarını azaltır.
Akım Yoğunluğu: Akım yoğunluğunu düşürmek için uygun kesitte kablolar seçilmeli ve sistemin genel tasarımı optimize edilmelidir.
Çevresel Koşullar: Kablonun yerleştirildiği çevresel koşullar (sıcaklık, nem vb.) dikkate alınarak uygun izolasyon ve koruma önlemleri alınmalıdır.
Bu makale, güneş enerji santrallerinde farklı parametrelere bağlı olarak kablo kayıplarının nasıl hesaplandığını ve bu kayıpların en aza indirilmesi için dikkate alınması gereken unsurları incelenmektedir.
Anahtar Kelimeler: Güneş enerji santrali (GES), Güneş paneli, Kablo kayıpları, Elektrik enerjisi

CALCULATION OF CABLE LOSSES IN SOLAR POWER PLANTS DEPENDING ON DIFFERENT PARAMETERS

ABSTRACT
Solar power plants (SPPs) have an important place among renewable energy sources and have great potential for sustainable energy production. Solar energy is an important alternative that can respond to the rapidly increasing energy demand as an environmentally friendly and sustainable energy source. SPP makes it possible to utilize this energy source by converting

sunlight into electrical energy through solar panels. However, the efficient use of solar energy requires minimizing the energy losses that occur in the system. A significant portion of these losses occur on cables during the transmission of electrical energy from solar panels to energy storage or distribution points. In order for SPPs to operate efficiently, all components in the system, especially the cables that play a critical role in the transportation of electrical energy, must be optimally designed and used. Cable losses are one of the important factors affecting the overall efficiency of solar power plants. It includes the following basic recommendations for minimizing cable losses:
Cable Length: Reducing cable length reduces resistance and therefore energy losses.
Cross-Sectional Area: Using cables with larger cross-sectional area reduces losses by lowering the resistance value.
Material Selection: Using low resistance materials reduces energy losses.
Current Density: To reduce the current density, cables of appropriate cross-section should be selected and the overall design of the system should be optimized.
Environmental Conditions: Appropriate insulation and protection measures should be taken considering the environmental conditions (temperature, humidity, etc.) where the cable is placed.
This paper examines how cable losses are calculated in solar power plants depending on different parameters and the factors that should be considered to minimize these losses.
Keywords: Solar power plant (SPP), Solar panel, Cable losses, Electric energy

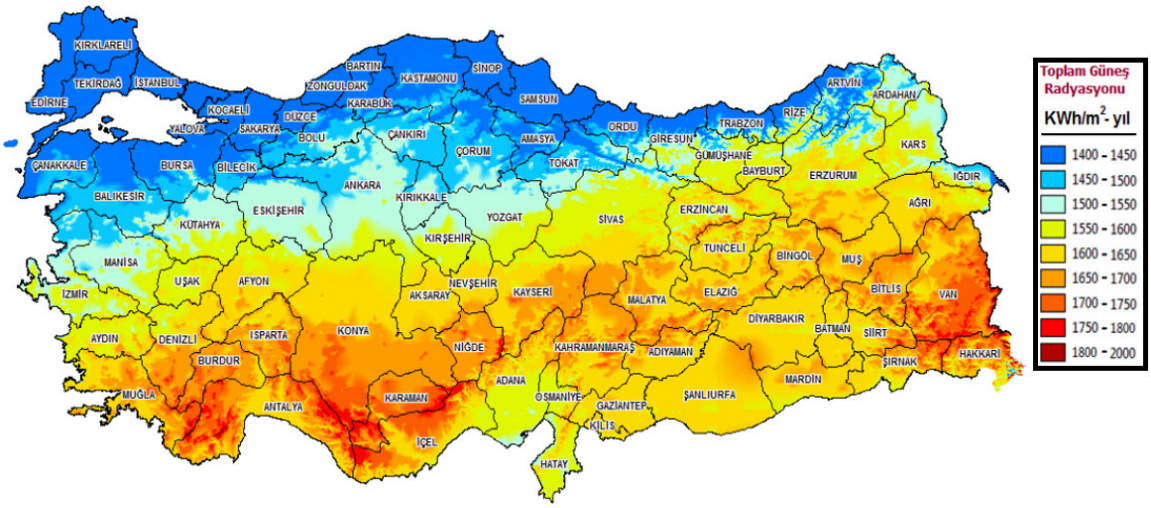
GİRİŞ

Nüfus artışı, hızlı sanayileşme, kentleşme ve teknolojik gelişmeyle birlikte doğal kaynaklara ve daha fazla enerjiye gereksinim duyulmaktadır [1].
Sürekli artan enerji talebini karşılamak amacıyla mevcut enerji kaynaklarının yanı sıra alternatif enerji kaynakları da kullanılmaya başlanmıştır. [2]. Bu bağlamda, güneş enerjisi, temiz ve sürdürülebilir bir enerji kaynağı olarak öne çıkmaktadır. Güneş enerjisi, fosil yakıtlara bağımlılığı azaltma ve karbon ayak izini küçültme potansiyeline sahip olduğundan, küresel enerji stratejilerinde önemli bir rol oynamaktadır. Güneş enerjisi santralleri (GES) temiz ve yenilenebilir enerji kaynakları arasında önemli bir yere sahip olmaktadır[3]. Güneş enerji santrali (GES), temiz ve yenilenebilir enerji kaynakları arasında önemli bir yer tutmaktadır. Güneş enerjisinin elektrik enerjisine dönüştürülmesi sürecinde, sistem verimliliğini etkileyen çeşitli faktörler bulunmaktadır. Bu faktörlerden biri de enerji iletiminde meydana gelen kablo kayıplarıdır [4]. Kablo kayıpları, güneş panellerinden üretilen elektrik enerjisinin, depolama ünitelerine veya dağıtım noktalarına iletilmesi sırasında çeşitli nedenlerle ortaya çıkan enerji kaybını ifade eder.
GES'te enerji iletimi sırasında meydana gelen enerji kayıplarının en önemli nedenlerinden biri kablo kayıplarıdır. Kablo kayıpları, iletim hatlarındaki direnç nedeniyle elektrik enerjisinin ısıya dönüşmesi sonucu oluşur ve bu kayıpların minimize edilmesi, sistem verimliliğini artırmak için kritik öneme sahiptir. Kablo kayıplarını etkileyen başlıca faktörler arasında kablo uzunluğu, kesit alanı, malzeme direnci, akım yoğunluğu ve çevresel koşullar bulunmaktadır. Her bir faktörün kablo kayıpları üzerindeki etkisi doğru bir şekilde analiz edilmeli ve uygun tasarım çözümleri ile minimize edilmelidir. GES'te enerji verimliliğini artırmak ve enerji kayıplarını minimize etmek için kablo kayıplarının doğru bir şekilde hesaplanması ve optimize edilmesi gerekmektedir. Bu bağlamda, kablo kayıplarını etkileyen başlıca parametreler arasında kablo uzunluğu, kesit alanı, malzeme direnci, akım yoğunluğu ve çevresel koşullar yer almaktadır. Her bir parametre, kablo kayıplarını farklı şekillerde etkileyerek toplam sistem verimliliğini belirleyici rol oynar.

Güneş enerjisi, bu alternatif enerji kaynaklarının en önemlilerinden biri olarak öne çıkmaktadır. Güneşin çekirdeğinde oluşan füzyon süreci ile birlikte açığa çıkan ışıma enerjisi, Dünya yüzeyinde yaklaşık 0-1000 W/m² değerleri arasında değişim göstermektedir [5].

Ülkemiz coğrafi konumu nedeniyle önemli bir güneş enerjisi potansiyeline sahiptir. Bakanlığın hazırladığı Türkiye Güneş Enerjisi Potansiyeli Atlası'na (GEPA) göre yıllık ortalama toplam güneşlenme süresi 2.741 saat, yıllık ortalama toplam ışınım değeri ise 1.527,46 kWh/m² olarak hesaplanmıştır. Bu potansiyel, güneş enerjisine dayalı elektrik üretimi için büyük bir avantaj sağlamaktadır [5].

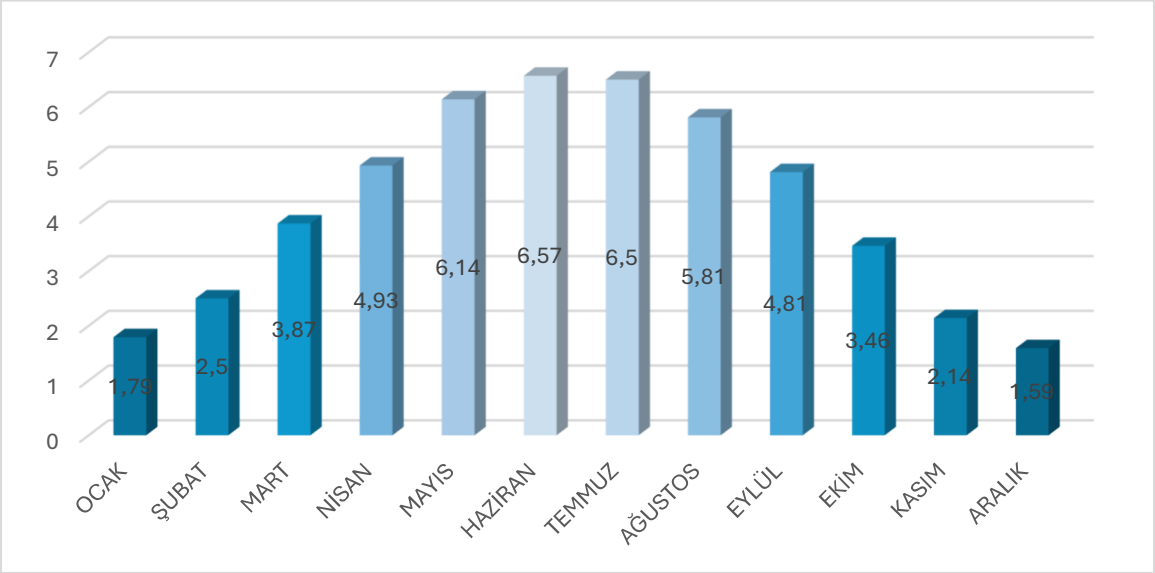
GEPA'da yer alan genel potansiyel görünümü ve aylık ortalama global radyasyon dağılımı, güneş enerjisi yatırımlarının planlanması ve optimizasyonu için kritik bilgiler sunmaktadır. Türkiye'nin farklı bölgelerinde güneş enerjisi potansiyeli farklılık göstermekte olup, özellikle güney ve iç bölgeler, daha yüksek güneşlenme süresi ve ışınım değerlerine sahiptir. GEPA'da yer alan genel potansiyel görünümü aşağıda yer almaktadır.



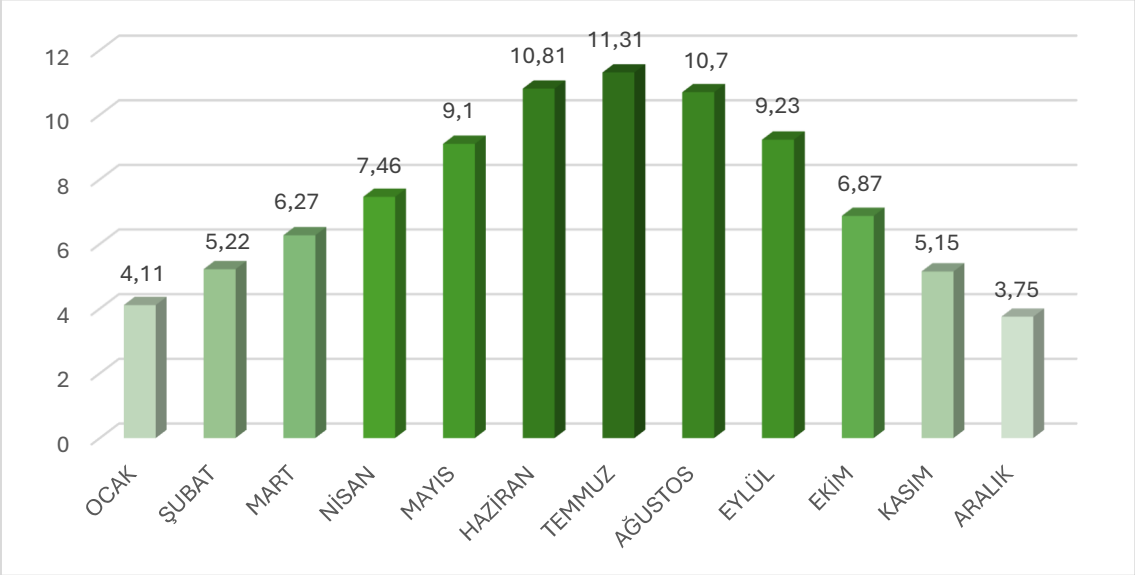
Şekil 1. Genel potansiyel görünümü ve aylık ortalama global radyasyon dağılımı [5].

Bu veriler, Türkiye'nin güneş enerjisi potansiyelinin değerlendirilmesi ve güneş enerji santrallerinin kurulumu için ideal bölgelerin belirlenmesi açısından büyük önem taşımaktadır. GEPA'da yer alan aylık ortalama global radyasyon dağılımı, yılın farklı dönemlerinde güneş enerjisi üretim kapasitesinin nasıl değiştiğini göstermekte ve bu veriler, güneş enerjisi sistemlerinin tasarımı ve işletimi için değerli bilgiler sunmaktadır.

GEPA'da sunulan haritalar ve grafikler, Türkiye'nin farklı bölgelerinde güneş enerjisi potansiyelinin coğrafi dağılımını ve aylık değişimlerini detaylı bir şekilde göstermektedir. Bu bilgiler, güneş enerjisi projelerinin planlanması sırasında dikkate alınarak, en verimli enerji üretim alanlarının belirlenmesine yardımcı olur. Akdeniz ve Güneydoğu Anadolu bölgeleri, yüksek güneşlenme süreleri ve ışınım değerleri ile öne çıkmaktadır. Aylık ortalama global radyasyon dağılımı ve güneşlenme süreleri aşağıda yer almaktadır.

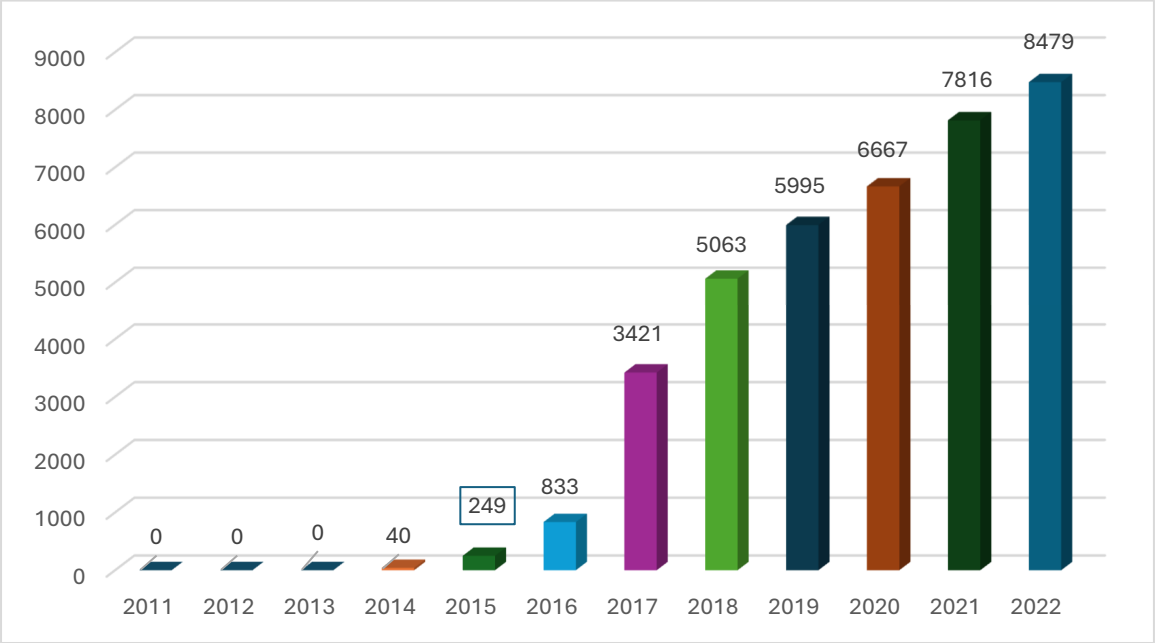


Şekil 0. Aylık ortalama radyasyon değeri (kWh/m^2) [5].

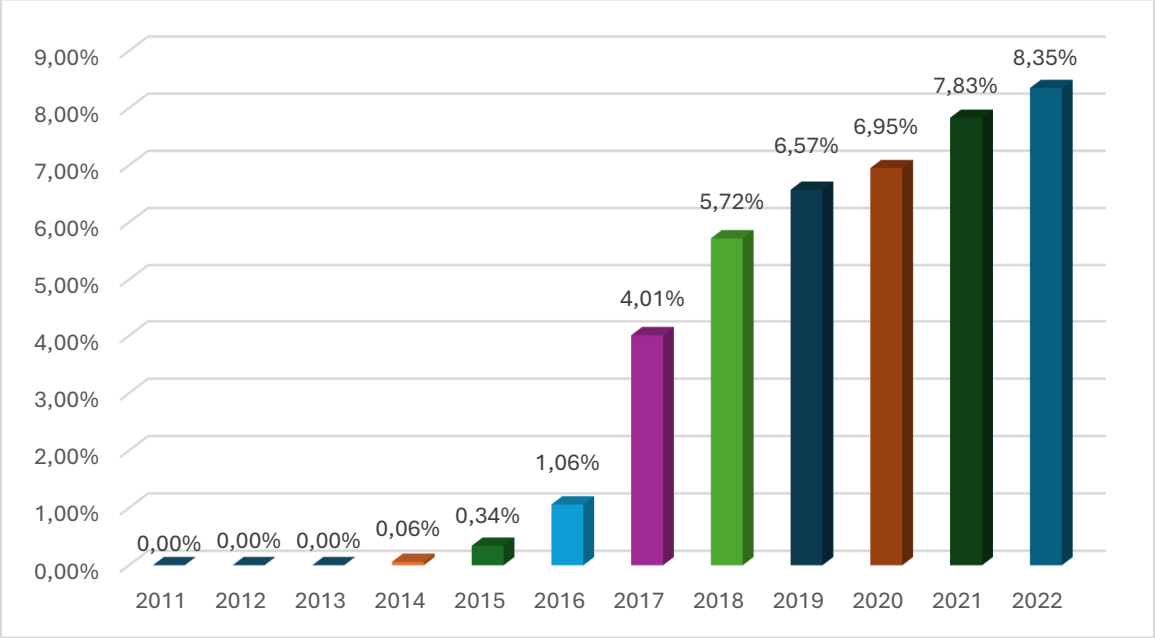


Şekil 2. Türkiye güneşleme süreleri (saat) [5].

Haziran 2022 sonu itibarıyla Türkiye'de güneş enerjisi kurulu gücü 8.479 MW'a ulaşarak toplam kurulu gücün %8,35'ini oluşturmaktadır. Kurulu gücün yıllara göre değişimi ve toplam kurulu güç içindeki payı aşağıdaki grafiklerde sunulmaktadır.



Şekil 3. Kurulu gücün yıllara göre değişimi ve toplam kurulu güç içindeki payı [5].



Şekil 4.5 Kurulu gücün yıllar içerisindeki payı [5].

Bu grafikler, Türkiye'nin güneş enerjisi yatırımlarının nasıl bir artış trendi içinde olduğunu ve güneş enerjisinin toplam enerji üretimi içindeki payının nasıl geliştiğini göstermektedir.
GES, elektrik enerjisinin üretimi ve verimli bir şekilde iletimi, sistemin genel performansını doğrudan etkileyen önemli unsurlardır. Bu bağlamda, enerji kayıplarının minimize edilmesi büyük önem taşımaktadır. Kablo kayıpları, güneş enerji santrallerinde dikkate alınması gereken başlıca enerji kayıplarındandır. Bu kayıplar, sistemin toplam verimliliğini düşürmekte ve ekonomik açıdan kayıplara yol açmaktadır.

Bu çalışmada, güneş enerji santrallerinde farklı parametrelere bağlı olarak kablo kayıplarının nasıl hesaplanacağı ve bu kayıpların en aza indirilmesi için hangi yöntemlerin kullanılabileceği incelenecektir. Çalışmada ele alınacak parametreler arasında kablo uzunluğu, kesiti, akım taşıma kapasitesi, direnç, iletkenlik ve çevresel faktörler yer almaktadır. Ayrıca, kablo kayıplarının hesaplanmasında kullanılan yöntemler ve formüller detaylı bir şekilde açıklanacaktır. Bu araştırmanın amacı, güneş enerji santrallerinin daha verimli ve ekonomik bir şekilde çalışmasını sağlayarak, yenilenebilir enerji kaynaklarının kullanımını teşvik etmektir.

MATERYAL VE METOT

Materyal

Güneş enerji santrallerinde kablo kayıplarının hesaplanmasında kullanılacak materyaller ve bileşenler şunlardır:

Güneş Panelleri (PV Modülleri)

Fotovoltaik (PV) güneş teknolojileri, güneş ışığını doğrudan elektrik enerjisine dönüştüren sistemlerdir[6]. Bu teknoloji, yarı iletken malzemeler kullanarak, güneş ışığından elde edilen fotonların enerjisini elektrik enerjisine çevirmektedir. Bu işlem, güneş hücreleri adı verilen özel birimler aracılığıyla gerçekleştirilmektedir [7]. Güneş panelleri, bir araya getirilmiş birçok güneş hücresinden oluşur. Paneller, genellikle alüminyum çerçeveler içinde yerleştirilir ve dayanıklı bir cam ile kaplanır. Bu yapı, güneş hücrelerini çevresel etkilerden korur ve uzun ömürlü olmalarını sağlar [8]. Farklı güç kapasitelerinde ve verimliliklerde güneş panelleri kullanılacaktır.

DC Kablolar

PV modüllerinden elde edilen doğru akım (DC) elektriği taşımak için kullanılan kablolardır. Genellikle bakır veya alüminyum iletkenli kablolar tercih edilir.

AC Kablolar

İnvertörler tarafından dönüştürülen alternatif akım (AC) elektriği taşımak için kullanılan kablolardır. Bu kablolar da bakır veya alüminyum iletkenli olabilir.

İnvertörler

İnvertörler, fotovoltaik sistemlerin ürettiği doğru akımı (DC), elektrik şebekesinde veya ev içi kullanımda kullanılan alternatif akıma (AC) dönüştüren cihazlardır [9]. İnvertörler, sistem verimliliği ve güvenliği açısından kritik öneme sahiptir. Piyasada dört çeşit invertör bulunmaktadır.

- Merkezi invertörler
- Mikro invertörler
- Dizi (string) invertörler
- Hibrit invertörler

Çeşitli kapasitelerde invertörler kullanılarak sistemin farklı yüklerdeki performansı ölçülecektir.

Veri Toplama ve İzleme Sistemi

Kablo kayıplarının hesaplanması ve sistem performansının izlenmesi için kullanılacak veri toplama cihazları ve sensörler.

Metot

Güneş enerji santrallerinde kablo kayıplarının hesaplanması için izlenecek yöntemler aşağıda detaylandırılmıştır:

Kablo Direncinin Hesaplanması

Kablonun direnci (R), kablonun uzunluğu (L), kesiti (A) ve iletkenlik katsayısı (ρ) kullanılarak hesaplanacaktır. Direnç hesaplama formülü şu şekildedir:

$R=\rho AL$

ρ (Ohm.m): Kablo malzemesinin iletkenlik katsayısı (örneğin, bakır için 1.68 x 10^-8 Ωm, alüminyum için 2.82 x 10^-8 Ωm).

L (m): Kablonun uzunluğu.

A (m²): Kablonun kesit alanı.

Güç Kaybının Hesaplanması

Kontrolcü tasarlanırken, sabit durum hatası ve salınımı minimize etmesi hedeflenmiştir. Sistem klasik PID denetleyici, kök konum kontrolü, frekans alanı, kontrol yöntemleri kullanılarak sistem denetlenmiştir.

Taşınan akım (I) ve kablo direnci (R) kullanılarak güç kaybı (P) hesaplanacaktır. Güç kaybı hesaplama formülü şu şekildedir:

$P=I^2\times R$

I (A): Kablodan geçen akım.

R (Ω): Kablonun direnci.

Verimlilik Hesaplamaları

GES'in genel verimliliği, üretilen enerji miktarı ve kayıplar dikkate alınarak hesaplanacaktır. Verimlilik hesaplama formülü şu şekildedir:

Verimlilik= Çıkış gücü / Giriş gücü x 100%

Çıkış Gücü: İnvertör çıkışında ölçülen AC elektrik gücü.

Giriş Gücü: PV paneller tarafından üretilen DC elektrik gücü.

Çevresel Faktörlerin Etkisi

Çevresel faktörlerin kablo kayıpları üzerindeki etkisi, sıcaklık, nem ve diğer atmosferik koşullar göz önünde bulundurularak analiz edilecektir. Bu analizde, kablo sıcaklığının artması durumunda direncin nasıl değiştiği ve buna bağlı olarak güç kayıplarının nasıl etkilendiği incelenecektir.

Deneysel Kurulum

Gerçek saha koşullarında kablo kayıplarının doğrulanması için deneysel bir kurulum yapılacaktır. Bu kurulumda, farklı uzunluk ve kesitlerde kablolar kullanılarak enerji kayıpları ölçülecek ve teorik hesaplamalarla karşılaştırılacaktır.

BULGULAR VE TARTIŞMA

Bulgular

Güneş enerji santrallerinde farklı parametrelere bağlı olarak yapılan kablo kayıpları hesaplamaları sonucunda elde edilen bulgular şu şekilde özetlenebilir:

Kablo Uzunluğunun Etkisi

Kablo uzunluğu arttıkça, kablo direnci ve dolayısıyla güç kayıpları da artmıştır.

50 metrelik bakır kablo ile 100 metrelik bakır kablo arasında yaklaşık %50 daha fazla güç kaybı gözlemlenmiştir.

Kablo Kesitinin Etkisi

Daha büyük kesitli kablolar, aynı akımı taşırken daha düşük direnç sunarak güç kayıplarını azaltmıştır.

4 mm² kesitli bakır kablo ile 6 mm² kesitli bakır kablo karşılaştırıldığında, daha büyük kesitli kablonun %30 daha az güç kaybına sahip olduğu görülmüştür.

Malzeme Türünün Etkisi

Bakır kablolar, alüminyum kablolara göre daha düşük direnç sunmuş ve dolayısıyla daha az güç kaybı yaşanmıştır.

Aynı uzunluk ve kesitteki bakır ve alüminyum kablolar karşılaştırıldığında, bakır kablonun yaklaşık %40 daha az güç kaybı oluşturduğu belirlenmiştir.

Akım Taşıma Kapasitesi

Kablo üzerinden geçen akım arttıkça, ısı nedeniyle güç kayıpları da artmıştır.

Yüksek akımlı sistemlerde, kablo kesitinin doğru seçilmemesi durumunda önemli derecede güç kayıpları meydana gelmiştir.

Çevresel Faktörler

Yüksek sıcaklıklar, kablo direncini artırarak güç kayıplarını artırmıştır.

25°C ile 45°C arasındaki sıcaklık değişimlerinde, kablo kayıplarının %10'a kadar artış gösterdiği gözlemlenmiştir.

TARTIŞMA

Kablo Uzunluğu ve Kesiti

Kablo uzunluğunun ve kesitinin doğru seçimi, güneş enerji santrallerinin verimliliği üzerinde önemli bir etkiye sahiptir. Uzun kabloların kullanılması durumunda, güç kayıplarını minimize etmek için daha büyük kesitli kabloların tercih edilmesi gerekmektedir. Bu çalışma, uzun kabloların daha büyük kesitlerle kombinlenmesi gerektiğini ve bu şekilde enerji kayıplarının önemli ölçüde azaltılabileceğini göstermektedir.

Malzeme Seçimi

Bakır ve alüminyum gibi iletken malzemeler arasındaki farklar, enerji kayıplarını doğrudan etkilemektedir. Bakır kablolar, daha düşük iç dirençleri sayesinde alüminyum kablolara kıyasla daha az enerji kaybına neden olmaktadır. Ancak, bakırın maliyeti alüminyuma göre daha yüksektir. Bu nedenle, maliyet-etkin bir çözüm için kablo seçimi yapılırken, enerji kayıpları ile kablo maliyetleri arasında bir denge sağlanmalıdır.

Akım Taşıma Kapasitesi ve Isınma

Kabloların taşıyabileceği maksimum akım miktarının üzerinde çalıştırılması, aşırı ısınmaya ve dolayısıyla daha yüksek güç kayıplarına yol açmaktadır. Bu çalışmada, yüksek akım taşıma kapasitesine sahip kabloların kullanılması ve sistem yükünün bu kapasitenin altında tutulması gerektiği vurgulanmaktadır. Ayrıca, ısınma probleminin önüne geçmek için kablo izolasyonu ve çevresel koşulların dikkate alınması önemlidir.

Çevresel Faktörler

Çevresel faktörlerin kablo performansı üzerindeki etkisi, özellikle sıcaklık artışının kablo direncini artırması, güç kayıplarını da artırmaktadır. Bu durum, güneş enerji santrallerinin kurulu olduğu bölgelerdeki iklim koşullarının kablo seçiminde önemli bir kriter olduğunu göstermektedir. Yüksek sıcaklıklara dayanıklı kabloların kullanılması ve kabloların uygun şekilde izole edilmesi, bu kayıpların azaltılmasına katkıda bulunabilir.

SONUÇ

Bu çalışmada Bu çalışma, güneş enerji santrallerinde farklı parametrelere bağlı olarak kablo kayıplarının nasıl hesaplandığını ve bu kayıpların minimize edilmesi için dikkate alınması gereken faktörleri incelemiştir.

Güneş enerji santrallerinin verimliliği üzerinde büyük etkiye sahip olan kablo kayıplarını azaltmak için doğru kablo seçimi ve tasarımı büyük önem taşımaktadır. Çalışmanın ana bulguları ve sonuçları şu şekilde özetlenebilir:

Kablo Uzunluğu ve Kesiti
Kablo uzunluğu arttıkça direnç ve dolayısıyla güç kayıpları da artmaktadır. Bu nedenle, uzun kablolar kullanılması gerektiğinde, daha büyük kesitli kabloların tercih edilmesi enerji kayıplarını önemli ölçüde azaltabilir. Kablo kesitinin doğru belirlenmesi, sistem verimliliğini artırmak için kritik öneme sahiptir.
Malzeme Seçimi
Bakır ve alüminyum gibi iletken malzemeler arasındaki farklılıklar, enerji kayıplarını doğrudan etkilemektedir. Bakır kablolar, alüminyum kablolara göre daha düşük iç direnç sunarak daha az enerji kaybına neden olmaktadır. Ancak, maliyet-fayda analizleri yapılarak en uygun malzemenin seçilmesi gerekmektedir.
Akım Taşıma Kapasitesi
Kabloların taşıma kapasitelerinin üzerinde akım taşımaları, aşırı ısınma ve enerji kayıplarına yol açmaktadır. Kabloların nominal akım taşıma kapasitelerinin altında çalıştırılması, enerji kayıplarını minimize etmek için gereklidir. Bu bağlamda, sistem tasarımı sırasında kablo kapasitesinin dikkatli bir şekilde belirlenmesi gerekmektedir.
Çevresel Faktörler
Yüksek sıcaklıklar, kablo direncini artırarak enerji kayıplarını yükseltmektedir. Bu nedenle, güneş enerji santrallerinin kurulu olduğu bölgelerdeki iklim koşulları dikkate alınarak, yüksek sıcaklıklara dayanıklı kabloların kullanılması ve uygun izolasyonun sağlanması gerekmektedir. Çevresel faktörlerin dikkate alınması, kablo performansının ve sistem verimliliğinin korunması açısından önemlidir.

Simülasyon ve Analiz
Kablo kayıplarının hesaplanması ve minimize edilmesi için yapılan simülasyon ve analizler, teorik hesaplamaların yanı sıra deneysel doğrulamaların da önemli olduğunu göstermektedir. Simülasyonlar, farklı parametrelerin etkilerini incelemek ve optimal kablo tasarımını belirlemek için güçlü bir araçtır. Ancak, gerçek saha koşullarında yapılan deneysel çalışmalar, teorik modellerin doğrulanması ve iyileştirilmesi açısından kritik öneme sahiptir.

Öneriler
Optimum Kablo Seçimi:
Kablo uzunluğu, kesiti ve malzeme türü dikkatle seçilmeli, enerji kayıplarını minimize edecek şekilde tasarlanmalıdır.
Sistem Tasarımı:
Kablo kapasitesi, taşıyacağı akım miktarına göre doğru belirlenmeli ve aşırı yüklenme durumlarından kaçınılmalıdır.
Çevresel Koşullar:
Kabloların kurulu olduğu ortamın sıcaklık, nem ve diğer çevresel koşulları dikkate alınarak, uygun izolasyon ve malzeme seçimi yapılmalıdır.
Düzenli Bakım ve Denetim:
Kabloların performansını korumak ve enerji kayıplarını minimumda tutmak için düzenli bakım ve denetim yapılmalıdır.

İleri Araştırmalar:
Farklı iklim koşullarında ve çeşitli kablo tiplerinde daha detaylı analizler yapılarak, güneş enerji santrallerinin performansını artırmaya yönelik yeni stratejiler geliştirilebilir.
Bu çalışma, güneş enerji santrallerinde kablo kayıplarının hesaplanması ve minimize edilmesi konusundaki önemli faktörleri ve stratejileri ortaya koyarak, yenilenebilir enerji sistemlerinin daha verimli ve ekonomik hale getirilmesine katkıda bulunmayı amaçlamaktadır.

KAYNAKLAR

[1] Kaya, K., Şenel, M. C., ve Koç, E. (2018). Dünyada ve Türkiye'de Yenilenebilir Enerji Kaynaklarının Değerlendirilmesi. Technological Applied Sciences, 13(3), 219-234.

[2] Yörükoğulları, E., 2013.Yenilenebilir enerji kaynakları (Ünite-1), Anadolu Üniversitesi Web-Ofset tesisleri, Eskişehir.

[3] Keçel, S., ve Yavuzcan, H. G., 2008. Türkiye"deki bölgesel sıcaklık değişimlerinin günes panellerinin verimliliğine etkisi, Gazi Üniversitesi Endüstriyel Sanatlar Eğitim Fakültesi Dergisi, 22, 12-20

[4] Chen, S., Quinn, S., Hsu, C.T. and Lehman, B., 2012. Estimation method of DC wire losses in photovoltaic systems, IEEE 34nd International Telecommunications Energy Conference (INTELEC), Scottsdale, AZ, September 2012,1-5 (in USA).

[5] https://enerji.gov.tr/eigm-yenilenebilir-enerji-kaynaklar-gunes 28.05.2024

[6] Bhol, R., Pradhan, A., Dash, R. ve Ali, S. M., 2015. Environmental effect assessment on performance of solar PV panel. Circuit, Power and Computing Technologies (ICCPCT), International Conference on. IEEE, 1-5.

[7] Oluklulu, Ç., 2001, Güneş Enerjisinden Etkin Olarak Yararlanmada Kullanılan Fotovoltaik Modüller, Boyutlandırılmaları ve Mimaride Kullanım Olanakları Üzerine Bir Araştırma, Yüksek Lisans Tezi, Gazi Üniversitesi, Fen Bilimleri Enstitüsü, Ankara..

[8] Çengel, Y., A., Kahraman, N., "Dünyada ve Türkiye'de Jeotermal, Rüzgar ve Diğer Yenilenebilir Enerji Kullanımı", Makine Mühendisleri Odası Kayseri Şubesi, Makine Bülteni, Haziran,Temmuz, Ağustos, 2001.

[9] Arslan, Ö. (2019). Yerleşkeler İçin Odaklamalı Güneş Enerji Sistemlerinden Enerji İhtiyacının Karşılanması. Süleyman Demirel Üniversitesi, Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, 81s, ISPARTA.

GERÇEK KULLANIM KOŞULLARINDA POLİKRİSTAL VE MONOKRİSTAL SİLİKON FOTOVOLTAİK HÜCRELERİN GÜNEŞ IŞINLARININ GELME AÇISINA BAĞLI SPEKTRAL TEPKİSİ

Raman JAFAROV
Yüksek Lisans Öğrencisi, Çanakkale Onsekiz Mart Üniversitesi, Lisansüstü Eğitim Enstitüsü, Enerji Kaynakları ve Yönetimi
ORCID ID: https://orcid.org/0009-0007-8520-0472

Prof. Dr. Necati KAYA
Çanakkale Onsekiz Mart Üniversitesi, Lisansüstü Eğitim Enstitüsü, Enerji Kaynakları ve Yönetimi
ORCID: 0000-0001-9461-7623

Özet
Nüfusun Enerji talebinin hızla artması, geleneksel kaynakların yetersizliği ve alternatif enerji kaynaklarına olan ihtiyacı artırmıştır (Sudhakar ve diğerleri, 2019). Güneş enerjisi, sürdürülebilir ve bol miktarda enerji sağlayan bir kaynak olarak öne çıkmaktadır. Fotovoltaik (FV) hücreler, güneş enerjisini doğrudan elektriğe dönüştürme kapasitesine sahip olup, son yıllarda önemli ilerlemeler kaydetmiştir. FV hücrelerinin verimliliği güneş ışık şiddeti, panel eğimi, sıcaklık, gölgeleme, konum, toz ve kir gibi faktörlere bağlıdır. İlk nesil silikon hücrelerin %6 civarındaki verimliliği, modern FV hücrelerinde %14-20 aralığına ulaşmıştır (Cuce ve Bali, 2010). Bu gelişim, maliyetlerin düşmesi ve enerji kıtlığı gibi etkenlerle hızlanmıştır. Demirtaş (2006), güneş takip sistemlerinin sabit panellere göre daha yüksek verimlilik sağladığını, Erkul (2010) monokristal, polikristal ve amorf-silisyum panellerin güç verimliliklerini karşılaştırmıştır. Kaddoura ve diğerleri (2016), Suudi Arabistan'daki şehirlerde güneş radyasyonunu maksimize edecek optimum panel eğim açısını belirlemiş, Zaihidee ve diğerleri (2016) ise toz birikiminin FV panellerin verimliliği üzerindeki olumsuz etkilerini incelemişlerdir. Bu çalışmada, FV sistemlerin verimliliği güneş radyasyonunun dalga boyuna, hücre tasarımı ve silikon tipine bağlı olarak incelenmiştir. Hücre dizilimi ve panel boyutunun yanı sıra güneş ışık şiddeti, panel eğimi, sıcaklık, gölgeleme, konum, toz ve kir gibi dış faktörlerin etkileri değerlendirilmiştir. Literatürde malzeme türü, güneş ışınımı ve sıcaklık katsayısı gibi konularda birçok çalışma bulunmakla birlikte, bu çalışmada polikristal ve monokristal silikon FV hücrelerin güneş ışınlarının gelme açısına bağlı spektral tepkisi ölçülmüştür. Çalışmanın amacı, farklı renkte filtreler kullanarak bu iki tip FV modülün spektral tepkilerini belirlemek ve hangi tür panelin hangi eğim açısında daha verimli olduğunu ortaya çıkarmaktır. Bu araştırma, özellikle sabah ve akşam saatlerinde FV panel verimliliklerinin optimizasyonuna yönelik önemli veriler sağlayacaktır. Deneyler, Çanakkale 18 Mart Üniversitesi'nde gerçekleştirilerek, paneller optimum eğimde monte edilmiştir. Farklı filtrelerle yapılan ölçümler sabah ve akşam saatlerinde karşılaştırılarak ve filtresiz paneller kontrol grubu olarak kullanılmıştır.
Anahtar Kelimeler: Alternatif, Fotovoltaik, Polikristal, Monokristal, Spektral Tepki, Silikon Hücre, FV Panel, PV Panel, Filitre

SPECTRAL RESPONSE OF POLYCRYSTALLINE AND MONOCRYSTALLINE SILICON PHOTOVOLTAIC CELLS IN REAL USE CONDITIONS DEPENDS ON THE ANGLE OF INCOMING SUNLIGHT

ABSTRACT

The rapid increase in the energy demand of the population has increased the inadequacy of traditional resources and the need for alternative energy sources (Sudhakar et al., 2019). Solar energy stands out as a sustainable and abundant energy source. Photovoltaic (PV) cells have the capacity to convert solar energy directly into electricity and have made significant progress in recent years. The efficiency of PV cells depends on factors such as solar irradiance, panel tilt, temperature, shading, location, dust and dirt. The efficiency of the first generation silicon cells, which was around 6%, has reached 14-20% in modern PV cells (Cuce and Bali, 2010). This development has been accelerated by factors such as decreasing costs and energy scarcity. Demirtaş (2006) reported that solar tracking systems provide higher efficiency than fixed panels, and Erkul (2010) compared the power efficiencies of monocrystalline, polycrystalline and amorphous-silicon panels. Kaddoura et al. (2016) determined the optimum panel tilt angle to maximize solar radiation in cities in Saudi Arabia, and Zaihidee et al. (2016) examined the negative effects of dust accumulation on the efficiency of PV panels. In this study, the efficiency of PV systems is analyzed depending on the wavelength of solar radiation, cell design and silicon type. In addition to cell array and panel size, the effects of external factors such as solar irradiance, panel tilt, temperature, shading, location, dust and dirt were evaluated. Although there are many studies in the literature on material type, solar irradiance and temperature coefficient, this study measured the spectral response of polycrystalline and monocrystalline silicon PV cells depending on the angle of incidence of solar radiation. The aim of the study is to determine the spectral response of these two types of PV modules using different colored filters and to reveal which type of panel is more efficient at which tilt angle. This research will provide important data for the optimization of PV panel efficiencies, especially in the morning and evening hours. The experiments were conducted at Çanakkale 18 Mart University and the panels were installed at the optimum tilt angle. Measurements with different filters were compared in the morning and evening hours and panels without filters were used as a control group.

Keywords: Alternative, Photovoltaic, Polycrystalline, Monocrystalline, Spectral Response, Silicon Cell, PV Panel, PV Panel, Filter

PERSISTENT OPTICALLY STIMULATED LUMINESCENCE FROM $CAAL_{12}O_{19}$ CERAMIC PELLETS

Assit. Prof. Dr. Volkan ALTUNAL
Cukurova University, Faculty of Arts and Sciences, Physics Department
ORCID: 0000-0001-9411-3441

Abstract
This study investigates the persistent luminescence properties of $CaAl_{12}O_{19}$-based ceramics synthesized via the sol-gel method and their trap structures with various dopant elements. Luminescence measurements were performed using Thermoluminescence (TL), Optically Stimulated Luminescence (OSL), and Linearly Modulated OSL (LM-OSL) methods. The TL glow curve, obtained after a radiation dose of 1 Gy, exhibited two prominent peaks at approximately 110 °C and 275 °C. The OSL signals remained stable even after 1000 seconds of blue light stimulation. Subsequent TL after OSL measurements indicated that all TL traps were influenced by light, whereas the OSL traps were unaffected by temperature. No luminescence signal was detected in afterglow measurements post a 1 Gy radiation dose, demonstrating the material's persistent OSL capabilities. Remarkably, the LM-OSL signals showed no decline over a period of 5000 seconds, suggesting that electrons released by light excitation from the traps were re-trapped, creating a luminescence cycle. The stability and potential dosimetric applications of the persistent OSL signals obtained from the samples were evaluated, revealing the reusability of these signals. Short-term fading measurements confirmed that there was no significant decrease in OSL signals. These findings underscore the potential of $CaAl_{12}O_{19}$-based ceramics for stable and reliable dosimetric applications, highlighting their effectiveness in persistent OSL.
Keywords: $CaAl_{12}O_{19}$, Lanthanide doping, Luminescence dosimetry, Persistent Luminescence, Radiation Measurements.

Introduction
By absorbing radiation, free electrons and holes are trapped in traps within the crystal (usually insulators or semiconductors). As a result of the recombination of electrons released by thermal or optical stimulation with holes, Thermoluminescence (TL) / Optically stimulated luminescence (OSL) emission occurs, respectively (Yukihara & McKeever, 2011). In a simple approach, measurement of the resulting luminescence provides information about the radiation dose. Although such materials are known as luminescent materials used in radiation dosimetry, they can store not only the radiation dose but also optical information for certain periods of time and then convert it into a physical signal. These materials are of great importance due to their applications in various scientific and technological fields (Bøtter-Jensen, McKeever, & Wintle, 2003).
In particular, persistent luminescence (PLUM) is characterized by the fact that light is still emitted for very long periods of time after the excitation source has been removed. Materials that provide PLUM have attracted the attention of the scientific world in many application areas, from security signs to luminescent paints, from LEDs to biomedical imaging (Salas-Juárez, Burruel-Ibarra, Gómez-Dominguez, Martínez-Gil, & Borbón-Nuñez, 2022; Wang et al., 2022). It has been reported as an alternative to TL, which is the most commonly used method in radiation dosimetry (Pérez Salas, Meléndrez, Aceves, & Barboza-Flores, 1993).

Storing information about radiation dose for long periods with PLUM has been reported as promising and attractive for in situ and real-time radiation dose measurements (Salas-Juárez et al., 2022; Wu et al., 2020).

Calcium aluminate, $CaAl_{12}O_{19}$ (CAO), known for its advanced properties, is a material with a hexagonal magnetolumbit structure with 12-fold coordinated Ca^{2+} region, and has shown promise in detector technologies, optical devices, LED and biomedical applications in recent years (Altunal et al., 2024; Singh, Gundu Rao, & Zhu, 2007; Singh et al., 2018). With appropriate doping elements, this material has been reported to offer superior OSL signals and dosimetric characteristics for OSL dosimetry application (Altunal et al., 2024). In this study, $CaAl_{12}O_{19}$ material was developed with dopant elements using the sol-gel synthesis method. The material with Tm and Mg dopant elements was found to provide persistent OSL signals, and the charge transfer mechanisms between the traps were examined in detail.

Material and Methods

In this study, $CaAl_{12}O_{19}$ ceramic pellets were prepared with and without additives by the sol-gel synthesis method. The synthesis, additive and pelletization process has been presented in detail in my previous work. The process briefly begins with dissolving Calcium Nitrate and Aluminum nitrate salts in water, then by adding Citric Acid in appropriate proportions, gel formation is achieved at a low temperature (approximately 80 °C). Following the drying of the gel, the material production process is completed after 2 hours of calcination at 900 °C and 4 hours of sintering at 1400 °C, respectively.

Luminescence measurements of the developed samples were carried out on the DA-20 model Riso TL/OSL reader system, and all presented luminescence signals were obtained using the Hoya U-340 filter with UV region emission transmittance. The system has a $^{90}Y/^{90}Sr$ beta source as a radiation source. Approximately 9 s of exposure corresponds to 1 Gy and is equipped with blue LEDs for light stimulation.

Results and Discussions

TL signals of CAO:Tm,Mg

Figure 1 shows a simple TL glow curve of CAO:Tm,Mg pellets. TL curve was obtained after 1 Gy beta radiation of CAO:Tm,Mg pellets without preheat at a heating rate of 3 °C/s from room temperature to 650 °C. As can be seen from the figure, the TL curve is represented by a relatively more sensitive peak in the UV region at 110 °C and a high-temperature peak located at 275 °C. Although the sensitive peak located at 110 °C was also seen for different formations of CAO in previous study (Altunal et al., 2024), the 275 °C TL peak was not found.

To examine whether the TL peaks occur from a trap level, thermal cleaning measurement was carried out and is presented in Figure 2. The CAO:Tm,Mg sample was reset after the basic TL curve was obtained after a 1 Gy dose and was exposed to a 1Gy dose again. Then, a 10 s preheat treatment was applied at 120 °C and the TL reading was measured again, starting from room temperature. The same experimental process was repeated for a 10 s preheat process at 280 °C, and the TL curves obtained after preheat were subtracted from the "basic TL curve" and presented. As can be seen from the figure, the sample has two TL trap levels.

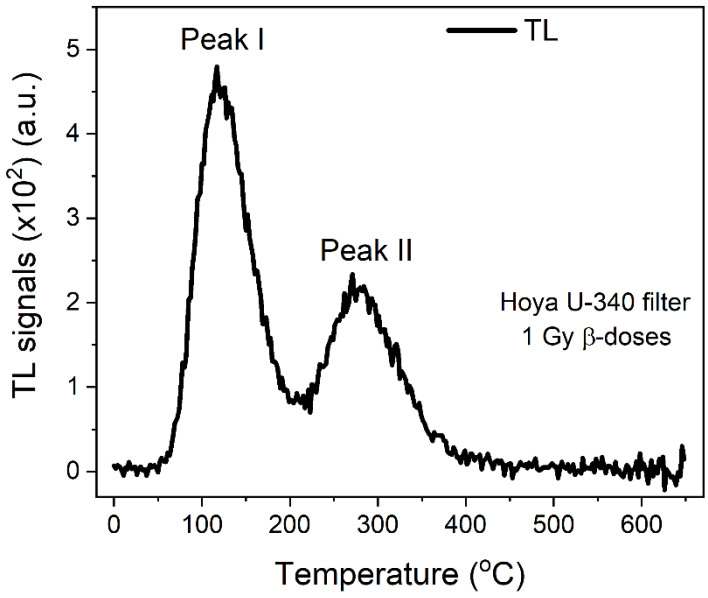


Figure 1. Basic TL glow curve of the CAO:Tm,Mg pellets

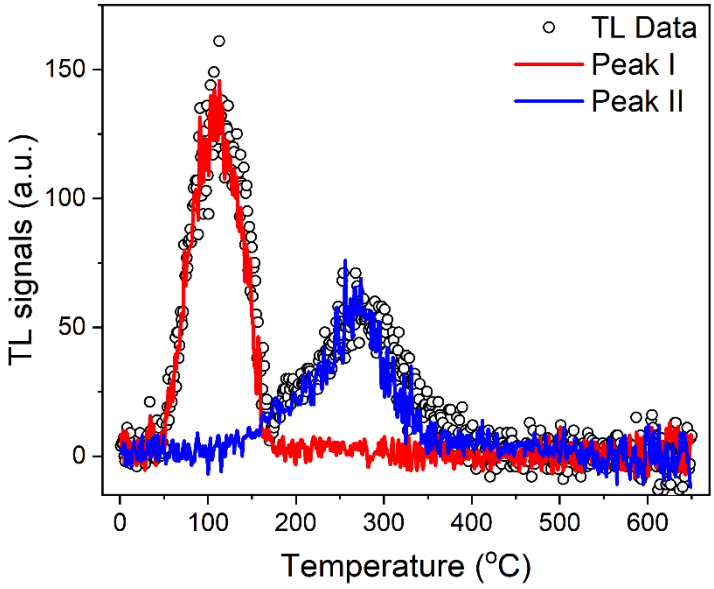


Figure 2. Thermal cleaning of the TL glow curve from 1 Gy irradiated CAO:Tm,Mg pellets

Persistent OSL signals of CAO:Tm,Mg

Figure 3 shows the basic OSL signals obtained by 1000 s blue light excitation exposure of the CAO:Tm,Mg material without preheat after 1 Gy beta radiation. As can be seen from the figure, OSL signals remained almost stable for approximately 995 s and tended to increase slightly, after a decrease in the first seconds of stimulation. In general, OSL signals represent a curve defined by the exponential decay function following the maximum signal, as electrons freed from all traps as a result of light excitation will produce luminescence. However, OSL signals obtained from CAO:Tm,Mg samples showed an increase after a rapid decrease.

Since this is not a typical situation, linearly-modulated OSL (LM-OSL) signals were obtained and presented in Figure 4 to take a closer look at the persistence of the obtained luminescence signals. Since LM-OSL signals are obtained with increasing light power, they are represented like a Maxwell-Boltzmann Curve. However, as can be seen from the figure, it was observed that LM-OSL signals entered a linear increase cycle with increasing light intensity.

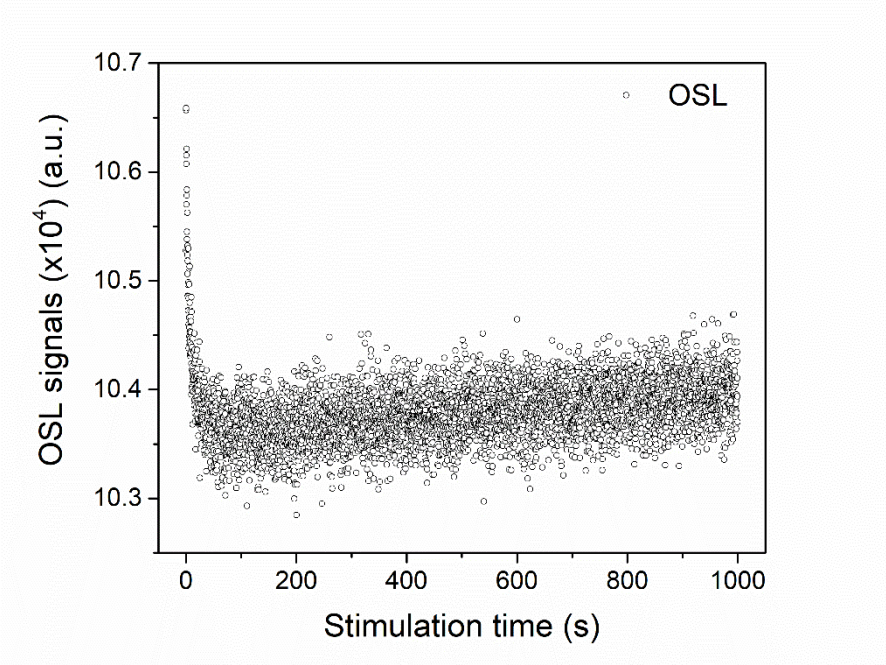


Figure 3. Basic OSL curve of the CAO:Tm,Mg pellets

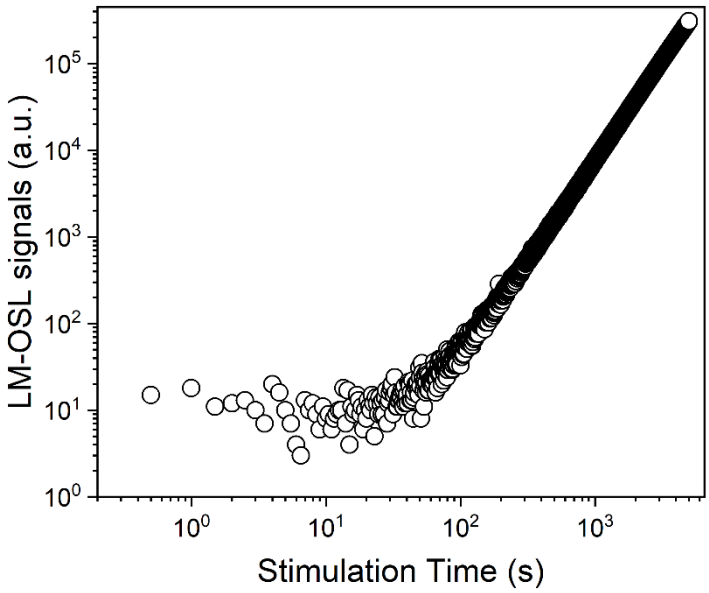


Figure 4. LM-OSL curve of the CAO:Tm,Mg pellets

Effect of Afterglow signals TL and OSL

Afterglow signals were obtained because the increase observed in OSL and LM-OSL signals could be a luminescence that occurs without stimulation after dose excitation. The luminescence signals received from the samples in 3600 s at room temperature without stimulation after a 1 Gy dose are presented as the bottom figure in Figures 5 a,b. As can be seen from the figure, Afterglow signals did not exceed beyond the background level of the reader unit. Considering the TL and OSL signals obtained after the afterglow, it can be said that the CAO:Tm, Mg samples have persistent OSL signals. The electrons released from the trap by light stimulation after irradiation tend to be trapped again.

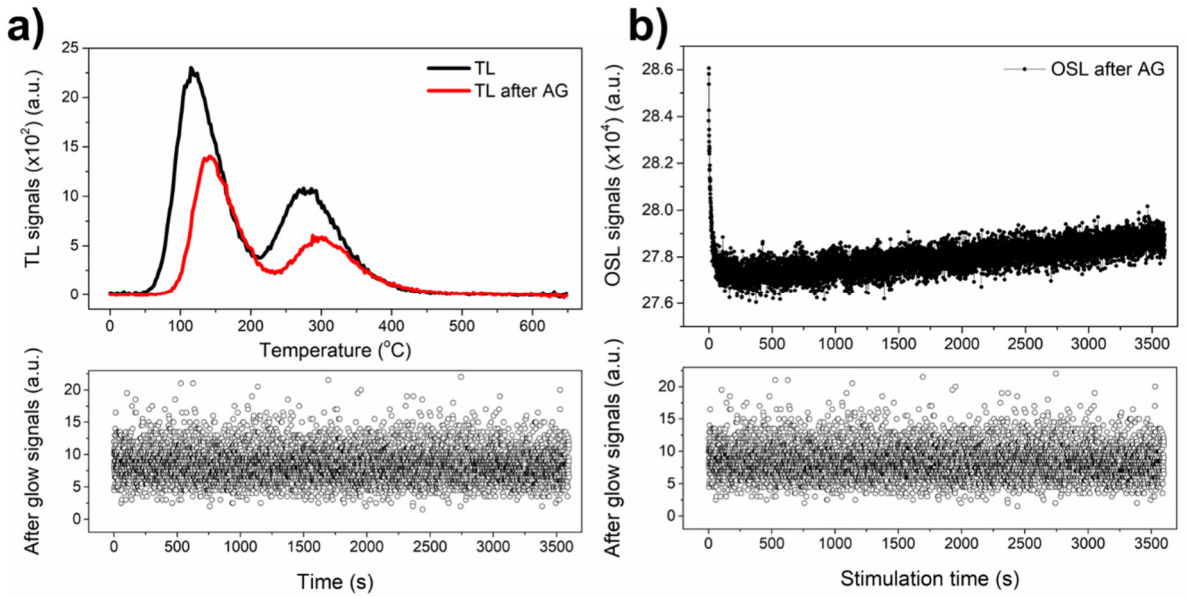


Figure 5. Effect of Afterglow signals on **a)** TL; **b)** OSL signals from the 1 Gy irradiated CAO:Tm,Mg pellet samples

Dosimetric Characteristics of Persistent OSL signals

To test the applicability of persistent luminescence obtained from CAO:Tm,Mg samples in dosimetric applications, important properties such as Reusability and Fading were examined. Figure 6a shows the distribution of OSL signals obtained under blue light excitation for 100 s from samples exposed to a 10-s preheat treatment at 120 oC after a 1 Gy radiation dose in 15 repeated experimental cycles, according to the first reading. As can be seen from the figure, the persistent OSL signals showed a good deviation within 3% deviation in 15 cycles.

On the other hand, in dosimetric applications, it is a desirable feature that after radiation excitation, the information about the radiation is stored stably for long periods of time, unless there is any stimulation in the traps in the dosimetric material. In this study, CAO:Tm,Mg samples were stored in the dark at room temperature for certain periods of time after a 1 Gy radiation dose, and OSL signals were obtained at the end of the waiting period and are presented in Figure 6b. Considering the deviations compared to the first reading, it was observed that 96% of the persistent OSL signals remained after the first 24 hours of storage. This result is an indication that persistent OSL signals have a very low and negligible fading characteristic.

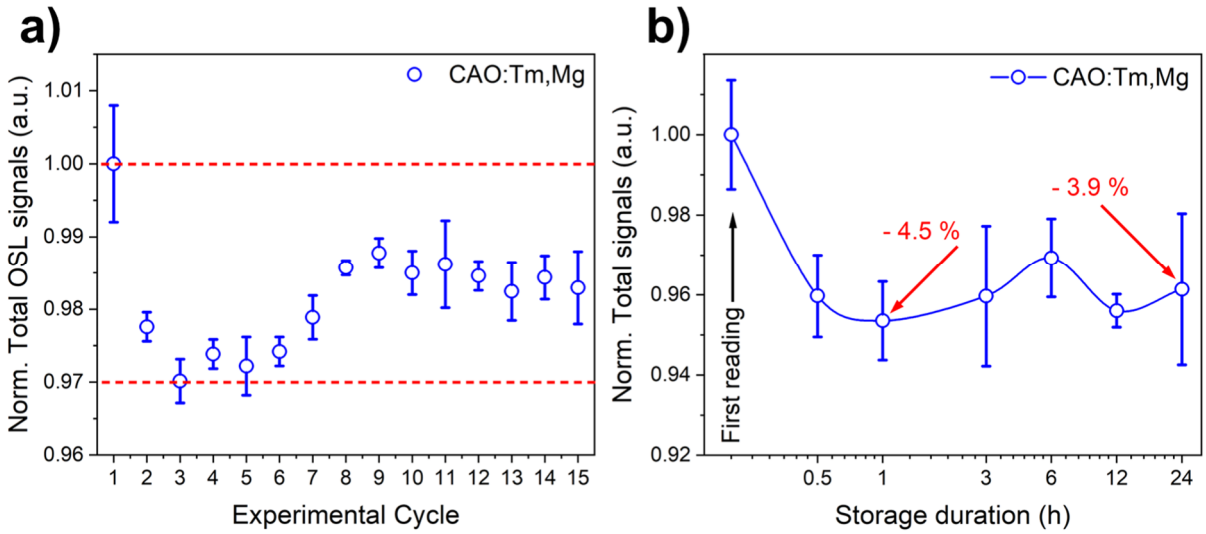


Figure 6. Changing of the total OSL signals with **a)** repeating experimental cycles, **b)** various storage durations after 1 Gy beta doses.

Conclusion

In this study, CAO:Tm,Mg pellets were successfully synthesized and added by the sol-gel method. While the obtained TL signals represent two TL trap regions, an unexpected increase in OSL signals was observed even at long stimulation times. In LM-OSL signals, the signal increase showed linearity with increasing light power. In the in-depth analysis performed with Afterglow, no post-dose signals were found and it was concluded that the OSL signals obtained could be defined as persistent OSL. Moreover, it was concluded that these persistent OSL signals are reusable in repeated experimental cycles and are suitable for lossless dose measurement in dosimetric applications with low fading characteristics after various dark storage periods. This study provided preliminary results for the development of luminescence dosimeters that emit persistent OSL from CAO-based ceramics.

References

Altunal, V., Ozdemir, A., Kurt, K., Yigit, O., Guckan, V., Isik, B., & Yegingil, Z. (2024). Luminescence properties of Ce and Be-doped CaAl12O19 for dosimetric and light-emitting applications. *Journal of Alloys and Compounds, 985*, 174081. doi:https://doi.org/10.1016/j.jallcom.2024.174081

Bøtter-Jensen, L., McKeever, S. W. S., & Wintle, A. G. (2003). *Optically stimulated luminescence dosimetry*: Elsevier.

Pérez Salas, R., Meléndrez, R., Aceves, R., & Barboza-Flores, M. (1993). Nonthermoluminescent dosimetry based on the afterglow response of europium-doped alkali halides. *Applied Physics Letters, 63*(22), 3017-3019. doi: https://doi.org/10.1063/1.110244

Salas-Juárez, C. J., Burruel-Ibarra, S. E., Gómez-Dominguez, C. E., Martínez-Gil, M., & Borbón-Nuñez, H. A. (2022). A pedagogical numerical simulation of persistent luminescence phenomenon for teaching radiation dosimetry. *The Physics Educator, 4*(03), 2250013. doi: https://doi.org/10.1142/S2661339522500135

Singh, V., Gundu Rao, T. K., & Zhu, J.-J. (2007). Synthesis, photoluminescence, thermoluminescence and electron spin resonance investigations of CaAl12O19:Eu phosphor. *Journal of Luminescence, 126*(1), 1-6. doi:https://doi.org/10.1016/j.jlumin.2006.04.003

Singh, V., Singh, N., Dubey, V., Singh, P. K., Shinde, K. N., & Ravi Kanth Kumar, V. V. (2018). Photoluminescence investigation on ultraviolet–emitting Ce3+, Mg2+-ions-doped/co-doped CaAl12O19 phosphors. *Optik, 158*, 1234-1239. doi:https://doi.org/10.1016/j.ijleo.2017.12.150

Wang, J., Liu, B., Chen, W., Qiang, Q., Peng, L., Han, T., . . . Nikolaevich, Y. A. (2022). Variable temperature persistent luminescence properties of phosphors with continuous traps. *Journal of Luminescence, 243*, 118644. doi: https://doi.org/10.1016/j.jlumin.2021.118644

Wu, S., Li, Y., Ding, W., Xu, L., Ma, Y., & Zhang, L. (2020). Recent advances of persistent luminescence nanoparticles in bioapplications. *Nano-Micro Letters, 12*, 1-26. doi: https://doi.org/10.1007/s40820-020-0404-8

Yukihara, E. G., & McKeever, S. W. (2011). *Optically stimulated luminescence: fundamentals and applications*: John Wiley & Sons.

EFFECT OF SILICON DOPING ON LUMINESCENCE PROPERTIES OF BeO CERAMICS

Dr. Öğr. Üyesi Volkan ALTUNAL
Çukurova Üniversitesi, Fen Edebiyat Fakültesi, Fizik Bölümü
ORCID: 0000-0001-9411-3441

Doç. Dr. Adnan ÖZDEMİR
Kahramanmaras Istiklal University, Elbistan Vocational High School of Health Service
ORCID: 0000-0002-2685-1562

Abstract
BeO ceramics have been a material of interest in radiation dosimetry for nearly 50 years due to their unique chemical, physical, and luminescence properties. Commercially known as Thermalox 995, BeO ceramics contain various impurities that complicate the understanding of their luminescence mechanisms. This study aims to investigate the effect of silicon, the most prevalent impurity in commercially used BeO ceramics, on the luminescence properties by incorporating silicon into BeO using the solid-state synthesis method. The successful synthesis was confirmed through X-ray Diffraction (XRD) and Scanning Electron Microscope (SEM) analyses. Significant enhancements in Thermoluminescence (TL) and Optically Stimulated Luminescence (OSL) signals were observed with increasing silicon concentrations in the BeO matrix, with OSL signal increases reaching nearly 50%. The 340 °C TL peak, consistent with that of Thermalox, was identified as the TL trap responsible for OSL, indicating the thermal stability of the OSL signals obtained. Dosimetric studies, including reusability, dose response, and short-term fading, demonstrated that silicon doping enhances the luminescent properties of BeO, making it a promising candidate for personal dosimetry applications. These findings highlight the potential of silicon-doped BeO ceramics for improved performance in radiation dosimetry.
Keywords: Beryllium oxide, Silicon doping, Solid-state synthesis, Optically stimulated luminescence, Radiation dosimetry.

Introduction
Oxide ceramics have a wide application network thanks to their superior physical and chemical properties (Boch & Niepce, 2010). In addition to aluminium oxide ceramics, which are the most widely used in industry, metal oxides such as silicon di oxide (SiO2), magnesium oxide and Beryllium Oxide (BeO) also attract attention in technological, scientific and practical applications (Boch & Niepce, 2010; Carter & Norton, 2007; Lakshmanan, 2012; Rahaman, 2017). In particular, BeO is preferred in various high-technology applications because it has unique properties such as high thermal conductivity, electrical resistance, high thermal and chemical stability, durability, insulating characteristics and high melting point (V. Altunal, Guckan, & Yegingil, 2023; V. Altunal, Jain, Hayat, Guckan, & Yegingil, 2022; V Altunal et al., 2018; Petrovic & Haertling, 2020). Its luminescence properties and tissue equivalence have made it special in radiation dosimetry since the 1950s (Anderson & Horlock, 1967; Gammage, 1977; Rhyner & Miller, 1970). Although BeO was first proposed and studied as a thermoluminescence (TL) dosimeter (Tochilin, Goldstein, & Miller, 1969), the material's sensitivity to light led it to be developed as an Optically Stimulated Luminescence (OSL) dosimeter (Bulur & Goksu, 1998).

Following a few detailed studies on OSL dosimetry (Jahn, Sommer, Ullrich, Wickert, & Henniger, 2013; Marian Sommer, Freudenberg, & Henniger, 2007; M. Sommer & Henniger, 2006), it was developed as an alternative OSL dosimeter to Al_2O_3:C dosimeters and the BeO-based OSL dosimetry system was implemented.

TL and OSL methods are among the passive dosimetry methods widely used in radiation dosimetry. Briefly, information about the radiation dose is obtained by measuring the luminescence emitted by electron-hole recombination, as a result of the stimulation (thermal or light) of the electrons trapped in the crystal exposed to the radiation dose. Good knowledge and controllability of the luminescence obtained from the dosimetric material is vital in radiation dosimetry applications. However, the commonly used BeO chips, namely Thermalox 995 chips, contain many impurity elements (Si, Al, Ca, Mg, Ti, B etc.) in their structure because they are produced as heat sink materials in the electrical industry (Bøtter-Jensen, McKeever, & Wintle, 2003). This makes it difficult to know and control the source of the luminescence obtained from the material.

In this study, after BeO ceramics were produced by the precipitation method, Si element was added to the structure using the solid-state synthesis method. The structural, morphological and luminescence characteristics of the BeO:Si material were examined in detail and the practical dosimetric use of the luminescence obtained from the material was investigated..

Material and Methods

BeO ceramics were synthesized by the co-precipitation method. The synthesis process briefly involves precipitating the target material by mixing two acidic and basic solutions. While the acidic solution was obtained by dissolving $BeSO_4.4H_2O$ salt in water, the basic solution was obtained by dissolving polyethylenemine gel in water. The white precipitate was obtained by mixing the acidic solution and then filtered. The dried precipitate was then subjected to calcination at 900 °C for 4 h. The obtained BeO powders were ground in an agate mortar with the solid-state synthesis method at appropriate SiO_2 (Sand) dopant concentrations, and as a result of the grinding process, the mixture was pelletized by cold-pressing at appropriate pressure. The obtained pellet forms were achieved as dense ceramics as a result of 2-h sintering processes at 1600 °C.

Structural analysis of the synthesized BeO:Si samples was carried out using the PANalytical EMPYREAN XRD analyzer. The system is equipped with a Cu-Kα radiation (λ = 0.1541 nm) source with a tube voltage of 40 kV. On the other hand, morphological analyzes of the samples were carried out on the Zeiss Supra55 (FE-SEM) device. Luminescence measurements of the developed samples were carried out on the DA-20 model Riso TL/OSL reader system, and all presented luminescence signals were obtained using the Hoya U-340 filter with UV region emission transmittance. The system has a $^{90}Y/^{90}Sr$ beta source as a radiation source. Approximately 9 s of exposure corresponds to 1 Gy and is equipped with blue LEDs for light stimulation.

Results and Discussions

Structure and Morphology

Figure 1 shows the XRD diffraction patterns of undoped and 1% Si-doped BeO pellets. As can be seen from the figure, BeO pellets were successfully synthesized with and without doping, and the XRD diffraction patterns matched well with the reference ICDD card number 98-001-5620, which represents the pure BeO Hexagonal phase. On the other hand, the morphology of powder and pellet additive samples sintered at 1600 °C was examined with SEM photographs and the obtained SEM micrographs are presented in Figure 2.

As can be seen from the figure, the particles approaching each other during the pelletization process in the pellet samples formed neck-like structures with the effect of high temperature, creating larger surface areas. Obtaining a homogeneous, smooth and enlarged surface can have a luminescence enhancing effect (discussed later).

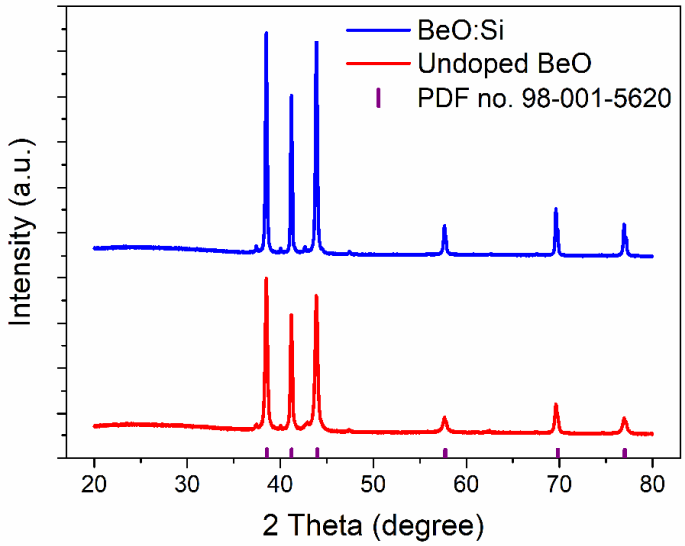


Figure 1. X-ray diffractions of the BeO:$Si_{1\%}$ pellets

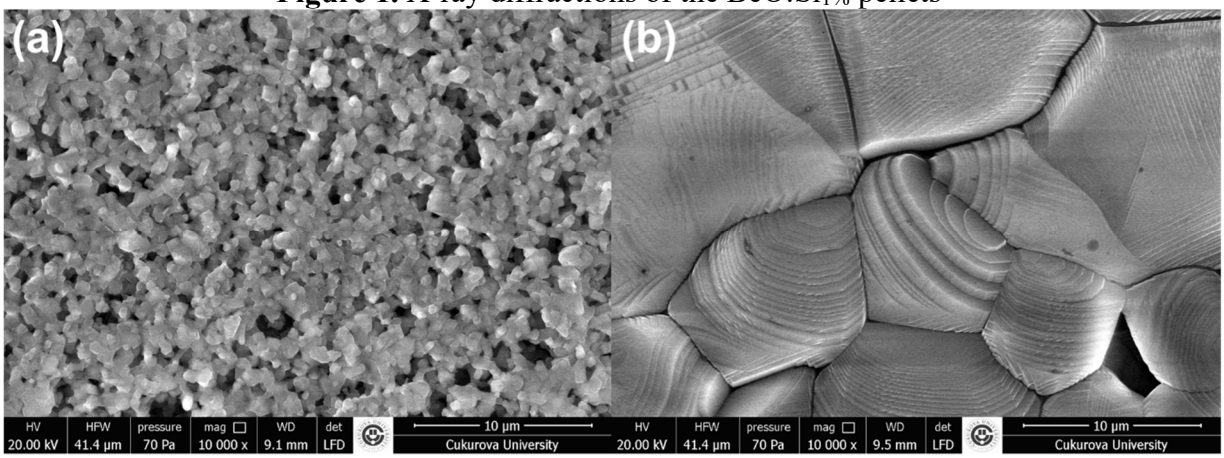


Figure 2. SEM micrograph of the BeO **a)** powders, **b)** pellet

TL and OSL Signals

1, 3 and 5% Si-doped BeO and undoped BeO pellets were heated from room temperature to 650 °C using a heating rate of 2 °C /s after a radiation dose of 1 Gy, and TL signals were collected. The resulting TL glow curves are presented in Figure 3. As seen in the figure, the TL glow curve of undoped BeO pellets is represented by four TL trap levels; a shallow trap level at approximately 75 °C, a highly sensitive dosimetric TL trap at 180 °C, a thermally stable TL trap located at 350 °C, and a low sensitive deep trap level at approximately 480 °C. With the Si dopant, TL trap levels were preserved, but a decrease in the signals of the shallow trap level was observed. Maximum TL sensitivity was achieved with 1% Si doping, and increasing Si concentration created a quenching effect. The reason for this may be concentration quenching or thermal quenching, which occurs between energy levels that increase with concentration in the crystal.

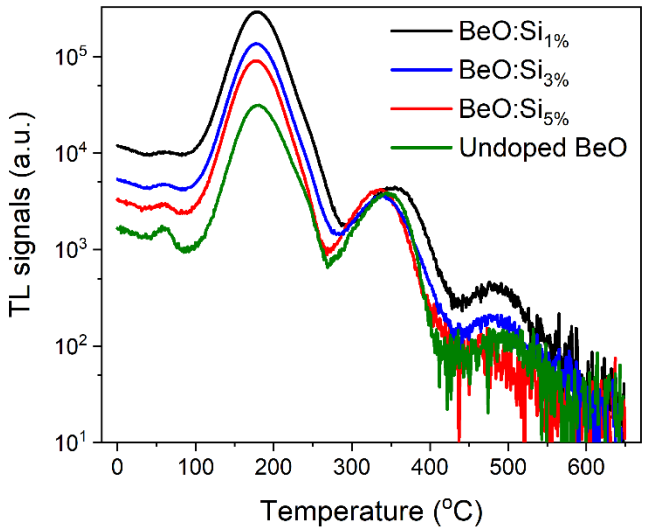


Figure 3. Basic TL glow curves of the undoped and Si-doped BeO ceramic pellets at different dopant concentrations

On the other hand, to examine how the OSL signals of neat BeO pellets changed with the Si dopant and its changing concentration, after a 1 Gy radiation dose, the samples were subjected to a preheat treatment at 100 °C for 10 s, and then the OSL signals were subjected to 100 s of blue light excitation. signals have been collected. The obtained OSL decay curves are presented in Figure 4. As can be seen from the figure, the Si dopant significantly affected the OSL trap structure of undoped BeO and caused a decrease in OSL signal sensitivity. It can be thought that the decrease observed in OSL signals, in contrast to the increase in TL signals, may be due to the difference in the luminescence emission bands of the TL and OSL traps located in the crystal, that is, the difference in the recombination centers. However, it should be noted that further in-depth research is needed to prove this.

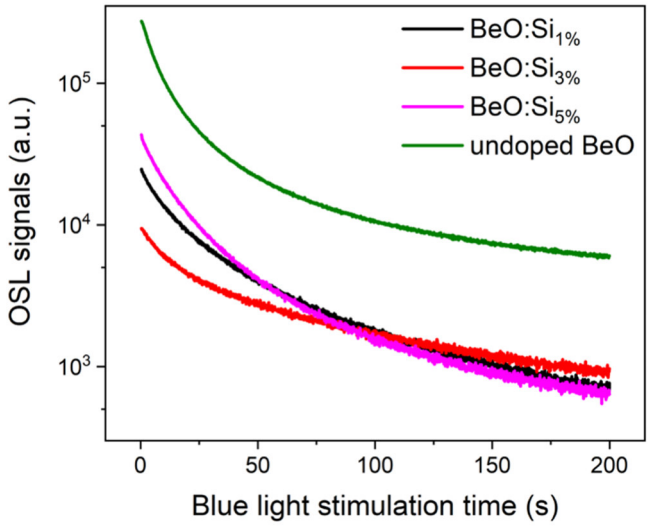


Figure 4. Basic OSL decay curves of the undoped and Si-doped BeO ceramic pellets at different dopant concentrations

Dosimetric Invesitgations

Dosimetric studies were carried out for Si-doped BeO pellets and undoped BeO pellets at 1% Molar concentration, three fresh samples were used in each experiment, and unstable signals that may come from shallow traps were eliminated by preheat treatment at 100 °C for 10 s. Luminescence signals obtained from a dosimetric material must meet some important properties for general dosimetric use; These are dose-response, reusability and fading.

In practical applications, dosimeters having a linear dose-response range is a desirable feature that determines the dosimetric usage area of the material and enables easy dose measurement. For this reason, the samples synthesized in this study were irradiated at some predetermined dose values and OSL signals were collected. The obtained OSL signals were collected and plotted against the dose on a log-log scale and are presented in Figure 5a. As can be seen from the figure, while undoped BeO pellets exhibited sublinear characteristics between 0.1 and 10 Gy, the 1% Si-doped BeO sample provided a fully linear characteristic.

On the other hand, the stability of luminescence signals over repeated experimental cycles is also a desirable feature. For this reason, the OSL signals of undoped and Si-doped BeO pellets were examined by applying the procedure with 1 Gy dose + OSL reading + TL readout (for delete the residual signals) in 10 repeating cycles, and the total OSL signals obtained each cycle are presented in Figure 5b. As can be seen from the figure, undoped and doped BeO pellets both exhibited acceptable deviations with reusable characteristics for 10 repeated cycles.

Finally, in practical applications, another desirable feature is that the luminescence signals obtained from dosimeters are preserved for long periods in the absence of any stimulation, that is, information about the radiation dose is stored for long periods. In this study, after the samples were exposed to 1 Gy beta radiation, they were stored in the dark at room temperature for certain periods and OSL readings were taken at the end of the storage period. The obtained OSL signals are collected and shown in Figure 5c against their storage time. As can be seen from the figure, the samples exhibited a similar behaviour up to 3 hours, while the decrease after the first 24 hours was 12% for undoped BeO and 8.1% for Si-doped BeO. At the end of 1 week, the decrease in OSL signals of Si-doped BeO increased slightly to 5%, while the decrease in OSL signals of undoped BeO reached 14.1%. The increases observed in both samples between the 3rd-day and 1st-week luminescence measurements can be interpreted as charge transfer from deep traps to shallower traps.

In general, it can be concluded that despite the decrease in OSL signals with Si-dopant, dosimetric improvements were observed.

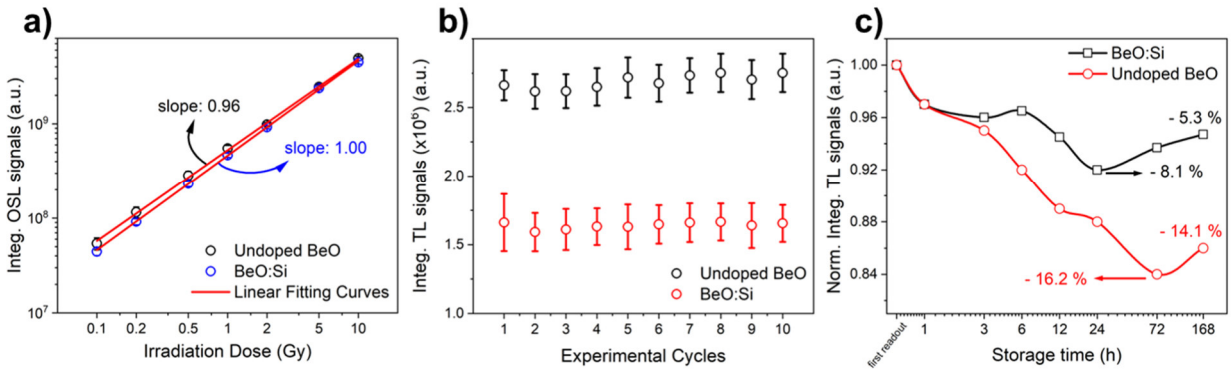


Figure 5. Changing of the total OSL signals with **a)** increasing dose exposure, **b)** repeating experimental cycles, **b)** various storage durations after 1 Gy beta doses and preheating at 100 °C for 10s.

Conclusion

BeO powders, which were successfully synthesized by the co-precipitation synthesis method, were successfully doped with the Si element by the solid-state synthesis method. The success of the synthesis was seen in the XRD analysis results and pure hexagonal BeO phase was obtained. Morphological changes with Si dopant were examined with SEM micrographs. In the photographs obtained, an increase in particle size and enlarged surfaces without gaps were obtained due to the effect of sintering and high temperature. While an increase in TL signals was achieved with the Si dopant, a decrease in OSL signals was found. Despite the decrease in OSL signals, significant improvements in dose-response, reusability and fading properties were observed in the dosimetric analysis of the material. This showed that the Si dopant is an impurity that directly affects the dosimetric characteristics of the host. It should be noted that some of the comments here, which remain as speculations, may be proven with in-depth analyses and emission measurements regarding the relationship between TL and OSL traps in the future.

References

Altunal, V., Guckan, V., & Yegingil, Z. (2023). Effects of oxygen vacancies on luminescence characteristics of BeO ceramics. *Journal of Alloys and Compounds, 938*, 168670. doi: https://doi.org/10.1016/j.jallcom.2022.168670

Altunal, V., Jain, M., Hayat, S., Guckan, V., & Yegingil, Z. (2022). Development of BeO:Na,Yb,Dy ceramics for optically stimulated luminescence dosimetry. *Radiation Measurements, 158*, 106852. doi:https://doi.org/10.1016/j.radmeas.2022.106852

Altunal, V., Yegingil, Z., Tuken, T., Depci, T., Ozdemir, A., Guckan, V., . . . Bulur, E. (2018). Optically stimulated luminescence characteristics of BeO nanoparticles synthesized by sol-gel method. *Radiation Measurements, 118*, 54-66. doi:https://doi.org/10.1016/j.radmeas.2018.08.009

Anderson, P., & Horlock, R. (1967). Calcination of microporous BeO powders. *Transactions of the Faraday Society, 63*, 2316-2323. doi: https://doi.org/10.1039/TF9676302316

Boch, P., & Niepce, J.-C. (2010). *Ceramic Materials: Processes, Properties, and Applications* (Vol. 98): John Wiley & Sons.

Bøtter-Jensen, L., McKeever, S. W. S., & Wintle, A. G. (2003). *Optically stimulated luminescence dosimetry*: Elsevier.

Bulur, E., & Goksu, H. Y. (1998). OSL from BeO ceramics: New observations from an old material. *Radiation Measurements, 29*(6), 639-650. doi: https://doi.org/10.1016/S1350-4487(98)00084-5

Carter, C. B., & Norton, M. G. (2007). *Ceramic materials: science and engineering* (Vol. 716): Springer.

Gammage, R. (1977). *Further characteristics important in the operation of ceramic BeO TLD*. Retrieved from

Jahn, A., Sommer, M., Ullrich, W., Wickert, M., & Henniger, J. (2013). The BeOmax system – Dosimetry using OSL of BeO for several applications. *Radiation Measurements, 56*, 324-327. doi: https://doi.org/10.1016/j.radmeas.2013.01.069

Lakshmanan, A. (2012). *Sintering of ceramics: new emerging techniques*: BoD–Books on Demand.

Petrovic, J. J., & Haertling, C. L. (2020). *Beryllium Oxide (BeO) Handbook*. Retrieved from

Rahaman, M. N. (2017). *Ceramic processing and sintering*: CRC press.

Rhyner, C. R., & Miller, W. G. (1970). Radiation dosimetry by optically-stimulated luminescence of BeO. *Health Physics, 18*, 681-684.

Sommer, M., Freudenberg, R., & Henniger, J. (2007). New aspects of a BeO-based optically stimulated luminescence dosimeter. *Radiation Measurements, 42*(4-5), 617-620. doi: https://doi.org/10.1016/j.radmeas.2007.01.052

Sommer, M., & Henniger, J. (2006). Investigation of a BeO-based optically stimulated luminescence dosemeter. *Radiat Prot Dosimetry, 119*(1-4), 394-397. doi: https://doi.org/10.1093/rpd/nci626

Tochilin, E., Goldstein, N., & Miller, W. (1969). Beryllium oxide as a thermoluminescent dosimeter. *Health Physics, 16*(1), 1-7.

ANALYTICAL SOLUTION OF BOHR HAMILTONIAN WİTH YUKAWA POTENTIAL FOR Z(5) MODEL

Dr. Lecturer Melek GÖKBULUT
Departmen of Medical Services and Techniques, Erbaa Vocational School, Tokat Gaziosmanpasa University
ORCID: 0000-0002-2737-805X

ABSTRACT
The collective motion of the atomic nucleus is described using the analytical solution of the Bohr Hamiltonian constructed for different potentials. In the framework of the Bohr Hamiltonian, nuclear collective motion is described in terms of the collective coordinates β giving the total amount of deviation from spherical symmetry, and γ which is related to the shape of the deformed nucleus, and the three Euler angles specifying the orientation of the nucleus in space. In this study, the Z(5) model, which corresponds to the approximate solution of the Bohr Hamiltonian, was considered to describe the spherical triaxial structure. In this context, the analytical solution of the Bohr Hamiltonian for this model is realized using the Yukawa potential, an exponential potential used in plasma, solid state, and atomic physics. Depending on the parameters of the chosen potential, the analytical expressions for the energy spectra and wave functions are derived using a new algorithm of the Nikiforov-Uvarov method with the conformable fractional Nikiforov-Uvarov method algorithm developed to derive closed analytical formulas for the energy spectra and wave functions. The wave functions obtained for this model are expressed in terms of Jacobi polynomials. The normalized and calculated energy spectra are evaluated in comparison with available experimental data and available theoretical predictions from various models.
Keywords: Bohr Hamiltonian, Yukawa Potential, The Conformable Fractional Nikiforov-Uvarov method.

INTRODUCTION
The study of the collective motion of atomic nuclei, one of the most intriguing topics in nuclear physics, allows one to learn more about the properties and behavior of the atomic nucleus, and hence to better describe the nuclear structure. The properties of this collective motion of the atomic nucleus are described using both geometric and algebraic approaches. In both approaches, different limit structures appear in the atomic nucleus: spherical vibrator (Arima and Iachello, 1976), axially symmetric rotor including prolate and oblate deformed structure (Elliott, 1958) and finally non-axially asymmetric deformed rotor including triaxial (Davydov and Filippov, 1958; Davydov and Rostovsky, 1959; Davydov and Chaban, 1960) and γ-unstable (Willets and Jean, 1956) structure. In the IBM model, whose theoretical background is based on group algebra, these limit structures correspond to the dynamical symmetries U(5), SU(3), SU(3), O(6), a subgroup under the group U(6) (Arima and Iachello, 1975). The situation where the structure changes suddenly and very quickly and the system undergoes a phase transition from one shape to another corresponds to the breaking of these dynamic symmetries and is called critical point symmetries. The critical point symmetry E(5) (Iachello, 2000) is located at the transition point from the spherical vibrator to the γ-unstable structure and the critical point symmetry X(5) (Iachello, 2001) is located at the transition point from the spherical vibrator to the axially symmetric prolate deformed structure .

The Y(5) (Iachello, 2003) critical point symmetry corresponds to the transition from axially symmetric to triaxial deformed structure between two deformed limit structures. The Z(5) (Bonatsos, et al., 2004) critical point symmetry, which does not have a direct image in IBM, corresponds to the shape phase transition point from the triaxial vibrator structure to the rigid triaxial rotor structure. Critical point symmetries are studied by considering analytical solutions of the Bohr Hamiltonian (Bohr, 1952; Bohr and Mottelson, 1998) described by the collective variables β and γ, a measure of the deviation of the deformed nucleus from spherical and rotational symmetry, respectively. All critical point symmetries are constructed in the Bohr Hamiltonian using the infinite square well potential in β-variable and a harmonic oscillator in the γ-variable, considering the experimental data of the atomic nuclei at the phase transition point of the figure (Cejnar, et al., 2010).

The critical point symmetry Z(5), located at the shape phase transition point between the spherical triaxial structure and the solid triaxial rotor, is the approximate solution of the Bohr Hamiltonian for $\gamma \cong 30°$ corresponding to the maximum asymmetric shape. On the other hand, nuclei regions near or far from critical point symmetries have also been investigated using analytical solutions of the Bohr Hamiltonian obtained using different potential forms such as Morse (Inci, et al., 2012), Kratzer (Hammad, et al., 2021), Davidson (Yigitoglu and Bonatsos, 2011), Woods Saxon (Çapak, et al., 2015), Sextic (Sobhani, et al., 2017), Hulten (Chabab, et al., 2015), Killingbeck (Sobhani, et al., 2018) (Mbadjoun, et al., 2018), Manning-Rosen (Chabab, et al., 2016), Pösch-Teller (Hammou, et al., 2019), Tietz-Hua (Chabab, et al., 2017) and exponential-type potentials (Hammad, et al., 2023) . In this study, a new version of the Z(5) model is introduced with the Yukawa potential (Yukawa, 1934) (Imbo, et al., 1984) used to describe strong interactions between nucleons. This new model built with Yukawa potential is called Z(5)-Y. The energy eigenvalues and the corresponding wave eigenfunctions required to study the nuclear structure were calculated by the conformable fractional Nikiforov and Uvarov (CFNU) method (Karayer, et al., 2016). The conformal fractional Nikiforov–Uvarov method (CFNU) was developed to solve any second-order differential equation with at most four singular points created by varying the boundary conditions of the Nikiforov-Uvarav (NU) method (Nikiforov and Uvarov, 1988). Examination of the eigenfunctions and eigenvalues of the Bohr Hamiltonian obtained for the Z(5) model was used to examine phase transitions in the shapes of deformed nuclei.

MATERIAL METHOD

The original Bohr Hamiltonian (Bohr, 1952), which describes the collective motion of the atomic nucleus, is expressed as follows

$$H = -\frac{\hbar^2}{2B}\left[\frac{1}{\beta^4}\frac{\partial}{\partial\beta}\beta^4\frac{\partial}{\partial\beta} + \frac{1}{\beta^2}\frac{1}{\sin 3\gamma}\frac{\partial}{\partial\gamma}\sin 3\gamma\frac{\partial}{\partial\gamma} - \frac{1}{4\beta^2}\sum_k^3 \frac{L_k^2}{sin^2\left(\gamma - \frac{2\pi}{3}k\right)}\right] + V(\beta,\gamma) \quad (1)$$

In Equation (1), the parameters β and γ are the usual collective coordinates, while L_k $(k = 1,2,3)$ are the components of the angular momentum and B is the mass parameter. In the Z(5) critical point symmetry, the potential is considered to have a deep minimum at $\gamma \approx 30°$and the last term in the Bohr Hamiltonian can be written in the form (Bonatsos, et al., 2004),

$$\sum_k \frac{L_k^2}{sin^2(\gamma - \frac{2\pi}{3}k)} \cong 4\,(L_1^2 + L_2^2 + L_3^2) - 3\,L_1^2 \quad (2)$$

Introducing reduced potentials $u = 2BV\ /\ \hbar^2$and reduced energies $\varepsilon = (2B/\hbar^2)E$, supposing the reduced potential takes the form $u(\beta,\gamma) = u(\beta) + u(\gamma)/\beta^2$ as well as using in the Schrödinger equation associated with the Hamiltonian, two equations result from the separation of variables

$$\left[-\frac{1}{\beta^4}\frac{\partial}{\partial\beta}\beta^4\frac{\partial}{\partial\beta}+\frac{1}{4\beta^2}[4L(L+1)-3\alpha^2]+u(\beta)+\frac{\Omega}{\beta^2}\right]\xi_L(\beta)=\varepsilon\xi_L(\beta) \quad (3)$$

$$\left[-\frac{1}{\sin 3\gamma}\frac{\partial}{\partial\gamma}\sin 3\gamma\frac{\partial}{\partial\gamma}+u(\gamma)\right]\eta(\gamma)=\eta\Omega(\gamma) \quad (4)$$

The wave function is taken as $\Psi(\beta,\gamma,\theta_i)=\xi_{L,\alpha}(\beta)\eta(\gamma)D^L_{M,\alpha}(\theta_i)$. Here $D^L_{M,\alpha}(\theta_i)$ $(\theta_i=1,2,3)$ are the Wigner function of Euler angles and the symbols M and α represent the eigenvalues projections of the angular momentum operator L on the z-axis with the laboratory constant and the x'-axis with the body constant, respectively (Bohr, 1952).
By assuming transformation $r\to\beta$ in the Yukawa potential, the potential is taken as follow

$$u(\beta)=-\frac{A}{\beta}e^{-\delta\beta} \quad (5)$$

where δ is the screening parameter, A is the strengths of the Yukawa potential. By substituting the potential form in Equation (3), we obtain Equation (3) for Yukawa potential as follows.

$$\frac{\partial^2\xi_L(\beta)}{\partial\beta^2}+\frac{4}{\beta}\frac{\partial\xi_L(\beta)}{\partial\beta}+\left(\varepsilon-\frac{[4L(L+1)-3\alpha^2]}{4\beta^2}+\frac{A}{\beta}e^{-\delta\beta}-\frac{\Omega}{\beta^2}\right)\xi_L(\beta)=0 \quad (6)$$

Here this approximation has been used (Arda and Sever, 2012).

$$\frac{1}{\beta^2}\approx\frac{\delta^2}{(1-e^{-\delta\beta})^2}$$

Then putting this into Equation (6), we have

$$\frac{d^2\xi_L(\beta)}{d\beta^2}+\frac{4\delta}{(1-e^{-\delta\beta})}\frac{d\xi_L(\beta)}{d\beta}+\left[\varepsilon-\frac{L(L+1)\delta^2}{(1-e^{-\alpha\beta})^2}+\frac{3\alpha^2\delta^2}{4(1-e^{-\alpha\beta})^2}+\frac{A\delta e^{-\delta\beta}}{(1-e^{-\delta\beta})}-\frac{\Omega\delta^2}{(1-e^{-\delta\beta})^2}\right]\xi_L(\beta)=0 \quad (7)$$

To apply the the conformable fractional Nikiforov-Uvarov method (CFNU) method, by taking a new variable $z=1-e^{-\delta\beta}$ we get Equation (7) in the following form:

$$\frac{d^2\xi_L(z)}{dz^2}+\frac{4-z}{z(1-z)}\frac{d\xi_L(z)}{dz}+\frac{1}{z^2(1-z)^2}[-a^2z^2-b^2z-c^2]\xi_L(z)=0 \quad (8)$$

$$-a^2=\frac{\varepsilon}{\delta^2}-\frac{A}{\delta}\quad,\quad -b^2=\frac{A}{\delta}\quad,\quad -c^2=\frac{3\alpha^2}{4}-L(L+1)-\Omega \quad (9)$$

The basic equation of the CFNU method is expressed as follows.

$$D^pD^p\psi(z)+\frac{\tilde{\tau}(z)}{\sigma(z)}D^p\psi(z)+\frac{\tilde{\sigma}(z)}{\sigma^2(z)}\psi(z)=0 \quad (10)$$

where D^p is a conformal fractional derivative operator and $0 < p \leq 1$. The $\tilde{\tau}(z)$ is a function of at most p-th order, i.e. this parameter can also be equal to a constant, $\sigma(z)$ and $\tilde{\sigma}(z)$ are functions of at most $2p$-th order, and the degrees of these parameters can also be equal to 0 or α. For $p = 1$, the CFNU method becomes the standard NU method. Here, taking the form $\psi(z) = \varphi(z)y_{n,p}(z)$, Eq. (10) is reduced to the following equation.

$$\sigma(z)D^pD^py_{n,p}(z) + \tau(z)D^py_{n,p}(z) + \lambda y_{n,p}(z) = 0 \quad (11)$$

where $\varphi(z)$ and $\tau(z)$ satisfy the following conditions

$$\frac{D^p\varphi(z)}{\varphi(z)} = \frac{\pi(z)}{\sigma(z)} \quad (12)$$

$$\tau(z) = \tilde{\tau}(z) + 2\pi(z) \quad (13)$$

To obtain a physically acceptable solution, the derivative of the function $\tau(z)$ must be negative. Here, a general equation for $\pi(z)$ is defined as follows.

$$\pi(z) = \frac{D^p\sigma(z) - \tilde{\tau}(z)}{2} \pm \sqrt{\left(\frac{D^p\sigma(z) - \tilde{\tau}(z)}{2}\right)^2 - \tilde{\sigma}(z) + k\sigma(z)} \quad (14)$$

The parameter λ is expressed as

$$\lambda = k + D^p\pi(z) \quad (15)$$

The newly defined parameter $\pi(z)$ must be at most an p-th order function. Since $\pi(z)$ is at most an p-th order polynomial here, the expression within the square root must be the square of a polynomial, and to find the value of k, the expression under the square root of Eq. (14) must be the square of a function with a maximum degree of p. (Karayer, et al., 2016). From here, the solutions of the $y_{n,p}(z)$ polynomial, which is a hypergeometric type of polynomial, are found by the Rodrigues relation.

$$y_{n,p}(z) = \frac{B_n}{\rho(z)}(D^p)^n[\sigma^n(z)\rho(z)] \quad (16)$$

In Equation (16), B_n represents the normalization coefficient and $\rho(z)$ represents the weight function satisfying the following condition.

$$D^p[\sigma(z)\rho(z)] = \tau(z)\rho(z) \quad (17)$$

Finally, the parameter λ_n corresponding to the specific solution of eigenvalue equation is given as follows.

$$\lambda = \lambda_n = -nD^p\tau(z) - \frac{n(n-1)}{2}D^pD^p\sigma(z) \quad n = 0, 1, 2,\ldots \quad (18)$$

By comparing Equation (8) with Equation (10), For Yukawa potential, the relevant polynomials are determined as follows.

$$\tilde{\tau}(z) = 4 - z \quad , \quad \sigma(z) = z(1-z) \quad , \quad \tilde{\sigma}(z) = -a^2z^2 - b^2z - c^2 \tag{19}$$

By substituting these polynomials in Equation (14), the $\pi(z)$ polynomials for potential are obtained as follows.

$$\pi(z) = -\frac{(3+z)}{2} \pm \sqrt{z^2\left(\frac{1}{4} + a^2 - k\right) + z\left(\frac{3}{2} + b^2 + k\right) + \frac{9}{4} + c^2} \tag{20}$$

The constant k is determined by the condition that the discriminant of the quadratic equation under the square root is zero and the discriminant gives a new quadratic equation which can be solved for the constant k. The roots of k are taken as follows.

$$k_{\pm} = -(6 + b^2 + 2c^2) \pm \sqrt{(4 + a^2 + b^2 + c^2)(9 + 4c^2)} \tag{21}$$

When the k value obtained for potential are substituted into Equation (20) , one obtains four possible $\pi(z)$ equations for potential.

$$\pi(z) = -\frac{(3+z)}{2} \pm \begin{cases} \left(\sqrt{9/4 + c^2} - \sqrt{(4 + a^2 + b^2 + c^2)}\right)z - \sqrt{9/4 + c^2}, for\ \ k_+ \\ \square \\ \left(\sqrt{9/4 + c^2} + \sqrt{(4 + a^2 + b^2 + c^2)}\right)z - \sqrt{9/4 + c^2}, for\ \ k_- \end{cases}$$

Since $\tau(z)$ given in the above equations contains a negative derivative for the negative value of $\pi(z)$, the resulting negative polynomial $\pi(z)$ for k_- is chosen to calculate the polynomial $\tau(z)$ and λ. From here, using the parametric polynomials gained for potential, the following equations are obtained.

$$\tau(z) = 1 - 2z - \left[\left(\sqrt{9 + 4c^2} + 2\sqrt{(4 + a^2 + b^2 + c^2)}\right)z - \sqrt{9 + 4c^2}\right]$$

$$\lambda = -(6 + b^2 + 2c^2) - \sqrt{(4 + a^2 + b^2 + c^2)(9 + 4c^2)} - 1/2\sqrt{9 + 4c^2} - \sqrt{(4 + a^2 + b^2 + c^2)} - 1/2$$

$$\lambda_n = n\left(2\sqrt{(4 + a^2 + b^2 + c^2)} + \sqrt{9 + 4c^2} + 2\right) + n(n-1)$$

Considering the values of the parameters given in Equation (9) and using $\lambda = \lambda n$, the energy eigenvalues for the Yukawa potential are obtained as follows.

$$\varepsilon_{n,L} = 4\delta^2 - \frac{3\delta^2\alpha^2}{4} + \delta^2 L(L+1) + \delta^2\Omega - \delta^2\left[\left(n+\frac{1}{2}\right) - \frac{n(n+1) - (6 - A/\delta - 3\alpha^2/2 + 2L(L+1) + 2\Omega)}{(2n+1) + \sqrt{9 + 4\Omega - 3\alpha^2 + 4L(L+1)}}\right]^2 \quad (22)$$

To determine the Ω value in the energy equation, the solution of the angular part of the Bohr Hamiltonian must be taken. From here, the γ -part of the Bohr Hamiltonian given by Equation (4) is obtained as follows for the $u(\gamma) = \frac{1}{2}c\left(\gamma - \frac{\pi}{6}\right)^2 = \frac{1}{2}c\tilde{\gamma}^2$ potential form, which has a minimum at $\gamma \approx \pi/6$.

$$\left[\frac{d^2}{d\tilde{\gamma}^2} + \left(\Omega - \frac{1}{2}c\tilde{\gamma}^2\right)\right]\eta(\tilde{\gamma}) = 0 \quad (23)$$

To apply the CFNU method, the Equation (23) is rewritten under the $\tilde{\gamma}^2 = s$ transformation as follows.

$$\frac{d^2\eta(s)}{ds^2} + \frac{1}{2s}\frac{d\eta(s)}{ds} + \frac{1}{4s^2}\left[\Omega s - \frac{1}{2}cs^2\right]\eta(s) = 0 \quad (24)$$

By comparing this obtained equation with the main equation of the CFNU method, the equations required for the calculations are determined as follows.

$\tilde{\tau}(s) = 1$ $\quad \sigma(s) = 2s$ $\quad \tilde{\sigma}(s) = \Omega s - \frac{1}{2}cs^2$

$\pi(s) = \frac{1}{2} - \left(\sqrt{\frac{c}{2}}s - \frac{1}{2}\right)$ $\quad \tau(s) = 3 - \sqrt{2c}s$ $\quad \lambda_n = \sqrt{2c}n$

$\lambda = \frac{\Omega}{2} - \frac{\sqrt{2c}}{4} - \sqrt{\frac{c}{2}}$ $\quad k_- = \frac{\Omega}{2} - \frac{\sqrt{2c}}{4}$

By using $\lambda = \lambda n$, the Ω value is determined as follows:

$$\Omega = \sqrt{2c}\left(2n + 1 + \frac{1}{2}\right) = \sqrt{2c}\left(n_{\tilde{\gamma}} + \frac{1}{2}\right) \quad n_{\tilde{\gamma}} = 0, 1, 2,\ldots \quad (25)$$

To find the wave function of the β part of the Bohr Hamiltonian, we first calculated the weight function from Equation (17) as follows.

$$\rho(z) = (1-z)^{2a_1}z^{2b_1} \quad (26)$$

where $a_1 = \sqrt{(4 + a^2 + b^2 + c^2)}$, $b_1 = \sqrt{9/4 + c^2}$

Adding $\rho(z)$ to the Equation (18) allows us to find the function $y_n(z)$ in the following form.

$$y_n(z) = B_n(1-z)^{-2a_1}z^{-2b_1}\frac{d^n}{dz^n}[(1-z)^{n+2a_1}z^{n+2b_1}] \quad (27)$$

The polynomials $y_n(z)$ with $B_n = (-1)^n/2^n n!$ correspond the orthogonal polynomials associated with Jacobi polynomials and the Jacobi polynomials are denoted by $P_n^{(\omega,q)}(x)$. The orthogonal polynomials with the weight function $(b-x)^{\omega}(x-a)^{q}$ on the finite interval $[a,b]$ are expressed as (Szego, 1939)

$$const.\, P_n^{(\omega,q)}\left(2\frac{x-a}{b-a}-1\right)$$

and usually, the case $a=0$, $b=1$ is used (Szego, 1939). Hence, the polynomial $y_n(z)$ for both potentials separately can be written in terms of the Jacobi polynomials as follows:

$$y_n(z) \sim P_n^{(2a_1,2b_1)}(2z-1)$$

By considering Equation (12), the other part of the wave function is obtained for the beta part of the Bohr Hamiltonian.
$\varphi(z) = (1-z)^{2+a_1}\ z^{-3/2+b_1}$

Thus, we find the radial component of the wave function as, $\xi_L(z) = \varphi(z) y_n(z)$

$$\xi_L(z) = C_n(1-z)^{2+a_1} z^{-3/2+b_1} P_n^{(2a_1,2b_1)}(2z-1) \tag{28}$$

In Equation (28), the parameter C_n is the normalization constant and is calculated by taking the condition $\int_0^{\infty} \beta^4 f^2(\beta) d\beta = 1$. From here, the Jacobi polynomials appearing in the wave functions of the ground-state band ($n=0$), the β_1 band ($n=1$), and the β_2 band ($n=2$), which required for the calculation of the normalization constant C_n, are obtained using the following equation (Szego, 1939; Gradshteyn and Ryzhik, 2007).

$$P_n^{(\omega,q)}(x) = \frac{1}{2^n}\sum_{m=0}^{n}\binom{n+\omega}{m}\binom{n+q}{n-m}(x-1)^{n-m}(x+1)^{m}$$

$$P_0^{(\omega,q)}(x) = 1$$

$$P_1^{(\omega,q)}(x) = \frac{1}{2}[(\omega+q+2)x + (\omega-q)]$$

$$P_2^{(\omega,q)}(x) = \frac{1}{4}[4(\omega+1)(\omega+2) + 4(\omega+q+3)(\omega+2)(x-1) + (\omega+q+3)(\omega+q+4)(x-1)^2]$$

To find the wave function of the γ part of the Bohr Hamiltonian, the necessary parameters to find the wave function dependent on the γ parameter is obtained as follows.

$$\varphi(s) = s^{1/2}e^{-\sqrt{2c}s/4} \tag{29}$$

$$\rho(s) = s^{1/2}e^{-\sqrt{2c}s/2} \tag{30}$$

$$y_n(s) = B_n 2^n e^{\sqrt{2c}s/2} s^{-1/2} \frac{d^n}{ds^n}\left[e^{-\sqrt{2c}s/2} s^{n+1/2}\right] \tag{31}$$

It can be seen that the wave function $y_n(s)$ given in Equation (31) corresponds to Laguerre polynomials (Szego, 1939) and hence, $u(s) = \varphi(s)y_n(s)$, the γ-wave function for $s \to \gamma$ is obtained as follows.

$$\eta(\gamma) = N_{n_\gamma}\gamma e^{-\sqrt{2c}\gamma^2/4} L^{1/2}_{n_{\gamma,K}}(\gamma^2) \tag{32}$$

NUMERIC RESULTS AND DISCUSSION

In the Z(5) model, the wobbling quantum number defined as $n_\omega = L - \alpha$ is used instead of the quantum number α, which corresponds to the projection of the angular momentum L on the body-constant $\hat{x}'$axis and takes only even values (Meyer-Ter, 1975). From here, for Z(5) critical symmetries the angular momentum values are labelled as L_{s,n_ω} and allowed angular momentum values are determined as $L = n_\omega, n_\omega + 2, n_\omega + 4$,……according to the wobbling quantum number.

Inserting $\alpha = L - n_\omega$ and Ω in Equation (22) one obtains

$$\varepsilon^{(n_\omega, n_{\tilde{\gamma}})}_{n,L} = 4\delta^2 - \frac{3\delta^2(L-n_\omega)^2}{4} + \delta^2 L(L+1) + \delta^2\sqrt{2c}\left(n_{\tilde{\gamma}} + \frac{1}{2}\right) - \delta^2\left[\left(n+\frac{1}{2}\right) - \frac{n(n+1) - \left(6 - A/\delta - 3(L-n_\omega)^2/2 + 2L(L+1) + 2\sqrt{2c}\left(n_{\tilde{\gamma}} + \frac{1}{2}\right)\right)}{(2n+1) + \sqrt{9 + 4\sqrt{2c}\left(n_{\tilde{\gamma}} + \frac{1}{2}\right) - 3(L-n_\omega)^2 + 4L(L+1)}}\right]^2 \tag{33}$$

The parameter c taken in Equation (33) depends on the parameter a, which is a measure of the γ stiffness of the Bohr Hamiltonian and obtained by numerical calculations and is expressed as $c = \sqrt{a}/3$ (Caprio, 2005; Bonatsos, et al., 2007). The $R^{(n_\omega, n_{\tilde{\gamma}})}_{n,L}$ energy ratios, which play a very important role in the investigation of nuclear structure, are expressed as follows.

$$R^{(n_\omega, n_{\tilde{\gamma}})}_{n,L} = \frac{\varepsilon^{(n_\omega, n_{\tilde{\gamma}})}_{n,L} - \varepsilon^{(0,1)}_{0,0}}{\varepsilon^{(0,1)}_{0,2} - \varepsilon^{(0,1)}_{0,0}} \tag{34}$$

For the Z(5)-Y model built using the Yukawa potential, the levels of the ground state band are characterized by $n = 0$, $n_\omega = 0$, $n_{\tilde{\gamma}} = 0$, while the quasi-β ones are characterized by $n = 1, n_\omega = 0, n_{\tilde{\gamma}} = 3$. The quasi-γ band is constituted of the even L levels with $n = 0$, $n_\omega = 2$, $n_{\tilde{\gamma}} = 1$ and the odd L levels with $n = 0$, $n_\omega = 1$, $n_{\tilde{\gamma}} = 1$. The angular momentum values are denoted by the L^+_{n,n_ω} . The ratio of energy of first $4^+_{0,0}$ state to that of the first $2^+_{0,0}$ state $R_{4/2}$ is often used to indicate whether or not the nucleus is deformed, although is des not give the magnitude of the deformation. For Z(5) critical point symmetry, $R_{4/2} = 2.35$ was calculated (Bonatsos, et al., 2004). One of the most important features of parameter-dependent models is that they can examine how the characteristic structure of the region changes depending on free parameter change. In this context, the free parameters δ and A in the potential expression and the parameter c, which determines the γ stiffness of the Bohr Hamiltonian, need to be determined. In this context, appropriate parameters will be determined by examining the $R_{4/2}$ ratios and γ-band structures of the Xe nuclei located around the $Pd^{112\text{-}116}$, $Pt^{192\text{-}196}$ and $A = 130$ regions, which are predicted to have a triaxial structure.

CONCLUSION

In this study, the analytical solution of the Bohr Hamiltonian, which is in a five-dimensional space with two collective variables (β, γ) and three Euler angles, used to describe the deformed nuclei region, is obtained for γ ≈ 30 by selecting the Yukawa potential in the β-part. The constructed new model is called Z(5)-Y. Analytical solutions for both the β- part and the γ- part are calculated using an analytic method which has been recently developed conformable fractional NU method. The wave functions are obtained for the β- part are expressed in terms of Jacobi polynomials while the wave functions obtained for the γ- part are expressed in terms of Laguerre polynomials. The parameters required to describe the deformed nuclei regions close to and far from the shape phase transitions point in the triaxial structure with the selected potential will be determined by using the existing experimental data of the isotopes in some nuclei regions with the predicted triaxial structure, using some indicators such as the energy levels of ground state bands, γ bands and β-bands. From here, it will be investigated how and to what extent the model created using the Yukawa potential depicts which nuclei regions.

REFERENCES

Arda, A., & Sever, R. (2012). Approximate Analytical Solutions of the Dirac Equation for Yukawa Potential Plus Tensor Interaction with Any κ-Value. *Few-Body Syst , 54* (DOI 10.1007/s00601-012-0509-9), 1829–1837.

Arima, A., & Iachello, F. (1975). Collective Nuclear States as Representations of a SU(6) Group. *Physical Review Letters, 35*(16), 1069-1072.

Arima, A., & Iachello, F. (1976). Interacting Boson Model of Collective States I. The Vibrational Limit. *Annals of Physics, 99*, 253-317.

Bohr, A. (1952). *The Coupling of Nuclear Surface Oscillations to the Motion on Individual Nucleons* (Matematisk-fysiske Meddelelser, bind 26, nr. 14 b., Cilt 26 (14)). Printed in Denmark: Danske Videnskabernes Selskab Matematisk-fysiske Meddelelser.

Bohr, A., & Mottelson, B. (1998). *Nuclear Structure Volume II. Nuclear Deformations* (First published b.). U. S. A: World Scientific Publishing Co. Pte. Ltd.

Bonatsos, D., Lenis, D., Petrellis, D., & Terziev, P. (2004). Z(5): critical point symmetry for the prolate to oblate nuclear shape phase transition. *Physics Letters B, 588* (doi:10.1016/j.physletb.2004.03.029), 172–179.

Bonatsos, D., Lenis, D., McCutchan, E., Petrellis, D., & Yigitoglu, I. (2007). Exactly separable version of X(5) and related models. *Physics Letters B , 649* , 394–399.

Caprio, M. (2005). Effects of β-γ coupling in transitional nuclei and the validity of the approximate separation of variables. *Physical Review C , 72*(054323), 1-11.

Chabab, M., Lahbas, A., & Oulne, M. (2015). Bohr Hamiltonian with Hulthen plus ring-shaped potential for triaxial nuclei. *Eur. Phys. J. A , 51*(131), 1-14.

Chabab, M., El Batoul, A., Lahbas, A., & Oulne, M. (2016). Electric quadrupole transitions of the Bohr Hamiltonian with Manning–Rosen potential. *Nuclear Physics A, 953*(158), 1-18.

Chabab, M., El Batoul, A., Hamzavi, M., Lahbas, A., & Oulne, M. (2017). Excited collective states of nuclei within Bohr Hamiltonian with Tietz-Hua potential. *Eur. Phys. J. A, 53*(157), 1-19.

Chabab, M., El batoul, A., Hamzavi, M., Lahbas, A., Moumene, I., & Oulne, M. (2019). Comparison between Coulomb and Hulthèn potentials behaviors in γ -rigid nuclei within a generalized uncertainty principle. *Annals of Physics , 403* (https://doi.org/10.1016/j.aop.2019.02.002), 47–58.

Cejnar, P., Jolie, J., & Casten, R. (2010). Quantum phase transitions in the shapes of atomic nuclei. *Reviews of modern Physics, 82* (DOI: 10.1103/RevModPhys.82.2155), 2155-2158.

Çapak, M., Petrellis, D., Gönül, B., & Bonatsos, D. (2015). Analytical solutions for the Bohr Hamiltonian with the Woods–Saxon. *Journal of Physics G: Nuclear and Particle Physics, 095102* (doi:10.1088/0954-3899/42/9/095102), 1-24.

Davydov, A., & Filippov, G. (1958). Rotational States in Even Atomic Nuclei. *Nuclear Physics , 8*, 237-249.

Davydov, A., & Rostovsky, V. (1959). Relative Transition Probalities Between Rotational Levels of Non-Axial Nuclei. *Nuclear Physics, 12*, 58-68.

Davydov, A., & Chaban, A. (1960). Rotation -Vibration Interaction in Non-Axial Even Nuclei. *Nuclear Physics, 20*, 499-508.

Elliott, J. (1958). Collective Motion in the Nuclear Shell Model. I. Classification Schemes for States of Mixed Configurations. *Proc. R. Soc. Lond. A , 245*, 128-145.

Gradshteyn , I., & Ryzhik, I. (2007). *Table of Integrals, Series, and Products* (Seventh Edition ed. b.). USA: Academic Press is an imprint of Elsevier.

Hammad, M., Yaqut, A., Abdel-Khalek, M., & Doma, S. (2021). Analytical study of conformable fractional Bohr Hamiltonian with Kratzer potential. *Nuclear Physics A, 1015*(122307), 1-18.

Hammad, M., Yahia, M., & Bonatsos, D. (2023). Triaxial nuclei and analytical solutions of the conformable fractional Bohr Hamiltonian with some exponential-type potentials. *Nuclear Physics A, 1030*(122576), 1-31.

Hammou, A., Chabab, M., El Batoul, A., Hamzavi, M., Lahbas, A., Moumene, I., & Oulne, M. (2019). Bohr Hamiltonian with trigonometric Pöschl-Teller potential in γ-unstable and γ-stable pictures. *Eur. Phys. J. Plus, 134*(577), 1-14.

Iachello, F. (2000). Dynamic Symmetries at the Critical Point. *Phsical Review Letters, 85*(17), 3580-3583.

Iachello, F. (2001). Analytic Description of Critical Point Nuclei in a Spherical-Axially Deformed Shape Phase Transition. *Pysical Review Letters, 87*(5), 052502, 1-4.

Iachello, F. (2003). Phase Transitions in AngleVariables. *Physical Review Letters, 91*(13), 132502.

Imbo, T., Pagnamenta, A., & Sukhatme, U. (1984). Bound State of the Yukawa Potential via the Shifted 1/N Expansion Technique. *Phsics Letters, 105A*(4, 5), 183-187.

Inci, I., Boztosun, I., & Gonen, Y. (2012). Bohr Hamiltonian with a finite well for triaxial nuclei. *J. Phys. G: Nucl. Part. Phys., 39*(085112), 1-10.

Karayer, H., Demirhan, D., & Buyukkılıç, F. (2016). Conformable Fractional Nikiforov–Uvarov Method. *Commun. Theor. Phys., 66*, 12–18.

Mbadjoun, B., Ema'a Ema'a, J., Abiama, P., Ben-Bolie, G., & Ateba, P. O. (2018). Nuclear energy excitation by Bohr Hamiltonian for triaxial nuclei using Killingbeck plus Morse potential. *International Journal of Modern Physics E, Vol. 27,*(No. 9), 1850072 (1-20).

Meyer-Ter, V. (1975). Collective Model Description of Transitional Odd-A Nuclei. *Nuclear Physics A, 249*, 111-140.

Nikiforov, A. F., & Uvarov, V. B. (1988). *Special Functions of Mathematical Physics.* Moskow: Springer Basel AG, ISBN 978-1-4757-1597-2.

Sobhani, H., Ikot, A., & Hassanabadi, H. (2017). Analytical solution of Bohr Hamiltonian and extended form of sextic potential using bi-confluent Heun functions. *Eur. Phys. J. Plus , 132*(240), 1-9.

Sobhani, H., Hassanabadi, H., & Chung, W. (2018). Investigation of Bohr Hamiltonian in presence of Killingbeck potential using bi-confluent Heun functions. *Nuclear Physics A , 973*(https://doi.org/10.1016/j.nuclphysa.2018.02.007), 33–47.

Szego, G. (1939). *Orthogonal Polinomials* (Volume XXIII b.). United States of America: American Mathematical Society Providence, Rhode Island.

Wilets, L., & Jean, M. (1956). Surface Oscillations in Even-Even Nuclei. *Phsical Review, 102*(3), 788-795.

Yigitoglu, I., & Bonatsos, D. (2011). Bohr Hamiltonian with Davidson potential for triaxial nuclei. *Physical Review C, 83*(014303), 1-8.

Yukawa, H. (1934). *On the Interaction of elementary particles I* (I b.). Osaka: Department of Physics, Osaka Imperial University.

DİNİN DİJİTALLEŞMESİ VE BENLİK

Dr. Bilal BEKALP
Uludağ Üniversitesi, İlahiyat Fakültesi, Din Felsefesi
ORCID: 0000-0001-8733-959X

ÖZET
Dijital dünyayı sanal gerçeklik (görünüş) olarak düşünmek alışılagelmiş bir durumdur. 1990'ların başında sanal sıfatı her türlü bilgisayar oyununa uygulanıyordu. Bu yolla güçlü benlik duygusunu pekiştirilmekte, dünyanın tamamen sizinle ilgili olduğu ve iradenizi dünyaya başarıyla dayattığınız, onu kendi zevklerinize göre şekillendirdiğiniz izlenimini vermektedir. Bu durum çoğulluğa bir birlik dayatarak, özgürleştirilmiş metaforları tekilliğin iradesine indirgiyor ki bu da benliktir. Bu benlik Dindar insan için de geçerli bir hal alarak, yaratılan benliğin geleneksel dindar bireyden oldukça farklı olduğu görülüyor. Dijital din, dijital medya ve kültürler aracılığıyla yeni biçimlerde oluşturulan bir inanç sistemi olarak tanımlanabilir; bu da yeni bir din anlayışına ve dijital teknoloji aracılığıyla anlamın aracılık edilmesi deneyimlerine yol açabilir. Dolayısıyla, mevcut dini uygulamaların yeniden şekillendirilmesi hem çevrimdışı hem de çevrimiçi olarak yeni deneyimlere, özgünlüğe ve manevi düşüncelere yol açmaktadır. Küresel bilgi pazarında fikirlerin hayatta kalması ve yayılması, Darwin tarafından öne sürülen bir yasa olan en uygun olanın hayatta kalması prensibiyle düzenlenmektedir. Ritüel, tekrar ve yeniden üretim şimdiye kadar dinin konusuydu; izole edilmiş, kutsal yerlerde gerçekleştiriliyorlardı. Ancak modern çağda bu durum tüm kültürün kaderi haline gelmiştir.
Anahtar Kelimeler: Dijitalleşme, Din, Modernizm, Benlik

DIGITALIZATION OF RELIGION AND THE SELF

ABSTRACT
It is customary to think of the digital world as virtual reality (appearance). In the early 1990s the adjective virtual was applied to all kinds of computer games. In this way it reinforces a strong sense of self, giving the impression that the world is all about you and that you have successfully imposed your will on the world, shaping it according to your tastes. This imposes a unity on the plurality, reducing the liberated metaphors to the will of the singularity, which is the self. This self also applies to the religious person, where the self created is quite different from the traditional religious individual. Digital religion can be defined as a belief system created in new ways through digital media and cultures, which can lead to a new understanding of religion and experiences of the mediation of meaning through digital technology. Thus, the reshaping of existing religious practices leads to new experiences, authenticity and spiritual reflections both offline and online. The survival and diffusion of ideas in the global information marketplace is regulated by the principle of survival of the fittest, a law proposed by Darwin. Ritual, repetition and reproduction have hitherto been the domain of religion, performed in isolated, sacred places. In the modern era, however, this has become the fate of all culture.
Keywords: Digitalization, Religion, Modernism, Selfness

PERCEPTIONS OF PROPHET MUHAMMAD IN WESTERN DISCOURSE

Öğr. Gör. Zühal GÖKBEL
Kırşehir Ahi Evran Üniversitesi, Yabancı Diller Yüksekokulu, İngiliz Dili ve Edebiyatı
ORCID: 0000-0003-2772-7042

ABSTRACT
Certain distinct stereotypes characterise the Western image of the Muslim and the prophet Muhammad has been the source figure for most of the Westerners and orientalists for creating these stereotypes. This new form of belief and its religious leader, with its similarities as well as overriding differences, have become a growing threat to Christian Western civilisation. With the rise of Islam, before reaching the West, within three centuries of its birth, it made great scientific and philosophical achievements that led to significant intellectual growth in the Islamic world. Islam in the Western Christendom was nothing but a heresy. The Western perception of Islam brought a negative portrayal of it and Muhammad's claim to prophethood. Thus, the cultural, diplomatic, and military developments of the ages have dramatically affected the perceptions of Westerners related to Islam and the prophet. Recognition of the Prophet Muhammad has developed intertwined with interactions between the East and West. In this process, the prophet has been subjected to various representations including mostly negative associations ranging from pseudo-prophet to positive ones describing him as a heroic and reliable leader. Predominantly, Muhammad's prophecy was seen as pseudo by the historic Christian polemicians, and Islam was believed to have been misused to compensate for the perversions of the prophet. The otherizing and marginalising attitude of the Western oriental gaze has also essentially affected the ideas related to Islam and the prophet. This paper aims to investigate how the prophet Muhammad was perceived and represented within the Western discourse in an overall background.
Keywords: Discourse, East-West Interactions, Islam and Christianity, Orientalism.

PONTOS SİKKELERİNDEKİ EŞYALAR VE MİTOLOJİK KARAKTERLER

Kazım ERTÜRK
Selçuk Üniversitesi, Sosyal Bilimler Enstitüsü, Tarih Bölümü
ORCID: 0009-0009-2512-4265

ÖZET
Pontos Bölgesi'nin dağlık ve sık bitki örtüleriyle kaplı olması Antik Çağlara ait yerleşim yerlerinin tespitini zorlaştırmakta, bu da arkeolojik çalışmaların güçlükle yürütülmesine neden olmaktadır. Bu nedenle bölgeye ait antik dönem sikkeleri ile ilgili verilerin sunulacağı çalışmalara ihtiyaç duyulmaktadır. Mithridates Hanedanlığı dönemine tarihlenen sikkelerin tanıtımı bu makalenin konusunu oluşturmaktadır. Pontos sikkeleri ile ilgili bir değerlendirme yapmayı ve yapacağımız bu değerlendirme ile karşılaştırma çalışmalarının sonucunda mevcut diğer sikkeler arasındaki kültür bağlantıları ile bu sikkelerin gelişim özelliklerini ortaya koymayı amaçlamaktayız. Giriş bölümünde Pontos Krallığının kuruluşundan yıkılışına kadar ki dönemlerde basılan sikkelerin basım politikası, hangi medeniyetlerden etkilendiği, hangi amaçla bu tasvirlerin yapıldığı ve bu tasvirlerin özellikleri hakkında bilgiler verilmiştir. Pontos Krallığının, Mithridates Hanedanlığı dönemine ait altın ve gümüş paraları sadece krallık tarafından darp edilirken, birim değeri daha küçük olan pirinç (bronz) paralar krallığa bağlı Sinope, Amisos (Samsun), Khabakta (Ünye), Pharnekeia (Giresun), Amaseia (Amasya) gibi on iki farklı şehirde darp edilmiştir. Bu sikkelerin bazılarının bu makalede resimli tanıtımı ile birlikte değerlendirilmeleri yapılmıştır. Bu paralar boyutları, birim değerleri ve basılan resim tekniği açısından birbirleriyle benzerlik göstermektedir. Söz konusu sikkelerde tasvir edilen eşyalar ve mitolojik karakterlerin özellikleriyle birlikte dönemin dinî, sosyal, siyasal ve ekonomik gelişmeleri ve bunun sikke darp politikasına olan yansımaları değerlendirilmiştir. Ayrıca Pers ve Helenistik kültürlerinin Pontos sikke tasvirlerine yansıması ve etkileri bu çalışmada irdelenmiştir. Pontos sikkelerinin en büyük özelliği hem Pers, hem Helenistik hem de Anadolu kültürlerinin sentezlerini bu paraların üzerinde görebiliyor olmamızdır. Sonuç olarak kurduğu güçlü kültürel bağlarla birbirinden farklı kültürleri içinde barındıran Pontos Krallığı sikkeleri de önemli değişim ve dönüşümler geçirmiştir. Bu süreçte yaşanan kültürel değişimler paraların her bir detayında kendisini somut belgelerle göstermiştir.
Anahtar Kelimeler: Mithridates Hanedanlığı, Pontos Devleti, Sikke, Mitolojik Kahramanlar, Helenistik.

OBJECTS AND MYTHOLOGICAL CHARACTERS ON PONTUS COINS

ABSTRACT
The mountainous and densely vegetated terrain of the Pontos Region makes the identification of ancient settlements challenging, thereby complicating archaeological studies. Consequently, there is a need for studies presenting data on ancient coins from the region. This article focuses on the introduction of coins dated to the Mithridatic Dynasty. Our aim is to evaluate Pontus coins and, through comparative studies, reveal the cultural connections and developmental features of these coins among existing others. In the introduction, information is provided about the coin minting policies from the establishment to the fall of the Pontus Kingdom, the civilizations that influenced them, the purposes of these depictions, and their characteristics. While the gold and silver coins of the Pontos Kingdom during the Mithridatic Dynasty were minted solely by the kingdom, the smaller denomination bronze coins were minted in twelve different cities affiliated with the kingdom, such as Sinope, Amisos

(Samsun), Khabakta (Ünye), Pharnekeia (Giresun), and Amaseia (Amasya). Some of these coins are evaluated in this article along with their pictorial introductions. These coins are similar to each other in terms of size, denomination, and minting technique. The religious, social, political, and economic developments of the period, as well as their reflections on the coin minting policies, are evaluated alongside the characteristics of the objects and mythological characters depicted on these coins. Additionally, the influences of Persian and Hellenistic cultures on the depictions on Pontus coins are examined in this study. The most significant feature of Pontus coins is that they allow us to see the synthesis of Persian, Hellenistic, and Anatolian cultures. As a result, the Pontus Kingdom, which harbored diverse cultures through strong cultural ties, also underwent significant changes and transformations in its coinage. The cultural changes experienced during this process are concretely evidenced in every detail of the coins.

Keywords: Mithridatic Dynasty, Pontos State, Coin, Mythological Heroes, Hellenistic.

İLK TUNÇ ÇAĞINDAN ORTA TUNÇ ÇAĞINA GEÇİŞ DÖNEMİNDE KONYA'NIN KOMŞU BÖLGELERLE İLİŞKİLERİ

Mehmet CEYLAN
Selçuk Üniversitesi, Fen Edebiyat Fakültesi, Tarih Bölümü
ORCID: 0009-0006-3761-7647

ÖZET
Konya ve çevresi yerleşik yaşama geçişin ilk başladığı dönemden itibaren yoğun olarak yerleşik yaşama geçiş izleri barındıran bölgelerdir. Bölge üzerindeki çalışmalar, gezi ve araştırmalar yaklaşık 200 yıllık bir geçmişe uzanmaktadır. Yapılan araştırmalar, arkeolojik kazılar İlk Tunç Çağı'ndan Orta Tunç Çağı'na geçiş döneminde bölge üzerindeki höyüklerin çeşitli sebeplerle merkezileştiğini yani küçük yerleşmelerin tek bir yerleşim yerinde toplandığını göstermektedir. Araştırmanın konusu, Konya'nın İlk Tunç Çağı'ndan Orta Tunç Çağı'na geçiş dönemindeki tarihi ve kültürel varlığıdır. Araştırmanın kapsamı dönemsel olarak İTÇ-OTÇ, bölgesel olarak ise Konya ile sınırlıdır. Araştırmanın amacı; anılan dönemdeki bölgedeki insan topluluklarını merkezileşmeye zorlayan iklimsel, coğrafi, siyasi, ekonomik ve sosyo-kültürel faktörlerin neler olduğunu ortaya koymaktır. Anadolu'nun tarih öncesinden tarihi döneme giriş olarak görülen OTÇ döneminde doğu-batı ilişkilerinin rolü, diğer taraftan da höyüklerdeki değişiklikler, madenlerin keşfi ile birlikte siyasallaşma dönemine geçilen bu dönemde yerel güçlerin siyasallaşma sürecinin aydınlatılmasına katkı sağlayabilmek, bütün bu süreci ve süreç içerisinde meydana gelen iklimsel, siyasal, ekonomik ve sosyo-kültürel gelişmeleri jeolojik, ekolojik, arkeolojik ve antik yazılı belgeler ve modern literatüre bağlı kalarak ortaya koymaktır. Çalışmamızda yerel gelişmelere etki eden komşu bölgelerdeki siyasal etkileşimler göz önünde bulundurulacaktır. Çalışmamızda Konya'nın, Orta Anadolu, Çukurova, Batı Anadolu ile karşılıklı etkileşimlerinin yanı sıra Doğu Akdeniz ve Ege uygarlıklarının etkileri araştırılmıştır. Büyük Kervan Yolu" olarak adlandırılan, MÖ. III. Bin yılın ortalarından itibaren oluşan ticari güzergâhın, Mezopotamya'dan başlayarak Kilikya bölgesi üzerinden Troya'ya ulaştığını iddia edilmektedir. Bu noktada Konya Bölgesi ve Orta Anadolu kilit bir konumdadır. Orta ve Batı Anadolu'da sayıları giderek çoğalan ortak tipteki buluntular İTÇ II-III'te ise Orta Anadolu'ya ve Konya'ya yönelen bir ticaret anlayışının geliştiğini göstermektedir. Uzun mesafeli ticarette sadece ETÇ toplumlarının ihtiyaçlarını karşılamaya yönelik olmamıştır. Arkeolojik buluntular sonucunda yeni düşüncelerin, mimari tarzların, teknolojik gelişmelerin ve toplumsal inançların da bu yolla aktarıldığını göstermektedir.
Anahtar kelimeler: Höyükler, Konya,İlk Tunç Çağı.

IN THE TRANSITION PERIOD FROM THE EAST BRONZE AGE TO THE MIDDLE BRONZE AGE KONYA'S RELATIONS WITH NEIGHBORING REGIONS

SUMMARY
Konya and its surroundings are regions that contain intense traces of the transition to settled life, starting from the period when the transition to settled life first began. Studies, trips and research on the region date back nearly 200 years. Research and archaeological excavations show that during the transition period from the Early Bronze Age to the Middle Bronze Age, the mounds in the region became centralized for various reasons, that is, small settlements were gathered in a single settlement.

The subject of the research is the historical and cultural existence of Konya in the transition period from the Early Bronze Age to the Middle Bronze Age. The scope of the research is periodically limited to EBA-MBA and regionally to Konya. Purpose of the research; The aim of this study is to reveal the climatic, geographical, political, economic and socio-cultural factors that forced the human communities in the region to centralize in the mentioned period. The role of east-west relations in the MBA period, which is seen as the entrance to the historical period from the prehistory of Anatolia, and on the other hand, the changes in the mounds and the discovery of mines, to contribute to the elucidation of the politicization process of local powers in this period, and to contribute to the elucidation of this whole process and the climatic conditions that occurred during the process. To reveal political, economic and socio-cultural developments based on geological, ecological, archaeological and ancient written documents and modern literature. In our study, political interactions in neighboring regions that affect local developments will be taken into consideration. In our study, the effects of Konya's interactions with Central Anatolia, Çukurova and Western Anatolia, as well as the Eastern Mediterranean and Aegean civilizations, were investigated. The so-called "Great Caravan Road", BC. III. It is claimed that the commercial route, which was formed since the middle of the millennium, started from Mesopotamia and reached Troy via the Cilicia region. At this point, Konya Region and Central Anatolia are in a key position. The increasing number of common type finds in Central and Western Anatolia shows that a trade approach directed towards Central Anatolia and Konya developed in EBA II-III. Long-distance trade was not only aimed at meeting the needs of EBA societies. As a result of archaeological findings, it shows that new ideas, architectural styles, technological developments and social beliefs were transferred in this way.
Keywords: Mounds, Konya, Early Bronze Age.

AYDINLANMA DÖNEMİNİN AVRUPALILIK KİMLİĞİ VE AVRUPA KÜLTÜRÜNE ETKİLERİ

Yasemin CAN
Marmara Üniversitesi, Avrupa Araştırmaları Enstitüsü, Avrupa Birliği Siyaseti ve Uluslararası İlişkiler
ORCID: 0009-0004-4951-4907

Birkan ŞENYÜZ
Nevşehir Hacı Bektaş Veli Üniversitesi, Sosyal Bilimler Enstitüsü, Kültürel Miras ve Kültür Yönetimi
ORCID: 0000-0001-7020-201X

ÖZET
Avrupalılık düşüncesini yüzlerce yıl öncesine götürmek mümkündür. Binli yıllarla birlikte bu düşünce ortaya çıkmış ve gelişmeye başlamıştır. Avrupalılık düşüncesinin ilk oluşumunda inanç birliği görmekteyiz. Hristiyan birliği etrafında gelişen bu düşünce Aydınlanmaya kadar bu özelliğini korumuştur. Müslümanların Kudüs'ü ele geçirmesi, İspanya üzerinden Avrupa içlerine ilerlemeleri, Türklerin Avrupa ilerleyişi, İstanbul'un fethi gibi gelişmeler Hristiyan birliğinin oluşumunda etkili olmuştur. Kutsal Roma Cermen İmparatorluğu Orta Çağ olarak adlandırdığımız dönemde Avrupa coğrafyasında hakimiyet süren güç olarak görülmektedir. Feodal merkezi bir krallık olan Kutsal Roma'da derebeylikler arasında sıkça gerçekleşen mücadele, Müslüman ve Türk tehdit algısı karşısında Hristiyan birleşmesi olarak gelişmiştir.
Aydınlanma dönemi günümüz modern dünyasının temellerinin atıldığı dönemdir. Bu dönemde insanlığın merkezine 'akıl' yerleşmiştir. Dogmatik kültür yerini pragmatist kültüre bırakmıştır. Günümüzde Avrupa'da hâkim görüş olan liberalizm, demokrasi, özgürlük, eşitlik, adalet, insan hakları gibi kavramlar bu dönemde zamanımız anlamlarıyla ortaya çıkmış ve özellikle Fransız Devrimiyle birlikte kurumsallaşmaya başlamıştır. Aydınlanma Döneminin İngiliz Devrimiyle başlayıp Fransız Devrimiyle doruk noktasına ulaştığını söylemek mümkündür. Aydınlanma Çağı olarak adlandırılan bu dönemde gerçekleşen önemli gelişmelerden biri de insanlık tarihinin en önemli sıçramalarından biri olan Sanayi Devrimidir. Sanayi Devrimiyle birlikte feodal düzen yerini kapitalist düzene bırakmıştır. Bu süreçte feodal dönemin hâkim gücü olan aristokrasi yerini burjuvaziye bırakırken, imparatorluklar ulus devletlere, krallıklar ise yerini cumhuriyetlere bırakmıştır.
Gerek Aydınlanmayla birlikte aklın insan merkezine yerleşmesi gerek eşitlik, özgürlük, adalet, demokrasi, sekülerlik, insan hakları gibi kavramların yaşam biçimine girerek kurumsallaşması gerekse de feodal düzenin yerini kapitalist düzene bırakması ve liberal düşünce etrafında yeni anlayışın hâkim olması Avrupalılık kimliği ve kültürü açısından da önemli etkiler yaratmıştır. Günümüzde Avrupalılık kimliği ve kültürü bu kavramlar üzerine şekillenmiş, Avrupa medeniyeti insani bu ortak değerlerle biçimlenmiştir.
Anahtar Kelimeler: Aydınlanma, Avrupalılık Kimliği, Avrupa Kültürü

THE EUROPEAN IDENTITY OF THE ENLIGHTENMENT ERA AND ITS EFFECTS ON EUROPEAN CULTURE

ABSTRACT

It is possible to take the idea of Europeanism back hundreds of years. This idea emerged and began to develop over the millennia. We see unity of belief in the early formation of the European idea. This idea, which developed around Christian unity, preserved this feature until the Enlightenment. Developments such as the Muslims' capture of Jerusalem, their advance into Europe via Spain, the Turkish advance into Europe, and the conquest of Istanbul were effective in the formation of Christian unity. The Holy Roman Empire is seen as the dominant power in the European geography during the period we call the Middle Ages. The frequent struggle between feudal lords in Holy Rome, a central feudal kingdom, developed as Christian unity against the perception of Muslim and Turkish threats.

The Enlightenment period is the period in which the foundations of today's modern world were laid. In this period, 'mind' settled at the center of humanity. Dogmatic culture has been replaced by pragmatist culture. Concepts such as liberalism, democracy, freedom, equality, justice and human rights, which are the dominant views in Europe today, emerged with their contemporary meanings in this period and began to be institutionalized, especially with the French Revolution. It is possible to say that the Enlightenment Period started with the English Revolution and reached its peak with the French Revolution. One of the important developments that took place during this period, called the Age of Enlightenment, was the Industrial Revolution, one of the most important leaps in human history. With the Industrial Revolution, the feudal order was replaced by the capitalist order. In this process, the aristocracy, which was the dominant power of the feudal period, gave way to the bourgeoisie, empires gave way to nation states, and kingdoms gave way to republics.

Both the settling of the mind at the human center with the Enlightenment, the institutionalization of concepts such as equality, freedom, justice, democracy, secularism, and human rights by entering the way of life, the replacement of the feudal order with the capitalist order, and the dominance of a new understanding around liberal thought have created important effects in terms of European identity and culture. Today, European identity and culture have been shaped on these concepts, and European civilization has been shaped by these common human values.

Keywords: Enlightenment, European Identity, European Culture

AZƏRBAYCANIN TARİXİ TORPAĞI – ZƏNGƏZUR

Sevda Aghayeva Aydin
Azerbaijan State Pedagogical University, Philology Faculty, the Foreign Languages Centre
ORCID: 0000-0002-5615-692

XÜLASƏ
Qədim və tarixi əhəmiyyətə malik olan Zəngəzur Azərbaycanın irs və mədəni mənzərəsində mühüm yer tutur. Zəngin tarixi, müxtəlif coğrafiyası və strateji əhəmiyyəti ilə səciyyələnən bu ərazi çoxsaylı tarixi hadisələrin və mədəni inkişafın mərkəz nöqtəsi olmuşdur. Bölgənin tarixi qədim dövrlərə gedib çıxır, burada ilkin insanların məskunlaşması və müxtəlif sivilizasiyaların çiçəklənməsi sübut olunur. Əsrlər boyu Zəngəzur müxtəlif imperiya və sülalələrin təsiri altına düşmüş, hər biri bölgənin mədəni və memarlıq irsində öz izini qoymuşdur. Zəngəzurun demoqrafik tərkibi də müxtəlif olub, Cənubi Qafqazın daha geniş etnik və mədəni mozaikasını əks etdirir. Tarixən bura müxtəlif etnik qrupların, o cümlədən azərbaycanlıların və başqa millətlərin məskəni olub, onlar birgə yaşamış və regionun zəngin mədəni qobeleninə öz töhfələrini vermişlər. Müasir dövrdə Zəngəzurun əhəmiyyəti onun tarixi-mədəni dəyərindən kənara çıxır. Xüsusilə 20-ci əsrdə Rusiya İmperiyasının və daha sonra Sovet İttifaqının dağılmasından sonra milli sərhədlərin yenidən cızılması və yeni dövlətlərin yaranması səbəbindən bu, mübahisə və geosiyasi maraq nöqtəsi olmuşdur. Regionun strateji yerləşməsi onu nəqliyyat, ticarət və hərbi strategiya üçün kritik bir nöqtəyə çevirib. Bu gün Zəngəzur irsi onun memarlıq və arxeoloji abidələrində, xalqının davamlı mədəni ənənələrində öz əksini tapmışdır. Bu irsin qorunub saxlanması və təbliği istiqamətində aparılan davamlı səylər regionun Azərbaycanın tarixi və mədəni kimliyinin simvolu kimi əhəmiyyətini vurğulayır. Bu məqalə Zəngəzurun tarixi əhəmiyyəti, çoxşaxəli mədəni irsi və müasir aktuallığı haqqında qısa məlumat verir, onun çoxşaxəli irsinin daha dərindən araşdırılmasına zəmin yaradır.
Açar sözlər: Zangazur, Şərqi və Qərbi Zəngəzur, Azərbaycan, tarixi bölgə, mədəni irs, qədim sivilizasiyalar, etnik müxtəliflik, Cənubi Qafqaz, milli sərhədlər, memarlıq abidələri, arxeoloji, mədəni ənənələr

HISTORICAL LAND OF AZERBAIJAN – ZANGAZUR

ABSTRACT
Zangazur, an ancient and historically significant region, holds a pivotal place in Azerbaijan's heritage and cultural landscape. This area, characterised by its rich history, diverse geography, and strategic importance, has been a focal point of numerous historical events and cultural developments. The region's history dates back to ancient times, with evidence of early human settlements and the flourishing of various civilisations. Over the centuries, Zangazur has been influenced by different empires and dynasties, each leaving its mark on the region's cultural and architectural heritage. The demographic composition of Zangazur has also been diverse, reflecting the broader ethnic and cultural mosaic of the South Caucasus. Historically, it has been home to various ethnic groups, including Azerbaijanis and other nations, who have coexisted and contributed to the region's rich cultural tapestry. In the modern era, Zangazur's significance extends beyond its historical and cultural value.

It has been a point of contention and geopolitical interest, particularly during the 20th century, as national borders were redrawn and new states emerged in the aftermath of the collapse of the Russian Empire and later the Soviet Union. The region's strategic location has made it a critical juncture for transportation, trade, and military strategy. Today, the legacy of Zangazur is reflected in its architectural monuments, archaeological sites, and the enduring cultural traditions of its people. The ongoing efforts to preserve and promote this heritage underscore the region's importance as a symbol of Azerbaijan's historical and cultural identity. This article provides a concise overview of Zangazur's historical significance, its diverse cultural heritage, and its contemporary relevance, setting the stage for a deeper exploration of its multifaceted legacy.
Keywords: Zangazur, Eastern and Western Zangazur, Azerbaijan, historical region, cultural heritage, ancient civilisations, ethnic diversity, South Caucasus, national borders, architectural monuments, archaeological, cultural traditions

"We speak the truth. It is our ancestral land: all of Zangazur - Eastern and Western Zangazur. Now they say in Armenia that Ilham Aliyev is making a territorial claim. If there is Eastern Zangazur, then there is also Western Zangazur. Yes, West Zangazur is our ancestral land. I said we should go back there. I said it ten years ago. All my speeches are in the press. I have said that it is our ancestral land, we must return there, we will return and we are returning. Nobody can stop us. We will definitely be back because there is no other way."

Ilham Aliyev, President of the Azerbaijan Republic

The people of Azerbaijan, the state of Azerbaijan won the war of justice by liberating the lands occupied by the armed forces of Armenia for nearly 30 years. The invading Armenian fascists were expelled from our lands. The liberation war started against the next provocations of the enemy. It ended with a Great Victory thanks to the leadership, wise, far-sighted policy, high diplomatic skills, decisive steps of our Supreme Commander-in-Chief and the strength of our glorious army.

Our people waved the flag of victory over our liberated territories. The territorial integrity of Azerbaijan was ensured. It is worth reminding Azerbaijan President Ilham Aliyev's, interview with the Turkish TV channel "SNN Türk": "Starting the War of Independence, Azerbaijan liberated its historical lands from the invaders, restored historical justice, expelled the invaders from our lands and restored its territorial integrity."

After the historic victory in the Patriotic War, it became necessary to open the Zangazur corridor. As we know, large-scale works are currently being carried out in this direction, and soon we will witness a change of the region's economic landscape in Zangazur, our historical land. Thus, based on the Decree signed by the head of the country on July 7, along with the Garabakh economic zone, the Eastern Zangazur economic zone was also created.

On August 17, when President Ilham Aliyev and First Lady Mehriban Aliyeva were visiting Kalbajar and Lachin regions, the head of state recalled some points related to Eastern Zangazur in his speech and said: "As you know, 14 economic regions were created by my decree. Among them, the creation of two economic regions stood out - Garabakh and East Zangazur economic regions were created. I think this is a very right step. It is also based on the future. Both Garabakh and Zangazur belong to the entire Garabakh economic region. The regions belonging to Eastern Zangazur have been united. But Western Zangazur is currently under the control of Armenia. However, as a result of the construction of the Zangazur corridor, we have plans to return our citizens to our ancestral lands.

Because our citizens were forcibly evicted from the territory of Armenia, not only from Zangazur, but also from Goycha and they have every right to go and live in their ancestral lands. We're saving that for later."

During his visit to the regions of Kalbajar and Lachin, the President of the Azerbaijan Republic in his extensive speech, at the same time, specifically stated: "All the work related to the future development of East Zangazur will go according to plan and we will achieve our wish. Garabakh and East Zangazur are Azerbaijan!"

In general, what is meant by the term "Zangazur" from a historical-geographical point of view, what are the historical facts and historical truths that are fossilized in sources, what lands did these areas cover, and how did its borders change? What are the historical roots of the emergence of Western and Eastern Zangazur? (1)

Before clarifying the questions, let's remember a historical moment. The views expressed by the President of the Azerbaijan Republic, Ilham Aliyev, in his magnificent speech at the III Congress of the World Azerbaijanis, held on July 5, 2011, fully and correctly reflected the historical truth about Garabakh and Zangazur, and conveyed the history as it is to the Azerbaijanis of the world: "History is history. In the settlements in Garabakh in 1978 Armenians who are celebrating their 150th anniversary are well aware that they came to these lands as guests. Not only Yukhari-Garabakh, today's history of Armenia was formed on the lands of Azerbaijan. The Khanate of Iravan is our historical territory.

If we look at the map, we will see that the great Turkic world was geographically divided because of separating Zangazur from Azerbaijan and giving it to Armenia. Giving Zangazur to Armenia had a very negative meaning."



Zangazur district was a territory, a geographical space that included the lands of ancient Azerbaijan. At the same time, the Zangazur lands have been part of the states formed in the territories of Azerbaijan since ancient times. Names are the spoken language of the land, the most reliable and long-lasting addresses of our ancestors. The large number of toponymic names of Turkic origin in Zangazur territory fully confirms our opinion. According to many scientists deepening their research in this direction, the lexical unit "zangi" in the name of the toponym is also the name of a Turkish tribe. (1)

We can count dozens of toponyms related to Zanjan and Zangazur: in Turkiye - Erzinjan, in Georgia - Zangishamlı, Zangane, in Azerbaijan - Zangilan, Zangaran (Yardimli district), Zangane (Sabirabad district), Zangishali (Aghdam district), Zangidare river (Gobustan district)), the Zangi River (Ismayilli district), Iravan district - the presence of toponyms related to the "Zangi" component such as Zangibasar, Zangiler, Zangili, the Zangi River is evidence of the connection of this toponym with the name of a large and powerful tribe that lived in a wide area and moved from one place to another.

Traces of this Oghuz-Turkic tribe live in Turkic-speaking republics, including many place names of our country. In the works of Mahmud Kashgari, Fazlullah Rashidaddin, Abdulgazi, Abbasgulu Aghanov, the name of the "Zangi" tribe, one of the Oghuz-Turkic tribes, is mentioned in many written sources. The Zangi tribes were one of the main pillars of the Atabay and Safavid states and authorities in Azerbaijan. (8)
Zangazur district included present-day Gafan, Gorus, Mehri, Garakilsa (Sisian), Lachin, Gubadli and Zangilan districts. Gorus settlement was called the central part.
As a result of the genocides committed by the Armenians against the Azerbaijanis in 1905-1907 and 1914-1920, about half a million local people were killed in Zangazur. In those years, 115 Muslim villages were wiped out in Zangazur. 4472 women and children were brutally murdered by Armenian armed groups. (8)
In general, it should be noted that the Zangazur issue was as important as the Yerevan issue in our National Leader Heydar Aliyev's speeches. He very accurately assessed the serious consequences of giving Zangazur to Armenia at the time, and noted that this process separated Nakhchivan, which is an integral part of Azerbaijan, from the physical point of view of Azerbaijan. In one of his speeches in 1998, Heydar Aliyev touched on this painful moment and said: "The transfer of Azerbaijan land Zangazur, including Mehri, Gafan districts, which are part of it - Azerbaijani lands to Armenia in 1920 is the most important loss of Azerbaijani lands in our history. It is a serious incident." When we pay attention, the national leader uses their historical names when naming these historical territories of Azerbaijan. The great leader knew the history of Meghri and Gafan, and those territories were part of the Azerbaijani state and empire very well. (2)

History

Zangazur is one of the areas of Azerbaijan with a rich historical past. Historical lands of Azerbaijan, covering a wide geography from Darbend to Zanjan, from Kirkuk to Eastern Anatolia, have been divided from time to time and settled within the borders of Modern Azerbaijan. The modern state of Azerbaijan is divided into two parts through the Zangazur corridor. The territory of Zangazur covers a part of the Zangazur range, the longest mountain range of the Lesser Caucasus, the southwest of the borders of the Azerbaijan Republic, and the southeast of the territory of Armenia.
The historical Zangazur area was known by different names in different periods. One of the oldest names of the region was Sünik. Sunik was one of the four major provinces of Albania. Although Sunik became an independent principality in some periods, sometimes it was part of Atropatena, and in most periods it was part of the Albanian state.
The remaining part of historical Zangazur within the borders of Azerbaijan is called Eastern Zangazur, and the remaining part in the territory of the present Armenian state is called Western Zangazur. In ancient times and the early Middle Ages, the territory of Zangazur was part of the kingdom of Mada, the kingdom of Scythians and the state of Atropatena under the name of Sunik or Sisakan, and the state of Azerbaijan Albania. In the middle of the 6th century, as a result of the administrative reform of Khosrov I Anushireva, the province of Adurbadagan was created, and both the north and the south of Azerbaijan were united under a single name. At the beginning of the 7th century, the victory of the Byzantine emperor Irakli II in the war with the Sassanid king Khosrow Parviz II strengthened the independence tendencies in the countries subject to Persian rule. As a result, the principality of Sünik became independent. (5)

Moisey Kalankatli in his "History of Albania" mentions the existence of an independent Sunik principality at the beginning of the 7th century. In ancient sources, this region was called Sisakan, or Sünik, and in Arabic sources, Sijan. Researchers write that the toponym of Sisakan is related to the name of the Saks, one of the ancient Turkic tribes living in that area. Albanian historian Moisey Kalankatuklu in his work "History of Albania" provides information about Albanian tribal associations living in this area, as well as Gargars, Khazars, Huns and other Turkic tribes.

Zangazur, which forms the eastern part of the state of Albania, covers a wide area, starting from Meghri along the Araz River, up to Akara, and towards the north to Gapijik, Khustup mountains, from the Zangazur mountain range to the Bargushad mountains. In the second half of the 7th century, Zangazur was occupied together with the Albanian stateby the Arabs. During the weakening of the Arab caliphate, small Azerbaijani feudal states emerged on the territory of former Albania.

It is also clear from the history of Azerbaijan that the 150-year Seljuk rule under the leadership of Alp Arslan, the glorious ruler of the Seljuk-Turk Empire in 1065, further expanded the Turkish-Islamic influence in the Zangazur area. Zangazur was invaded by Mongol Tatars in 1236. The written sources of these periods mention the names of places and yurts of Turkish-Oghuz origin in Zangazur.

During the rule of the Mongols, Zangazur was part of the Nakhchivan district of the Azerbaijan province. This situation continued during the times of Garagoyunlu and Aghgoyunlu and the first Safavid era. The term "Zangazur" is known as a toponym in written sources from the 14th century. In this period, not only in Zangazur, but also in the entire Caucasus, a powerful Turkish-Muslim spirit prevailed.

The toponym "Zangazur" is related to the name of the Zangi tribes living in these areas, distinguished by their bravery and chivalry, and the arrival of the Arabs to these areas. In Arabic "sur" means stone wall, fortress, constellation. This very warlike and freedom-loving tribe fought against the Arabs until the end. Undoubtedly, during these years, they built dozens of castles and fortifications, as well as used the natural fortifications specific to the places as a means of fighting against the enemy. (3)

In the 13th-14th centuries, Zangazur lands were geographically included in the Nakhchivan district of Azerbaijan province and Arran province. In the late Middle Ages, during the breakup of Sūnik, a large part of Zangazur was part of the provinces of Gabanat and Nakhchivan. The closure covered the southern part of Zangazur up to the Bergushad range. Sisyan was part of Nakhchivan province. Gorus and Kashtag (Lachin) districts of Zangazur were part of Garabakh province. During the Ottoman-Safavid war of 1578-1590, the Ottomans, who captured a large part of Azerbaijan, removed Nakhchivan province, along with Sisyan and Gapanat districts, from Azerbaijan province and transferred it to Chukhursad province.

The Gapanat district was divided into Barghushad and Urud livas. Small Bazarchay was separated from the Sisyan district. The territories of Gapanat and Zangazur together with Bayazid and Alashkert provinces of Chukhursad formed a separate Bayazid liva. Keshtag and Hekari districts were part of Garabakh (Ganja) province.

After recapturing Azerbaijani lands at the beginning of the 17th century, Shah Abbas I re-included Nakhchivan, Gapanat and Barghushad into the Azerbaijan province. The Bazarchay district was merged with Sisyan. Near the end of the 30s of the 17th century, the districts of Nakhchivan and Sisyan were included in Chukhurshad Baylarbey. In the 20s of the 18th century, the Ottomans again captured most of Azerbaijan.

During the Ottoman rule of the 1920s and 1930s, a part of Zangazur lands - Sisyan and Meghri Chukhurshad province, Barghushad, Hekari, Keshtak, Gulandar districts and a part of Keshtak were part of Ganja-Garabakh province.

Nadir Afshar took back all the lands of Azerbaijan from the Ottomans until 1735, when he was proclaimed king at the Mughan Congress in 1736, because the Beylarbeys of Garabakh (Ganja) opposed his election, he removed the Garabakh estates from the Beylerbey's control and placed them under the control of his brother Ibrahim, who was appointed as the judge of Azerbaijan. had spent After Nadir Shah was assassinated in 1747, his empire was divided into numerous small states - khanates. The territory of Zangazur became part of the Garabakh Khanate founded by Panahali Khan. As an administrative-territorial unit, Zangazur appeared at the end of the first quarter of the 19th century. (5)

However, in the harsh and merciless periods of history, our lands were forced to split and divide from time to time. Let's take a look at other historical facts about Zangazur.

According to the Gulistan Treaty of 1813, these territories were included in the territories occupied by Russia. In 1822, after the Russians abolished the Garabakh Khanate and turned it into a province within the military district of Muslim provinces, in the early 1930s, a large Zangazur district was formed within this province, which included 9 thousand people.

These were the former districts of Sisyan, Tatev, Zangazur, Garachorlu, Pusyan, Barghusad, Gapan, Meghri-Guney and Chavundur (Chuldur). According to the new administrative structure implemented in Azerbaijan on January 1, 1841, the former Zangazur district within the Garabakh district of the Caspian province was divided into two areas - Zangazur and Meghri areas. According to the new territorial-administrative division of 1846, Garabakh district was named Shusha district, and Caspian province was called Shamakhi province. In connection with the establishment of the Iravan governorate, the southern part of Zangazur, the Meghri area (former Gabanat province together with Gapan, Meghri-Guney, Chavundur and Pusyan districts) became part of the Ordubad district of this governorate in 1850-1867.

On February 25, 1868, when Yelizavetpol Governorate was created, Zangazur Governorate was created at the expense of a part of the territories of Shusha Governorate of Baku Governorate and Nakhchivan Governorate of Iravan Governorate. This district was surrounded by Sharur-Darelayaz and Nakhchivan districts of Iravan governorate, Javanshir, Shusha, and Jabrayil districts of Yelizavetpol governorate, bordered with Iran by the Araz River. Zangazur accident was the biggest among the accidents included in Yelizavetpol governorate. At the end of the 19th century, the territory of Zangazur district was 7.83 thousand square kilometers. Historically, Zangazur was divided into 4 areas - South (Meghri), Gafan, Zangazur (Gorus) and Sisyan (Garakilsa) districts. (3)

After the Ottoman troops left Azerbaijan based on the Mudros Treaty, the British recognized the Garabakh Governorate, which was created within the Azerbaijan Democratic Republic. Along with Shusha, Javanshir, Jabrayil, Zangazur was included in the Garabakh governorate. The government of the People's Republic decided to send troops to Zangazur in order to ensure the territorial integrity of the country. Although the units of the national army, which started moving from Khankendi to Zangazur, successfully organized the clearing of the Armenian armed forces from the strategically important area, it was not possible to hold it...

A large part of the territory of Zangazur was occupied by Armenian armed forces in 1918-1920, only in 1921 Zangazur district was established in the western part of the historical district, which was included in the administrative territory of Armenia. The eastern part of Zangazur, which remained part of the Azerbaijan SSR, became the Gubadli district. In the documents of 1925, Zangilan is listed as a part of Jabrayil district.

According to the administrative-territorial division, the territory of Eastern Zangazur includes the Lachin, Gubadli, and Zangilan districts of the Republic of Azerbaijan, and Western Zangazur includes the territories of the former Sisian, Gafan, Gorus and Meghri districts, which are currently included in the territory of Armenia. (3)



Names are given by people, of course, and they think and find names suitable to their language, character, tribe, and the nature of the place where they live. The meaning of the name Zangazur, one of the oldest and most famous lands of Azerbaijan, should be sought in the historical past of Azerbaijan.

Armenian "scholars" try to explain the meaning of the word "Zangazur" in two senses. "Zange" or "Zanga" - "cave" and "Zur" - "hard-sounding". Supposedly, there are many caves in Zangazur, and these caves make very strong noise.

In fact, this "explanation" is nothing but an echo of the Armenian lie.

First of all, in which mountainous area of the world there are no caves, those caves do not echo the sound? But why don't they name a large region in any country of the world, as well as in other places where Armenians live, the "solid-sounding cave"?

Secondly, there are not many caves in Zangazur, on the contrary, there are many steep rocky, snow-capped mountains, deep narrow valleys, dense forests, bushy slopes and flowery alpine meadows. Armenian scientists only saw caves!

The explanation is very simple: in Armenian the words "mountain", "valley" and "meadow" do not sound like "Zange" or "Zanga". Relatively respectable Armenian scholars try to come closer to the truth and explain the word "Zangazur" as "Zanga+dzor", i.e. "Zangi Valley". The first part of this explanation is close to the truth. However, even though Armenian sources try to emphasise it as a term of Armenian origin ("dzor" means "valley" in Armenian), in fact, the toponym "Zangazur" has nothing to do with Armenians, nor with their word "dzor". Armenians have never used the word "Zangazur" in the form of Zangadzor. Another fact proves that the word Zangazur does not belong to the Armenian language. There is no area named Zangazur in the current administrative-territorial division of Armenia. This region is called the Sunik region in Armenia. During the years of Soviet rule, the Armenians who claimed the name Zangazur have abandoned the term Zangazur.

Armenians try to connect the origin of the name of the ancient national Azerbaijan musical instrument "zurna" with the word "zur". However, the zurna has nothing to do with the history and name of Zangazur. (7)

The explanation of this toponym in the form of "Sangi-Sur" is also interesting, although it does not have any scientific basis. Thus, in the Persian language, "seng" means stone, rock, and in Arabic, the word "sur" means a series of walls, a fortress. In this sense, the word Zangazur means a country where the stones are arranged like castle walls.

The episode of Babek, who fought a continuous and merciless fight against the Arab caliphate until the end of his life, came to the Sheki fortress located on the Darvazatape mountain after the renovation of the Bazz fortress, and was captured by Sakli Sumbat, the ruler of the Shaki fortress in Zangazur, and surrendered to the Arabs. are also historical facts that confirm that it was defeated as a result of the betrayal of people like Sumbat.

As it is known, the Zangi tribes are a Turkic tribe famous in history for their outstanding military leaders and statesmen. One of the oldest settlements of the Zangi tribes is the city of Zanjan in South Azerbaijan. Persians pronounce the name of this city as "Zangan" ("most" is a plural suffix in Persian). As a result of the replacement of the "g" sound with the "j" sound due to the arrival of the Arabs to these areas, the name of the city began to be recorded as Zanjan in written sources. The homeland of the Zangi tribes is Central Asia, more specifically, the territories of present-day Uzbekistan. The Zangi dialect still lives in Uzbekistan, where many toponyms related to the Zangi name still exist (Zengi, Zangitepe, Zangerik, etc.).

The Zangis began to spread over a wider area at the beginning of our era. The settlers who came to Kazakhstan, Afghanistan, Iran and the Caucasus began to build cities and villages with their names in the places where they settled, and gave their names to rivers, mountains and valleys.

In the evolution and strengthening of the powerful Safavid kingdom created by Shah Ismail Khatai, the Zangari tribes, who are the same height as the Oghuz, and distinguished by their courage and bravery, had a great role.

Some of the events in the ancient Turkish epic "Kitabi-Dade Gorgud" take place in Zangazur. Many names of places, people, and tribes from the book still exist in this area - Gorus, Engaleyüz, Dondarlı, Ulashlı, Gundanlı, Akerak, Boynekar, the Basat River, the Kapijik Mountain, Ichagiz and Dashagiz Caves, Aghgaya, Garagöl, Garadagh, Aghduz, Garayer, Aghdara, Aghbulag, Garagaya, Karasu, Karachay, Kara Dara, Garahun Dara, Khocik, Aghasar and others. (8)

The famous tribes of Gayi Turks are: Qajar, Avshar, Zulgadar, Zangane, Shepherd, Baharli, Padar, Ustajli, Lek, Khalilli, Sorsor, Shafaq, etc. Many of these tribes were closely involved in the creation of the Safavid state, and the tribal chiefs were widely represented in the military and administrative leadership of the Gizilbash.

A. A. Bakikhanov mentioned the names of Zargane, Khalilli, Ustajli, Gajar, Kangarli, Khalaj, Garamanli, Chiragli, Tekali, Shamli tribes and showed that they are Turkic tribes and settled in different regions of Azerbaijan.

Sisakan district, well-known to Arabs from the years of Babak Khurramdi's struggle with the Arab caliphate, the landscape of this area consisting of mountainous, rocky, natural fortress, and a series of stones reminiscent of a wall, remained in the attention of Arab travellers and scholars as a defensive fortification-fortress. At the same time, since almost all the settlements were built in the form of fortresses, the Arab travellers were right to call this mountainous area, where the Zangis tribes spread over a wide area, Zangisur - the fortress of the Zangis. The word sur, sur (as well as "sür" from the root of the words sür, sürekli, to slide) in Arabic means a ridge wall, a stone fence, a fortress. Zangazur is the name of this mountainous district, which is considered the continuation of the Little Caucasus mountain range and the highest mountain range, which stretches like a stone chain to the Garabakh plateau, with its narrow valleys, impassable slopes, terrible steeps, hard rocks, reminiscent of a natural fortification and castle walls, where the Zangi Turks used to ride horses. It is true in both historical-geographical, ethnographic and logical sense. (4)

The fact that there are a large number of other toponyms ending with the sur (zür) topomorphant in Zangazur territory and that almost all of these villages are located on mountains and cliffs (Tekazür, Erjazür, Gejezür, Darmezür, Astazur, Eynazur, Goranzur, etc.) it once again proves its connection not with the valley, but with the mountain, the wall, the castle. (4)

In a mountainous area, which is rich with all the historical struggles and scenes of large and small battles arising from the claims of local and foreign rulers, it was appropriate to establish the settlements not in the valley, but in the mountains, in places close to natural fortifications, and all the villages we have listed above are in the area with such a landscape.

On the other hand, the nature of Zangazur - snowy, harsh frosty winter and sunny enough summer requires that the settlements are not in the valley, but on the mountain breast, in places that are not affected by snow avalanches, floods, and storms, which are vital to create transport, sound and visual connections with other villages should be placed in strategically convenient places.

The name of Zangazur itself belongs to us. Thousands of years ago, our great-grandfathers planted and improved these lands, built villages and cities, and made them their homeland. Our people have always lived and ruled in these lands, except for short breaks in the last hundred years. The conspiracy and historical injustice committed against Zangazur by the Soviet government also violated the territorial integrity of Azerbaijan and Turkish geography.

All these studies prove that Zangazur district was the oldest place of residence in Azerbaijan and one of the settlements of our ancestors. As the President of the country declared " Zangazur district is our historical area..."

The people of Azerbaijan restored historical justice by rising to the War of Independence and fighting for the rights of our lands, which were under the occupation of Armenian fascists for nearly 30 years. Today, our compatriots who are longing for land, home, and village are returning to their ancestral homes, the historical lands where their ancestors slept. He is returning to rebuild our homelands, which were devastated by Armenian savages, to create beauty, to revive our looted and burned lands, our Garabakh, our Eastern Zangazur.

Conclusion

Zangazur stands as a testament to the rich and complex history of Azerbaijan, embodying the cultural, ethnic, and geopolitical narratives that have shaped the region over millennia. From ancient civilisations to modern political developments, Zangazur's story is one of resilience and diversity. The region's architectural and archaeological treasures offer invaluable insights into the past, while its strategic importance continues to influence contemporary geopolitics.

Efforts to preserve and promote Zangazur's heritage are crucial in maintaining the connection to this historical land, ensuring that its legacy endures for future generations. By understanding and appreciating Zangazur's multifaceted history, we gain a deeper appreciation of Azerbaijan's cultural and historical identity. As we continue to explore and document Zangazur's contributions to the broader narrative of the South Caucasus, we acknowledge the enduring significance of this remarkable region.

Now the Eastern Zangazur economic region is being rapidly established, the opening of the Zangazur corridor and the restoration of the integrity of the geographically disconnected great Turkic world is becoming a historical reality. The day when the high-speed train from Baki will pass through Zangazur and go to Nakhchivan and Kars is not so far away!

We will also go to Western Zangazur. The Commander-in-Chief will tell us which day and by which means of transport we will go!

I want to finish my article with the poem “Zəngazur” (“Zangazur”) written by Avaz Mahmud Laladagh:

Dünyada nə çoxdur gözəl yer, məkan,
Mənimsə qəlbimdə birdi Zəngəzur.
Dolanam başına Kəbədaşıtək,
Ocaqdı Zəngəzur, pirdi Zəngəzur.

Koroğlu nərəsi var qayasında,
İldırım iz qoyub hər qayasında.
Qoymaz məskən sala sar qayasında,
Dəyişməz namərdə mərdi Zəngəzur.

* * *

Gözüm yolda qalıb qulağım səsdə,
Hicrinə dözməyib olmuşam xəstə.
Nə qədər bülbülüm qaldı qəfəsdə,
De, kimə söyləyim dərdi Zəngəzur?

* * *

Hələ sərt küləklər əsir qoynunda,
İgidlər saxlanır əsir qoynunda.
"Çobanbinə" haylar gəzir qoynunda,
Kim səni güdaza verdi, Zəngəzur?

References

1. Lalə Hüseynova "Qarabağ və Şərqi Zəngəzur Azərbaycandır!" 25 Avqust, 2021 https://mod.gov.az/az/pre/37339.html

2. Elnur Kəlbizadə, Ulu öndər və Qərbi Azərbaycan, Xalq qəzeti. - 2023.- 25 fevral. - № 43, s. 7 https://files.preslib.az/projects/heydaraliyev/articles/he0765.pdf

3. Zəngəzurun tarixi coğrafiyası https://files.preslib.az/projects/zangazur/az/a1.pdf

4. Musa Urud, Zəngəzuru tanıyaq və tanıdaq! https://modern.az/qerbi-azerbaycan/363478/zengezuru-taniyaq-ve-tanidaq/

5. İbrahim Bayramov Tarixi Azərbaycan torpağı Qərbi Zəngəzur https://iksadyayinevi.com/wp-content/uploads/2023/11/ Tarixi-Azerbaycan-torpagı-Qerbi-Zengezur.pdf

6. Əvəz Mahmud Lələdağ Zəngəzurun daş yaddaşı Xalq qəzeti https://www.anl.az/down/meqale/xalqqazeti/2023/yanvar/831750 (meqale).pdf

7. S. Xankişiyeva Qədim dövrdən başlayaraq Zəngəzur tarixi. Biz onun haqqında nə bilirik? – I hissə https://1news.az/az/news/20210504034758970-Qedim-dovrden-bashlayaraq-Zengezur-tarixi-Biz-onun-haqqinda-ne-bilirik-I-hisse

8. Zəngəzur – tarixi Azərbaycan torpağı https://aztc.gov.az/az/posts/id:1310

EFFECTS OF REGGIO-EMILIA APPROACH IN TEACHING MEASUREMENT OF LENGTH TO PUPILS IN KWARA STATE, NIGERIA

Aishat A. Yusuf
Department of Science Education, University of Ilorin
ORCID: 0000-0001-8569-6278

A. O. Akanbi
Department of Science Education, University of Ilorin

Eniola K. Ola-Alani
Department of Adult and Primary Education, University of Ilorin

Khadijat S. Ameen
Department of Science Education, University of Ilorin

Abstract
This study investigates the effects of implementing the Reggio-Emilia approach in teaching measurement of length to pupils in Kwara State, Nigeria. The research aims to address the gap in engaging students effectively in basic science education. Traditional teaching methods often lead to passive learning and limited retention of scientific concepts. By exploring the impact of the Reggio-Emilia approach, which emphasizes interactive and experiential learning, this study seeks to enhance students' understanding and interest in physics-related concepts. The quasi-experimental design employed in the study allows for causal inferences to be drawn, despite the lack of randomization. Through the use of the Measurement of Length Achievement Test and statistical analysis with ANCOVA, the researchers assess the effectiveness of this innovative teaching approach. The findings contribute to the ongoing discourse on improving science education practices, particularly in regions facing challenges related to resources and infrastructure.
Keywords: Reggio Emilia approach, Measurement of Length, Pedagogistas, Atelieristas

ENHANCING TECHNICAL EDUCATION THROUGH PROBLEM-BASED LEARNING: EXPLORING THE FACILITATOR'S INFLUENCE

Jibril Wushishi Ahmed
Faculty of Social Sciences and Humanities, School of Education, Universiti Teknologi Malaysia

Shatima Abdullahi
Faculty of Vocational and Technical Education, Department of Industrial Technical Education University of Nigeria

Abstract
Problem-based learning (PBL) is a dynamic pedagogy that fosters problem-solving and critical thinking skills in 21st-century students. At the core of this revolutionary pedagogy lies the facilitator, whose multifaceted roles are significant in guiding students through problem-solving. The study delves into the multi-faceted roles of facilitators in PBL to improve the problem-solving skills of students enrolled in Technical Education (TE) in developing countries. The study was done at the Federal College of Education Technical, Gusau, Nigeria, and employed a quantitative design with 56 lecturers as respondents. All the respondents responded to the questionnaire, resulting in a 100% response rate during the data collection. The main objective of the research is to assess the roles facilitators play during PBL sessions, with a particular emphasis on their impact on the development of problem-solving skills among TE students. The results of this study were analyzed using Statistical Package for the Social Science (SPSS) version 29.0. The study's findings revealed a positive influence of facilitators on the development of problem-solving skills among TE students. Some key facilitators' roles emerged from the findings as critical in fostering problem-solving skills. Some of these roles include overseeing and promoting effective group discussions, mediating conflict resolution, and facilitating the overall learning process. It is hoped that the findings can serve as a reference to various stakeholders in designing and implementing the PBL pedagogy to produce skilled graduates who are lifelong learners, problem solvers, and critical thinkers in their work.
Keywords: Technical Education, Problem-Base Learning, Pedagogical Approach, Facilitator, Problem-Solving Skills

ASSESSMENT OF PHYSICAL QUALITIES OF STUDENTS IN THE FIRST YEAR

Ferdinand Mara
Department of Physical Activity, Recreation and Tourism, Faculty of Physical Activity and Recreation, Sports University of Tirana

Jorida Çobaj
Department of Physical Activity, Recreation and Tourism, Faculty of Physical Activity and Recreation, Sports University of Tirana

Enkeleida Lleshi
Department of Physical Activity, Recreation and Tourism, Faculty of Physical Activity and Recreation, Sports University of Tirana

Abstract
The aim of this study is to evaluate the skill level of students at the first year in the Faculty of Physical Activity and Recreation in Albania. One of the main components of the evaluation is the skill which affects the progress of the students. Methodology: The research group consists of a total of 180 students in UST who were studying at the Faculty of Physical Activity and Recreation. The students are in the first year of the academic season 2022-2023 and 2023-2024. They were evaluated in; age, body height, body weight, BMI, Agility t-test in the Shuttle Run 10x5m test. Photo finish equipment found in UST laboratories was used. Results: The obtained data were processed in Excel and comparisons were made between the years of study as well. Statistically significant and positive correlations were found between and speed values between students. Conclusion: The results of the study showed the high practical importance of testing agility characteristics of students and show prospects for the practical use of the test system for these components at the student level, to achieve high fitness of sports commands and successful games. The practical benefit of these results obtained lies in the ability to use them in the teaching process to develop the agility abilities of students, which has prospects for higher results.
Keywords: age**,** students, agility, speed

1. Introduction

Students at the Sports University of Tirana (UST) in Albania are accepted on the basis of physical testing, i.e. general sports performance. Faculty of Physical Activity and Recreation (FPAR) is one of the most developed faculties in these years. A successful performance depends on the tests used with the technology and their measurement results. With technology developments, sports scientists have created much different training equipment to push the highest level that athletes can reach and increase the athlete's physical performance (Nalbant et al, 2018). It is known that the basic motor feature, which is a requirement of a practiced sport, is the most important factor that brings success in that sport (Filiz, 2003). The basic motor skills include both some of the organism and genetic traits, as well as all the skills acquired in the development and maturation of the organism. Basic motor skills are mentioned under five headings such as strength, endurance, speed, mobility (flexibility) and coordination. Although these basic motor skills are genetic, both are known and can be developed. Bompa (2001) defines speed as the ability of a person to move him from one place to another maximum speed or the ability to apply movement as quickly as possible.

Speed in sports, on the other hand, means that a person applies basic motor movements in the shortest time and most intensively. Dexterity, on the other hand, is another contingent feature realized with more than one motor feature, which also involves changing direction. Some definitions made by researchers are as follows: Dexterity is the ability to change the direction of the body moving from one point to another as quickly and fluidly, simple and controlled, while maintaining balance without lack of speed (Özkan et al . 2009; Turner et al. 2011). According to Levy et al, (2021), agility is the ability of the whole body to move quickly and accurately in response to a perceived stimulus. In another definition, agility is defined as the activity of controlling body position and maintaining movement, while the athlete can change direction quickly throughout the series of movements (Asadi, 2012). Verstegen and Marcello (2001) stated that agility is perceived as a locomotor ability that makes the athlete change direction. Furthermore, according to Katis and Kellis (2009) agility is a combination of several basic motor traits and depends on speed, muscle strength and balance ability. It is noted that the agility feature includes the speed, flexibility and coordination of the whole body or only the lower limbs to change direction and position (Zanini et al. 2020). Dexterity is influenced by factors such as speed; overall strength and muscle strength that help determine the quality of the muscles in the legs. Dexterity includes components of biomechanics, motor learning and strength (Shepard and Young, 2006). The remarkable aspect of dexterity is that many motor characteristics are coordinated and integrated in a short time. Dexterity must be developed to bring control of body position and balance to a better level throughout the movement (Miller et al., 2006). Based on these definitions, we can state that agility is a rapid change of direction of the whole body in response to an effect in immediate development. Measuring agility is very important in planning the stages of athlete development. A number of agility tests have been developed that can be easily applied by both coaches and athletes. In terms of test examples, the most commonly used in field sports are: T-Test, Illinois Test, 505 Agility Test, Pro-Agility Test and Repeated Agility Test. The fields of application of the specified tests may vary depending on the sport, the branches and the equipment and field conditions. Agility studies in the literature show that the T-Test, Illinois Test, and 505 Agility Test are the most commonly used tests. Considering that agility is a feature in many sports, it is also important to know the agility levels of athletes. At this point, in the studies made by coaches or sports scientists, the question of the selection of the agility test according to the motor characteristics of the sports branches is not clear in the literature. This research was designed to reveal the relationship between the most preferred readiness tests, and to give an idea to researchers or trainers about test choices.

2. Material & methods

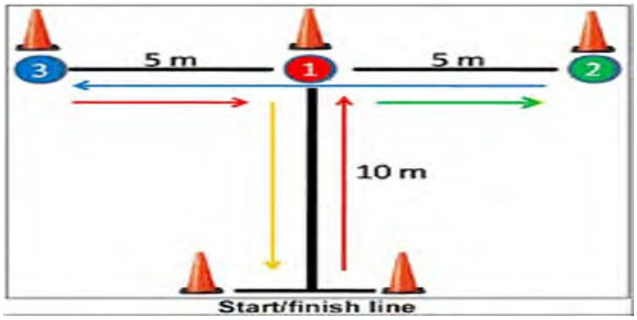
The research group consists of a total of 180 students in UST who were studying at the Faculty of Physical Activity and Recreation. The students are in the first year of the academic season 2022-2023 and 2023-2024. They were evaluated in; age, body height, body weight, BMI, Agility t-test in the Shuttle Run 10x5m test. Photo finish equipment found in UST laboratories was used

2.1 Research model

Students are introduced to the study process in advance. They were evaluated in; age, body height, body weight, BMI, Agility t-test and in the Shuttle Run 10x5m test. The students conducted a general warm-up of 10 minutes before the beginning of the tests. Each participant had two tests, with intervals of 5 minutes, and in the end the best time achieved was taken.

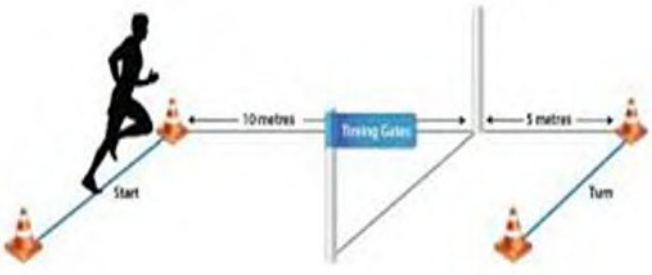
2.2. Test protocol

T-Test: The t-test was reliable in measuring leg strength, speed, and leg agility (Figure 1). The general purpose of the T-test is to ensure balance, maintain continuity in speed, and test the ability to make rapid, sudden and sustained changes in a given running direction. The athlete moves from the starting point with the voice command and goes straight to the first funnel. After touching the first funnel with his right hand, he goes to the second funnel with a sliding step and touches it again with his right hand. Then, with a sliding step to the left, he again touches the first funnel, and goes to the third funnel with a sliding step and touching it with his left hand. Finally, he returns to the first funnel with a sliding step and is directed back to the areas where he started and finishes the test.



(Figure 1) T-Test

Shuttle Run 10 x 5 m: This test is performed by covering a distance of 5 meters round trip after a run with an acceleration of 10 meters (Figure 2). After determining the distances that will be run, the two starting and stopping time gates that define the system are placed on the 5 m line. After the participants are informed about the test, they are allowed to do some exercises at a slow pace. To avoid any injury at the beginning of the test, participants are given 10 min of warm-up and flexibility exercises before the test. The test was repeated twice with an interval of 5 minutes of rest, and the best rate is recorded in seconds.



(Figure 2) Shuttle Run 10 x 5m.

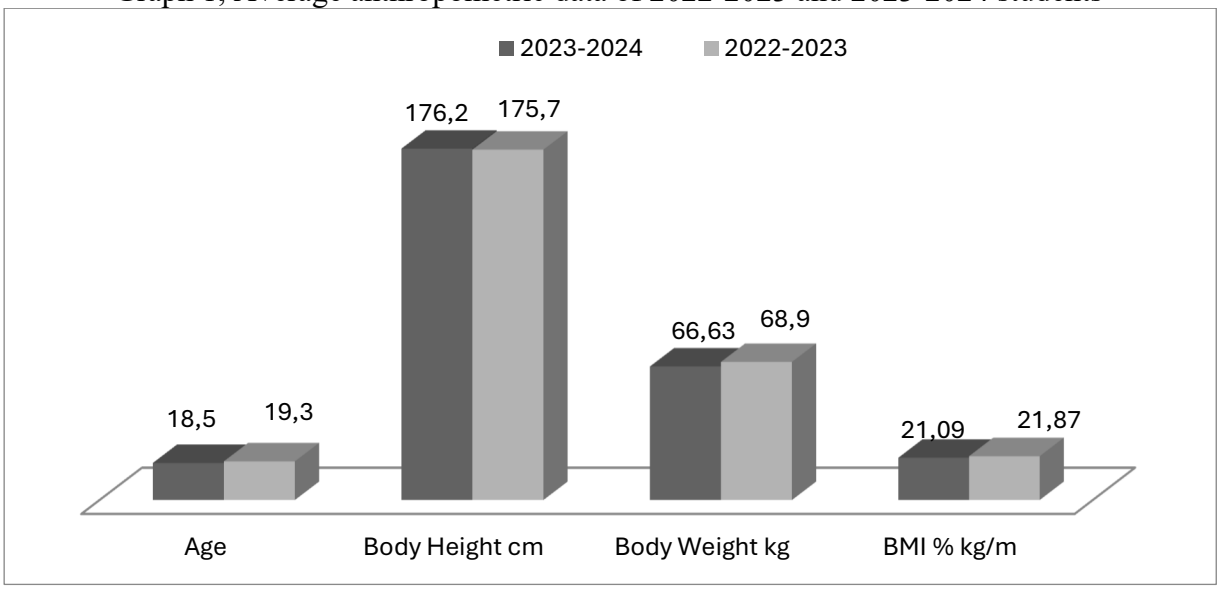
2.3. Statistical analysis

The obtained data were processed in Excel and comparisons were made between the years of study as well as between the two faculties. Statistically significant and positive correlations were found between and speed values between students and faculties. The significance level was determined as 0.05 in the interpretation of statistical procedures

3. Results

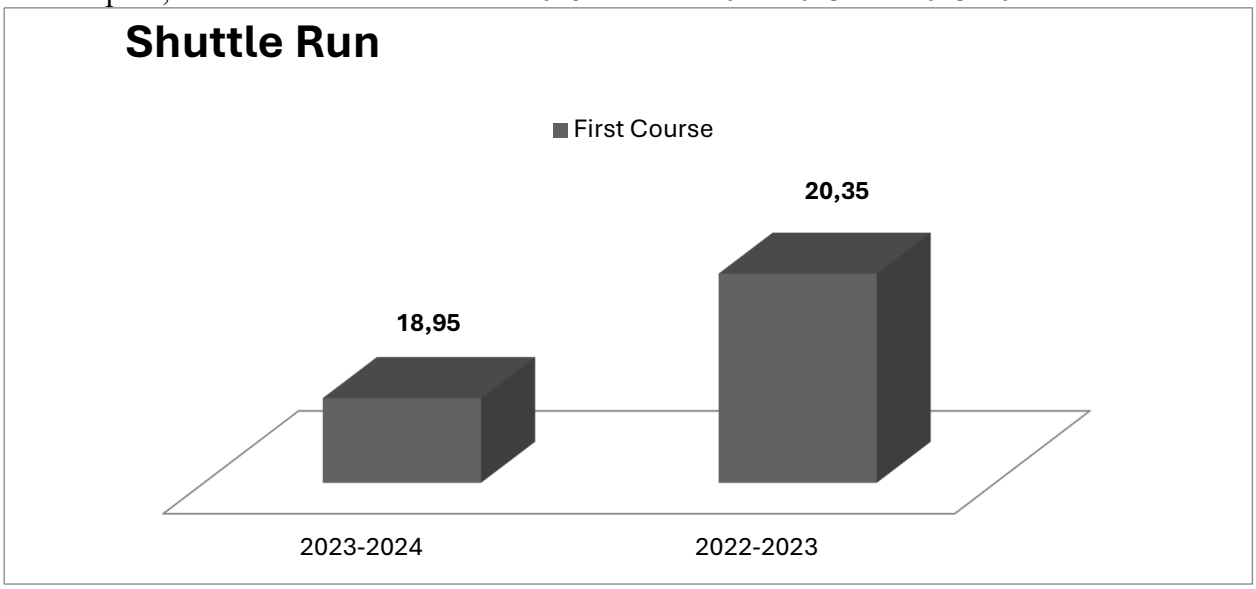
Graph 1 shows that average age (year) of students at 2023-2024 is 18.5 ± 1.05, body height (cm) is 176.2 ± 5.73, body weight (kg) is 66.63 ± 2.57 and body mass index (kg / m2) is 21.09 ± 1.87 and for 2022-2023 also shows that average age (year) is 19.3 ± 2.51, body height is 175.7 ± 5.87 cm, body weight is 68.9 ± 5.48 kg and body mass index is 21.87 ± 3.21 kg/m^2.

Graph 1, Average anthropometric data of 2022-2023 and 2023-2024 students



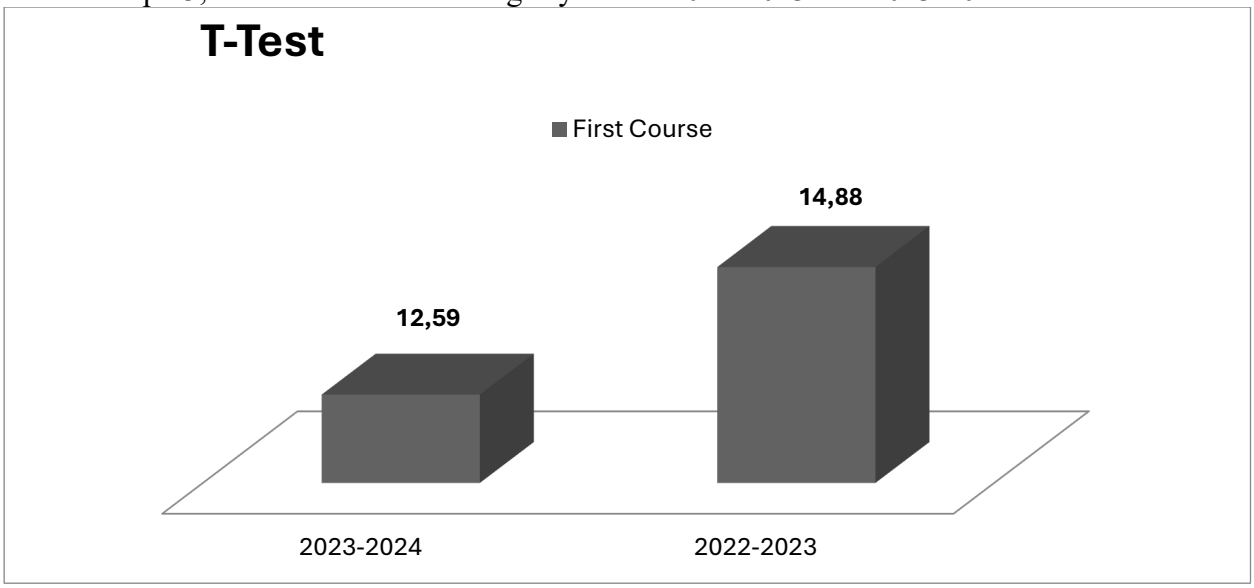
Graph 2 shows that average of the 10x5m shuttle run test of the students according to the study courses in their respective faculties. As we see in graph 2, students of the first course of 2023-2024 resulted with a speed value of 18.95 sec better than 2023-2024 students with a speed of 20.35 sec. Students of the second FMS course had a result of 20.23 sec compared to FPAR students with 20.67. While the students of the third course of FMS had the result 18.76 seconds better than the students of FPAR with 20.03 seconds.

Graph 2, Results of the Shuttle Run 10x5m test of 2022-2023 and 2023-2024 students



Graph 3 shows that average agility T-Test of students according to the study courses in their respective faculties. As we see in graph 3, the students of the first course of 2023-2024 resulted with a speed value of 12.59 sec better than the students of 2022-2023 with a speed of 14.88 sec. The students of the 2023-2024 had the result 14.32 sec compared to the students of 2022-2023 with 15.21. While the students of the third course of 2023-2024 had the result 14.01 sec better than the students of 2022-2023 with 15.63 sec.

Graph 3, Results of the T-Test agility test of 2022-2023 and 2023-2024 students



4. Discussion

As a result of this study, which was conducted to determine the most usable test students to determine the agility levels according to sports branches, the following were determined in terms of the basic characteristics of the students. In the literature, Molenaar (2009) found a significant difference according to T-test results in his strength study on female volleyball players. In their research article, Sonoda et al, (2018) concluded that there is a statistically positive relationship between agility and the T-test results they performed for agility. In their study, Schedler et al. (2020) concluded that muscle strength has a positive effect on agility. Some studies stated that the T-test is a good measure of strength, speed and agility. These studies support the results of the present research. Moreover, in the literature, contrary to the results of the present research, (Ferreira et al., 2018) found in the study he conducted that strength is not a factor directly affecting agility in ice hockey. In his master's thesis completed in Mukesh et al. (2021) concluded that there is no significant relationship between agility and strength. Kutlu et al. (2012) found a statistically significant difference between Illinois agility test values of professional amateur soccer players and university students. As a result of the present research, positive relationships were found between two agility tests of participants. The literature has works which compared speed values and agility tests. Çakmak concluded in his master's thesis in 2019 that there was a statistically significant relationship between the Illinois agility test values of speed values. Contrary to the above-mentioned results, Tatlısu et al. (2019) concluded that there is no significant relationship between the Agility T-test and speed values, in their study conducted.

5. Conclusion

The results of the study showed the high practical importance of testing agility characteristics of students and show prospects for the practical use of the test system for these components at the student level, to achieve high fitness of sports commands and successful games. The practical benefit of these results obtained lies in the ability to use them in the teaching process to develop the agility abilities of students, which has prospects for higher results.

6. Reference

Asadi, A. (2012). Effects of six weeks depth jump and countermovement jump. Sport Science 5 (2012) 1: 67-70.

Bompa, T. O. (2001). Quick Strength Training in Sports, Publishing. Page 7-34

Çakmak, E., İnce, A., & Arı, E. (2019, December 24). The examinaton of relationships among static and dynamic balance, speed and agility in female football players. https://dergipark.org.tr/en/pub/jiasscience/issue/52127/681281

Ferreira, A., Enes, C., Leao, C., Goncalves, L., Clemente, F. M., Lima, R., Bezerra, P., & Camoes, M. (2018). Relationship between power condition, agility, and speed performance among young roller hockey elite players. Human Movement, 20(1), 24–30. https://doi.org/10.5114/hm.2019.79040

FiLiZ, K. (2003). Gazi Üniversitesi Güreş Takımı ile Kara Harp Okulunda Güreşen Azeri Öğrencilerin Bazı Test Ölçüm Sonuçlarının Karşılaştırılması. TRDizin. https://search.trdizin.gov.tr/tr/yayin/detay/81196

Katis A, Kellis E. Effects of small-sided games on physical conditioning and performance in young soccer players. J Sports Sci Med. 2009 Sep 1;8(3):374-80. PMID: 24150000; PMCID: PMC3763282.

Kutlu, M., Yapıcı, H., Yoncalık, O., & Çelik, S. (2012). Comparison of a new test for agility and skill in soccer with other agility tests. Journal of Human Kinetics, 33(2012), 143–150. https://doi.org/10.2478/v10078-012-0053-1

Levy, M., Hadar, I., & Aviv, I. (2021). Agile-Based Education for teaching An agile requirements engineering methodology for knowledge management. Sustainability, 13(5), 2853. https://doi.org/10.3390/su13052853 .

Molenaar, Amy J., "A COMPARISON OF CONDITIONING LEVELS BETWEEN OFF-SEASON AND COMPETITION SEASON FOR DIVISION II WOMEN'S VOLLEYBALL" (2009). All NMU Master's Theses. 466. https://commons.nmu.edu/theses/466

Miller MG, Herniman JJ, Ricard MD, Cheatham CC, Michael TJ. The effects of a 6-week plyometric training program on agility. J Sports Sci Med. 2006 Sep 1;5(3):459-65. PMID: 24353464; PMCID: PMC3842147.

Mukesh, D. N., P, S., & Paul, J. P. J. (2021). Effect of agility specific exercise program on agility in badminton players. International Journal of Pharma and Bio Sciences, 11(4). https://doi.org/10.22376/ijpbs/lpr.2021.11.4.l29-34

Nalbant, Özgür; Kinik, Ahmet Metin (2018). The effect of suspension workout on agility and forces performance in elite basketball players. Journal of Education and Training Studies, 6(6): 128-133. https://eric.ed.gov/?id=EJ1178091.

Özkan, A., Köklü, Y., Alemdaroğlu, U., and Eyuboğlu, E. (2009). Developmental Periods, Physical Fitness and Physical Activity of 6- 12 Age Group Children, Ankara University Press, Ankara.

Schedler, S., Tenelsen, F., Wich, L., & Muehlbauer, T. (2020). Effects of balance training on balance performance in youth: role of training difficulty. BMC Sports Science, Medicine & Rehabilitation, 12(1). https://doi.org/10.1186/s13102-020-00218-4

Sheppard, J. M., and Young, W. B. (2006). Agility literature review: Classifications, training and testing. Journal of Sports Sciences, 24(9): 919-932.

Sonoda, T., Tashiro, Y., Suzuki, Y., Kajiwara, Y., Zeidan, H., Yokota, Y., Kawagoe, M., Nakayama, Y., Bito, T., Shimoura, K., Tatsumi, M., Nakai, K., Nishida, Y., Yoshimi, S., & Aoyama, T. (2018). Relationship between agility and lower limb muscle strength, targeting university badminton players. Journal of Physical Therapy Science, 30(2), 320–323. https://doi.org/10.1589/jpts.30.320

Turner, A., Walker, S., and Stembridge, M. (2011). A testing battery for the assessment of the fitness in score players. National Strength and Conditioning Journal, 33: 29-39.

Tatlısu, B., Karakurt, S., Agirbas, Ö., and Uçan, İ. (2019). The relationship between strength, speed, flexibility, agility, and anaerobic strength in elite athletes. International Journal of Applied Exercise Physiology, Vol. 8, No. 3.

Zanini, D., Kuipers, A., Somensi, I. V., Pasqualotto, J. F., De Góis Quevedo, J., Teo, J. C., & Antes, D. L. (2020). Relationship between body composition and physical capacities in junior soccer players. Revista Brasileira De Cineantropometria & Desempenho Humano, 22. https://doi.org/10.1590/1980-0037.2020v22e60769

Verstegen, M., & Marsello, B.; Agility and coordination. In B. Foran (Ed.), High performance sports conditioning. Champaign, IL: Human Kinetics: 139-165, 2001.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

EDUCATING FOR CREATIVITY AND 21ST-CENTURY SKILLS DEVELOPMENT: THE ROLE OF DESIGN-BASED LEARNING INSTRUCTIONAL STRATEGY.

Saifullahi M.
Department of Science Education, Federal University of Technology Minna

Bashir A. U.
Department of Science Education, Federal University of Technology Minna

Garba Shuaibu
Department of Science and Technology Education, Bayero University Kano

Osiboye M. O.
Department of Science and Technology Education, Bayero University Kano

Ahmed T.
Department of Physics Federal Collage of Education (Technical) Bichi

Abstract
Creativity and 21st-century skills are essential for economic development and sustainable national transformation. Fostering these competencies can prepare students not only to succeed in their careers but also to contribute meaningfully to society and face future challenges. The study highlighted the roles of Design-based learning (DBL) in the development of creativity and 21st-century skills. Design-based learning (DBL) plays a critical role in enhancing creativity and skills development in education. This strategy integrates hands-on, mind-on and project-based activities that require students to identify, define, collect information, analyze and solve real-world problems which enhances creativity and 21st-Century skills of the learner. The stages involve in the strategy gives room for students collaboration and brainstorming, these help students develop communication and teamwork skills. Its interdisciplinary nature encourages the application of different knowledge areas, while the iterative design process teaches resilience and a growth mindset. DBL also engages students through relevant, tangible prototype. The study concluded that Design-Based Learning could foster creativity and 21st-century skills when integrated in teaching and learning. And therefore, the study recommended among others that science teachers should employ DBL instructional strategy in teaching science subjects. It was also recommended that administrators should provide all necessary materials needed by teachers and students to integrate DBL into teaching and learning science.
Keywords: Design-based learning, creativity, 21st-century skills.

Introduction

In today's rapidly changing society, the need for creativity and 21st-century skills has become more vital than ever. As educators seek effective strategy to prepare students for future challenges, Design-Based Learning (DBL) has emerged as a powerful pedagogical approach which not only enhances creative thinking skills but also equips students with a broad set of 21st-century skills such as learning and innovative skills, life and career skills and information, media and technological skills (Delen & Sen, 2023). This could be achieved by engaging students in hands-on, interdisciplinary projects that mimic real-world scenarios.

Design-based learning is an innovative instructional strategy that allow learners to actively participate in the learning process and make sense of new information by matching the knowledge with different existing experiences (Balakrishnan, 2022). Design-Based Learning provides a learning situation in which teacher and learners have different roles to play, unlike lecture method whereby the teacher dominated the class and has the role of actively giving information, while the learners have the role of passively receiving information. Chunmeng, Congying and Xianfeng (2022) maintained that, learning process in Design-Based Learning is supported by real life problems or scenarios that requires learners' engagement and participation, teachers' facilitation and supervision during the process. On the other hand, the Design-Based Learning strategy allows students to actively participate in the learning process by providing opportunities to identify problems and solve such problems through designing prototype that could ensure the development of cognitive aspect of the learners. In developing cognitive knowledge of learners, elements like hands-on-activities and mind-on-activities are embedded in the design-based learning model

The model has plethora of strategy that could enhance academic achievement, conceptual understanding and skills (Azizan & Abu-Shamsi, 2022). Design-based learning model involves five phases: (i) identify problems in the context of current situations and generate ideas; (ii) define a solution's objectives (iii) design and development; (iv) demonstration and reflection; (v) communication and evaluation. Specifically, the design-based learning process focuses on identifying issues in situations at present and producing innovative ideas to encourage students to design a solution based on their 21st-century skills. This is the reason why design-based learning model would be better strategy in fostering creativity.

Statement of the Problems

Despite the growing recognition of the importance of creativity and 21st-century skills such as learning and innovative skills, life and career skills and information, media and technological skills, conventional instructional strategies often fall short in adequately developing these competencies in students. Many educational systems continue to prioritize rote memorization and standardized testing over innovative and experiential learning strategy. This gap leaves students ill-prepared for the complexities and demands of the 21st-century, modern workforce and society. Design-Based Learning offers a potential solution by integrating hands-on, project-based activities that promote creative problem-solving and interdisciplinary learning (Ai, Jiang, Hu, Chandrasekaran & Wang, 2020). However, the implementation of Design-Based Learning in conventional education faces challenges, such as curriculum constraints, teacher preparedness and resource availability. On that basis, the researcher is motivated to carry out this study with a view to highlight the role of Design-Based Learning in fostering creativity and 21st-century skills, identify barriers to its effective adoption and propose strategies for integrating Design-Based Learning into educational approaches to better prepare students for the future.

Role of Design-Based Learning in the Development Creativity and of 21st-century Skills

Design-Based Learning (DBL) plays a significant role in the enhancing creativity and development of 21st-century skills by providing students with opportunities to engage in hands-on, collaborative and problem-solving activities. These skills are essential for success in 21st-century workplace. The roles includes:

i. Encouraging Divergent Thinking: Design-Based Learning promotes divergent thinking, where students are encouraged to generate numerous solutions to a single problem. This process involves brainstorming and exploring various ideas which enhances creative thinking.

Design-Based Learning requires students to analyze problems, identify underlying issues, and break them down into manageable parts. Students also brainstorm, prototype, and test solutions, fostering an iterative approach to problem-solving and the design process leads to making informed decisions based on evidence and testing outcomes.

ii. Embracing Failure as a Learning Tool: In Design-Based Learning, failure is viewed as a natural part of the learning process. Students are encouraged to experiment, take risks and learn from their mistakes. This approach reduces the fear of failure and encourages a trial-and-error mindset, which is essential for creative problem-solving.

iii. Experiential Learning in Nature: Design-Based Learning involves hands-on activities that require students to engage actively with materials and tools. This experiential learning process helps students make abstract concepts tangible and stimulates creative thinking by involving multiple senses and cognitive processes.

iv. Promoting Iterative Design Processes: The iterative nature of Design-Based Learning, where students continually refine and improve their designs, fosters a mindset of continuous improvement and innovation. This cyclical process of designing, testing, and refining encourages students to think critically and creatively at each stage. DBL projects often involve unexpected challenges that require students to adapt their plans and approaches. The iterative nature of Design-Based Learning helps students develop resilience as they learn to cope with and overcome setbacks. Working on real-world problems helps students develop empathy and understanding of diverse perspectives and needs. Furthermore, Many DBL projects address global challenges, helping students understand and appreciate different cultures and viewpoints.

v. Encouraging Self Autonomy: Design-Based Learning allows students to take ownership of their projects and express their unique ideas and perspectives. This autonomy in the learning process promotes intrinsic motivation and enables students to explore their interests and creativity fully.

vi. Integrating Interdisciplinary Learning: Design-Based Learning often involves integrating knowledge and skills from various disciplines, such as science, technology, engineering, art, and math (STEAM). This interdisciplinary approach encourages students to make connections between different fields and think creatively to solve complex problems.

vii. Reflective Practice: Design-Based Learning encourages students to reflect on their design process and outcomes, promoting self-awareness and critical thinking. Reflective practice helps students understand their creative process, identify areas for improvement, and develop a deeper understanding of their creative potential. In addition, Design-Based Learning provides opportunities for students to take on leadership roles within their projects, guiding teams and making key decisions. Students learn to take responsibility for their contributions and the overall success of their projects.

Barriers to Effective Adaption of Design-Based Learning

1. Curriculum Constraints: Traditional education systems often have strict curriculum standards and standardized testing requirements, leaving little room for the flexibility needed for Design-Based Learning. Implementing Design-Based Learning requires extended periods for projects, which can be difficult to fit into the existing school schedule that focuses on covering mandated content.

2. Lack of Teacher Preparedness: Many educators are not trained on how to integrate Design-Based Learning methodologies or lack experience in facilitating open-ended and student-driven projects.

Teachers familiar with conventional teaching methods may be resistant to adopting new approaches like Design-Based Learning, especially if they feel unsupported or uncertain about its effectiveness.

3. Unavailability of Resource: Design-Based Learning requires specific materials, tools and financial investment that may not be readily available in all schools, particularly those with limited budgets. Effective Design-Based Learning often integrates technology, but not all schools have equal access to the necessary technological resources and infrastructure.

4. Poor Assessment Strategy: Traditional assessment methods, such as standardized tests, are not well-suited to evaluate the skills and competencies developed through Design-Based Learning. Assessing creative and collaborative projects can be subjective and challenging, requiring new frameworks and rubrics that can reliably measure student outcomes.

5. Parental Attitudes: expectations and cultural attitudes of parents towards education may favor traditional approaches and view Design-Based Learning as less rigorous. Parents may also be skeptical about the effectiveness of Design-Based Learning in ensuring academic success.

6. Partnerships Industry and community organizations: Effective Design-Based Learning often involves collaboration with industry professionals and community organizations which can be challenging to establish and maintain.

Strategies for Integrating Design-Based Learning (DBL) into Educational Approaches

Numerous strategies could be employed to integrate Design-Based Learning into educational approaches to better prepare students for the future. The strategies includes:

a) Develop a curriculum that includes interdisciplinary projects aligning with Design-Based Learning principles that allow students to apply knowledge from various subjects to real-world problems.

b) Implement a flexible scheduling to provide extended periods for project-based activities which may ensure students have adequate time to engage deeply with the design process.

c) Provide comprehensive training programs for teachers to develop their understanding and skills in facilitating Design-Based Learning activities, including workshops, online courses and hands-on experiences.

d) Encourage collaboration among teachers through professional learning communities where they can share best practices, resources and experiences related to Design-Based Learning. Offer continuous support and mentoring for teachers to help them navigate challenges and refine their Design-Based Learning implementation strategies.

e) Secure funding and grants to provide necessary materials, tools, and technology for Design-Based Learning projects. This may include 3D printers, prototyping materials, and digital devices.

f) Create dedicated maker spaces and labs equipped with resources for hands-on, creative projects. Ensure these spaces are accessible to all students.

g) Invest in technology infrastructure, including software and hardware, to support Design-Based Learning activities and ensure students have access to necessary digital tools.

h) Develop and implement innovative assessment strategy, such as project portfolios, presentations, peer reviews and reflective journals, to evaluate student learning and creativity.

i) Create detailed rubrics that assess 21st-century skills, providing clear criteria for both students and teachers.

j) Use formative assessments throughout the Design-Based Learning process to provide ongoing feedback and support student growth and development.

k) Develop a clear, long-term strategic plan for Design-Based Learning implementation, including goals, timelines, and milestones to track progress and ensure sustainability.
l) Establish partnerships with local businesses, industries and community organizations to provide real-world context, resources and expertise for Design-Based Learning projects.
m) Engage parents by informing them about the benefits of Design-Based Learning and involving them in project showcases, workshops and school events to build support and understanding.

Conclusion

The study concluded that Design-Based Learning has the potential of addressing the growing need for creativity and 21st-century skills development in students. Engaging students in hands-on activities, real world problem and scenarios could allow student to develop a prototype and solve a real-life problem and foster creativity and 21st-century skills development. It was also concluded that integration DBL into mainstream education faces numerous barriers, including curriculum constraints, lack of teacher preparedness, limited resources, and challenges in assessment. Overcoming these obstacles requires a concerted effort from educators, policymakers and the community.

Recommendations

Based on the findings from the study, the following recommendations are made:
1. Science teachers should employ DBL instructional strategy in teaching science subjects.
2. Administrators should provide all necessary materials needed by teachers and students to integrate DBL into teaching and learning science. Also students should have access to digital tools and resources essential for DBL activities.
3. Curriculum developers should design and develop curriculum modules that combine multiple subjects which allow students to apply diverse knowledge and skills to solve real-world problems.
4. Teachers should be trained on the integration of Design-Based Learning procedures through workshops, seminars, online courses and practical training sessions.
5. Government should provide schools with adequate funding and necessary resources for the integration of design-based learning strategy.
6. Innovative assessment strategy should be adopted and rubrics that assess creativity and 21st-century skills should be designed so as to provide a clear evaluation criteria.
7. Parents should be Informed and involved in DBL activities and project showcases to build support and understanding.

Reference

Ai, X., Jiang, Z., Hu, K., Chandrasekaran, S., & Wang, Y. (2020). Integrating a cross-reference list and customer journey map to improve industrial design teaching and learning in "project-oriented design based learning." *Sustainability, 12*(11), 4672. https:// doi. org/ 10. 3390/ su121 14672

Ann. A., Emmanuel E., & Josi. A. (2019).Effect of Design-based Learning Strategy on Upper Basic Two Student's Achievement in Basic Science in Makurdi Metropolis, Benue state.*Journal of Science, Technology, Mathematics and Education (JOSMED), 15(3), September, 2019*

Azizan S. A. and Abu-Shamsi N. (2022) Design-Based Learning as a Pedagogical Approach in an Online Learning Environment for Science Undergraduate Students. *Frontier in Education*. 7:860097. doi: 10.3389/feduc.2022.860097

Balakrishnan, B. (2022). Exploring the impact of design thinking tool among design undergraduates: a study on creative skills and motivation to think creatively. *International Journal of Technology and Design Education*, *32*(3), 1799-1812.

Chunmeng W., Congying C. Xianfeng A. (2022) A pedagogical study on promoting students' deep learning through design-based learning. *International Journal of Technology and Design Education.33*, 1653–1674 https://doi.org/10.1007/s10798-022-09789-4.

Delen, I., & Sen, S. (2023). Effect of design-based learning on achievement in K-12 education: A meta-analysis. *Journal of Research in Science Teaching*, *60*(2), 330-356.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

AI DRIVEN TEACHER EDUCATION: POLICY THRUST AND PRACTICE IN NIGERIA EDUCATION SYSTEM

Saidu, I.
School of Education, Department of Educational Foundations, Niger State College of Education

Abstract
Artificial Intelligence (AI) integration in teacher education is rapidly reshaping educational landscapes globally, including Nigeria. This paper explores the policy thrust and practical implementations of AI-driven teacher education within Nigeria's educational system. With a focus on seven key areas, namely AI integration, teacher training, curriculum development, assessment methods, resource allocation, infrastructure enhancement, and ethical considerations, this study delves into the multifaceted dimensions of AI's role in shaping the future of teacher education in Nigeria. The policy landscape surrounding AI-driven teacher education in Nigeria is analyzed, highlighting governmental initiatives, regulatory frameworks, and strategic alliances aimed at fostering AI integration in teacher training programs. Practical implementations encompass AI-powered learning platforms, virtual classrooms, adaptive learning systems, and data-driven pedagogical approaches tailored to Nigeria's socio-cultural context. Moreover, the paper scrutinizes the challenges and opportunities associated with AI-driven teacher education, including issues of accessibility, equity, data privacy, and technological infrastructure. Ethical considerations such as bias mitigation, transparency, and accountability are also explored within the Nigerian context. Through a comprehensive analysis of policy directives and practical implementations, this paper underscores the transformative potential of AI-driven teacher education in Nigeria, offering insights for policymakers, educators, and stakeholders to navigate the evolving landscape of educational reform in the digital age.
Keywords: AI-driven education, teacher training, curriculum development, assessment methods, Nigeria, policy, practice.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

EVERY BEAST OF THE EARTH AND EVERY BIRD OF THE HEAVEN: THE ANIMALS IN BYZANTINE

Ananda Majumdar
University of Alberta
ORCID: 0000-0003-3045-0056

Abstract
This article takes a comprehensive approach to the relationship between the Byzantines and animals, focusing on smaller creatures like worms and bees. It explores how these animals were integrated into everyday life in practical, socio-economic, and religious contexts. The article draws from a wide range of sources, including written accounts such as hagiographies, ancient scientific texts, miracle stories, legal documents, and evidence from archaeology, zooarchaeology, and architectural remnants from various regions of the Byzantine Empire. Unlike most existing studies, which have primarily examined the economic aspects of animal husbandry, this article sheds light on animals' socio-cultural and religious significance in Byzantine society. It aims to fill a gap in the scholarly literature, highlighting the often-overlooked role of smaller creatures like worms, bees, insects, and silkworms in Byzantine society's socio-cultural and economic dynamics. The article acknowledges the challenges posed by the limitations of primary and secondary sources and seeks to explore the Byzantine narrative regarding these animals comprehensively. Ultimately, it aims to reconstruct the Byzantine perspective on and utilization of these living beings, highlighting the multifaceted benefits that animals brought to the daily life of the Byzantines (Mulla, 2022).
Keywords: Byzantine Animals, Socio-Economic Role, Byzantine Empire, Archeological Sensitivity, Symbolism, Apiculture-Sericulture.

Introduction

Many scholars have written about the relations between humans and animals, such as some they hate, some they eat, and some they love. The sense of humour always mentions that it is hard to think about animals straight. A question that has always influenced human minds about animal activities is: How should they act with animals? The question has been illustrated in many ways, such as: Do humans act with animals as a stock of food? Should humans fear animals? Or should humans be accompanied by animals? In the contemporary world, animals are accompanied by humans. They are sleeping in the same room and acting as a daily companion for people. [1]In Greco-Roman times, humans kept animals as pets. Many scholars, such as Ingvild Saelid Gilhus, previously mentioned the concept of house animals. They mentioned the differences between animal-human relations in the past as well as in the present time. Whatever the role was between humans and animals, it was not similar in the modern-day relationship. [2]The scholar Gilhus mentioned ‘personal animals’ (Mulla, 2023) as a reference to that animal. The scholar also said that personal animals in the past would not kill for feed or meat. These animals had their names and would eat and accommodate people. People distribute food to animals. Many historians and scholars have also mentioned that human and animal relationships depend. [3]A relationship between a dog and a human differs from a relationship with a snake or an eel. There was regular [4] communication between humans and animals in some occupations. This communication would create a [5] personal bond and a personal relationship. The bonding relationship would be easier than with serpents with no visible arms and legs. The obscurity of the animals would arise from their distance from the human world.

Therefore, a psychological definition can reflect why humans fear worms or insects. It is because of the distance between little animals like worms or insects versus dogs and cats. Therefore, the relationship with animals will also vary. The human brain reacts with a quantifiable fear to the sight of bugs and other arthropods. [6] This is a psychological belief about human reactions to animals based on their characteristics. These feelings are responses to human evolution and concern about a being or an insect that might bite, injure or carry an illness. Due to the animals' appearance, humans do not appreciate them daily as there is no attraction for any research purpose in real life about the little animals. Therefore, [7] "little animals" (Mulla, 2023) are deprived of domestic animals. This analysis can focus on pre-industrial civilization's social, cultural, and economic attitudes towards little animals. The Eastern Roman Empire, better known as the Byzantine Empire, is one of the best examples to further analyze the animal world and human affection. In the [8] Byzantine Empire, a characteristic relationship between humans and animals reflected the socio-political prominence of Christendom in everyday life, which was related to a monetized economy. Many animals have been encountered in Byzantine religious and secular texts, and the embroidery details on clothes, frescoes, and mosaics in churches. They have also overlooked animals like [9] bees and worms in many sources, including churches and texts. Therefore, [10] The role of the little animals in the Byzantine Empire from the fourth century to the end of the fifteenth century was phenomenal. The role of little animals and non-animals in the Byzantine economy and culture was symbolic and more frequent after the [11] Macedonian Renaissance. It was, therefore, evidenced through the Byzantine era that [12] Little animals were similarly crucial to more giant animals in shaping culture, society, economy, and religious symbolic meaning.

Literature Review

The representation and symbolism of animals in Byzantine art and literature offer a captivating glimpse into how animals were depicted in religious texts and the broader cultural and spiritual beliefs of the time. Small animals such as bees and birds held significant socio-cultural and economic importance within the Byzantine Empire. These creatures frequently appeared in religious texts and iconography, while animals like cats and dogs were commonplace in households and folklore. Bees played a crucial role in honey production, a valuable trade commodity, while silkworms were essential for the thriving silk industry, serving as a primary economic driver for the Empire. Additionally, cats help control pests, safeguard food supplies, and contribute to public health. These varied roles underscore the multifaceted significance of small animals in Byzantine society, influencing daily life and the broader economy. While the previous scholarly focus has often centred on the economics of animal rearing, this study seeks to shed light on Byzantine animal depictions' socio-cultural and religious implications. By exploring the roles of creatures like worms, bees, and insects, we aim to restore their significance within Byzantine society's social and economic dynamics. Considering the limitations of available primary and secondary sources, the primary goal is to examine the Byzantine narrative about these animals, reconstruct the Byzantine perception and utilization of these creatures, and highlight the manifold benefits of their presence in the daily life of the Byzantines.

Methodology

This paper has thoroughly examined various primary and secondary sources, such as academic articles and websites, to gather comprehensive insights on my chosen topics. My research methodology involved extensive reading, analyzing, and interpreting information to understand the role of animals, tiny creatures like worms, bees, insects, and silkworms, in Byzantine society. The main objective of the text is to fill the gap in our understanding of Byzantine society's socio-cultural and economic dynamics by emphasizing the often overlooked of these animals in daily life. I delve into the practical, socio-economic, and religious aspects of human interaction with these creatures, utilizing written sources and archaeological evidence to reconstruct the Byzantine perception and utilization of these living beings. This research highlights the crucial role of these small animals in agriculture, apiculture, and sericulture, drawing from the insights of esteemed scholars who have studied Byzantine animals and their impact on society. Through this article, I aim to explore the rich Byzantine narrative about these animals, shedding light on their perception and utilization of other living beings and emphasizing the multifaceted benefits of their presence in daily life.

Discussion

In Byzantine society, animals contributed in various ways. Horses, for example, were essential for transportation, cavalry, and agricultural work. They played a crucial role in the Byzantine military, providing mobility and strength for soldiers. Additionally, oxen were used for plowing fields and transporting goods, while sheep and goats provided wool and milk for clothing and food. Animals also featured prominently in Byzantine artwork, literature, and religious symbolism, reflecting their cultural significance in Byzantine society. Overall, animals played a significant role in the economy, military, and artistic expressions of the Byzantine Empire. [13] Many Byzantine texts, like the Oxford Dictionary of Byzantium and any book or text about the world of Byzantium, discuss mythical or imaginary animals that are giants. Therefore, they overlooked those little animals in the context of the Byzantine diaspora. However, [14] little animals of the Byzantium diaspora have been found in scripts like agricultural lore, legislation documents, and religious literature such as [15] miracle stories, secular literature, hagiography, etc. Those scripts help to discover the roles of the “little animals” (Mulla, 2022). Little animals were helpful in [16] sericulture or apiculture in the production of honey; beeswax would help produce [17] candles essential for monastic foundations. These were all conducive to economic advancement for small industries in the Byzantine Empire. In Byzantine texts, little and giant animals have been illustrated in many ways, and they are also connected to Western scripts, as discussed and mentioned.

Animals are also imagined as tools of the devil and their engagement with evilness. Many religions, such as paganism and Christianity, have been discussed in the Byzantine texts. They had gone through many myths and imagination and regarded their sacrifice to the lord. Little animals have always been a part of this sacrifice and have represented the holy men of Christianity. Thus, animals were represented as a divine power. [18] The double-headed eagle was a prominent sign representing the dual sovereignty of the emperor in both secular and religious matters. [19] Hares and rabbits symbolize fertility and are often linked with gods of love and sacrifice. [20] Fish in Christian theology was significant as a food source and the symbol of faith. The ichthys was an early Christian symbol representing [21] Jesus Christ. Depending on the context, [22] serpents in the Byzantine era were represented as evil and wise. They were used for moralistic and allegorical tales in Byzantium myths. [23] Peacocks were symbolized as immortality and resurrection, often depicted in Christian art and literature.

In Byzantine literature, an allegorical tale like the [24] Cat and Mice's War is famous for symbolizing the struggle between good and evil. The story is used to reflect human behaviour and societal conflicts. Physiologus is another didactic tale in Byzantine literature that describes various animals in absolute and mythical ways. It was widely read in the Byzantine world and influenced by medieval bestiaries. Many saints live with animals called hagiographies, where it has been illustrated that the life of Saint Gerasimus [25] of Jordan is about a lion that became the saints' companion when he removed a thorn from its paw. The use of animal iconography in art has a deep-rooted history that dates to ancient times. Animals often conveyed [26] symbolic meanings that viewers of different eras understood. In the Medieval period, people believed that animals could discern the moral qualities of humans and act accordingly. For example, individuals were considered virtuous if a [27] sparrow landed on them, while a raven nesting on a home was seen as a sign of sin and often led to the destruction of the dwelling. [28] Dogs were thought to be able to peer into a person's soul and were even used in judicial proceedings to determine guilt in witchcraft cases. Similarly, the wolf symbolized compassion and mercy and was often associated with early saints such as St. Francis of Assisi. Using animals in this way added layers of meaning to artwork and allowed artists to convey complex ideas and beliefs. Each animal had its unique symbolism. [29] For instance, the winged ox represents Luke the Evangelist, while the lion symbolizes Jesus Christ and Satan. Additionally, certain animals, such as the [30] unicorn, were believed to have unique qualities that could only be tamed by specific individuals, like the unicorn being tamed by a virgin's gentle touch. These rich and varied associations with animals in art reveal the complex and deeply ingrained symbolism in different cultures throughout history. Therefore, these stories and texts illustrate the rich tapestry of animal symbolism and its role in conveying moral, religious, and cultural messages in Byzantine literature. The Byzantine economy was a pre-industrial economy based on agriculture and animal husbandry. Animals were crucial creatures for human lives in the Byzantine Empire. Animals were the most advanced technology in that era, instead of modern technological components. Most territories occupied the empire in terms of land and climatic features. Therefore, it had animal diversity. [31] Pigs were cost-effective and not helpful for primary food like milk, wool, etc. Because of the religious prohibition of the Jewish community, pigs were not the primary animal husbandry in some provinces. As per zoo-archeological evidence, pigs were bred considerably in Egypt and Italy due to meat preserved for famine emergencies. [32] In the Byzantine Empire, meat was preserved for emergencies caused by famine. In the Byzantine Empire, people kept [33] bees long before breeding horses, camels, and ducks. [34] Apiculture thus was essential and old as livestock husbandry activities. Bees are vital in the contemporary era as well for existing lives. Beekeeping activities, such as temperature, natural water supplies, and vegetarian production, are essential for environmental sustainability. Beekeeping activities were found in the warmer region of the Byzantine Empire due to bees' protection and safety. Honey was used for many purposes without refined sugar. In the Byzantine Empire, honey was the most acceptable sweetener for culinary needs. Many documents have illustrated honey as a tool for protecting food throughout the Mediterranean since ancient times. It was the region's weather that wax, and honey were excellent food preservatives. [35] Honey and honey vinegar played a vital role in making special pills to prevent feelings of hunger and thirst, and it was very strategic and helpful during the famine war in the Byzantine era. Honey was also the best food for purifying the body of pollutants without degradation. [36] Honey was also used on the battlefield and daily life in Byzantine, where tea and beverages were made for sweetening.

Honey and wax were also employed in both medical and pharmaceutical practices. [37] Joannes Zacharias Actuaries (c. 1275-1328 CE) first used honey and wax for medical uses in the twentieth century. The physician talked with his patient, who had urinary problems. He prepared a tablet, a mixture of honey and vinegar. Overall, Byzantines took advantage of honey as a cure for otolaryngological illnesses. In the context of [38] sericulture in the Byzantine Empire, silkworms were one of the best products, and they had been stolen by the ancient [39] monks of the Byzantines from China as per myth for the development of the economy. [40] Procopius thanked those monks for this adventure in his book [41] "History of the Wars." Byzantines would no longer buy the silkmoth from the outside, an excellent improvement in the Byzantine economy. Low-quality silk was sold to ordinary people. Therefore, silk production was for the rich and the ordinary people in the Byzantine Empire. Various wool and linen cloths were made in the Byzantine Empire, too. It was also crucial for international commercial value, as well as a reflection of the art and social life of the Byzantine Empire. [42] Silk curtains and silk garments protect many, and conflicts and complicated social relations between the elite and ordinary people of the empire as a distribution of gifts to each other.

Conclusion

The Byzantine Empire relied heavily on animals such as bees and silkworms, crucial in shaping the Empire's economy and societal structure. These creatures were essential for producing honey and silk and supporting various industries, including agriculture, transportation, and manufacturing goods like wool and silk. The passage "And to Every Beast of The Earth and Every Bird of The Heaven and To Everything That Creeps on The Earth" sheds light on the significant roles animals played in Byzantine society, offering valuable insights that remain pertinent. Delving into the historical context of animal utilization in Byzantium can provide contemporary culture with a deeper understanding of sustainable and traditional methods of animal husbandry, opening the door to fresh perspectives on the human-animal relationship. Furthermore, studying the role of animals in the Byzantine economy and daily life can provide valuable historical and cultural insights that have the potential to impact modern practices in animal welfare, ecology, and conservation. Therefore, examining the contribution and influence of the Byzantine diaspora in the contemporary era is a valid and compelling exploration.

References

Georgios, G. (2021, April 18). *The double-headed eagle as a symbol in the Byzantine Empire: Myths and realities*. Medievalists.net. https://www.medievalists.net/2021/04/double-headed-eagle-byzantine/

Marciniak, P., & Schmidt, T. (2024). The Routledge Handbook of Human-Animal Relations in the Byzantine World. In *Routledge & CRC Press* (p. 1). Routledge. https://www.routledge.com/The-Routledge-Handbook-of-Human-Animal-Relations-in-the-Byzantine-World/Marciniak-Schmidt/p/book/9780367519643. Description.

McLemore, E. (2024, March 22). *Medieval Rabbits: Ancient Symbolism, English Migration, and Manuscript Marginalia – Medieval Studies Research Blog: Meet us at the Crossroads of Everything*. Nd.edu. https://sites.nd.edu/manuscript-studies/2024/03/22/medieval-rabbits-ancient-symbolism-english-migration-and-murderous-marginalia/

Mulla, A. (2022). *"AND TO EVERY BEAST OF THE EARTH AND EVERY BIRD OF THE HEAVEN AND TO EVERYTHING THAT CREEPS ON THE EARTH": ANIMALS IN BYZANTIUM A Master's Thesis*. https://repository.bilkent.edu.tr/server/api/core/bitstreams/3caefaab-4a5a-4bd8-a2d4-64951cbd8172/content

The symbolic importance of animals in Byzantine, Gothic and Renaissance Painting. (n.d.). Www. history of painters.com. https://www.historyofpainters.com/animals.htm

Vakalopoulos, M. C., & Vakalopoulos, A. (2009, November 18). *Fishes and other aquatic species in the Byzantine literature: Classification, terminology and scientific names - Medievalists.net*. Medievalists.net.https://www.medievalists.net/2009/11/fishes-and-other-aquatic-species-in-the-byzantine-literature-classification-terminology-and-scientific-names/

[1] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 1st. P1

[2] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 1st. P1

[3] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 1st. P1

[4] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 1st. P1

[5] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 1st. P2

[6] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 1st. P2

[7] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 1st. P2

[8] "And To Every Beast of The Earth and to Every Bird of The Heaven and to Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 1st. P3

[9] "And To Every Beast of The Earth and to Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 1st. P3

[10] "And To Every Beast of The Earth and to Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 1st. P3

[11] "And To Every Beast of The Earth and to Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 1st. P

[12] "And To Every Beast of The Earth and to Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 1st. P

[13] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 3. P4

[14] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 3. P4

[15] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 3. P4

[16] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 3. P4

[17] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Animals in Byzantium. Introduction. Paragraph 4. P4

[18] The Double-Headed Eagle as A Symbol in The Byzantine Empire: Myths and Realities. Paragraph 1st.

[19] Medieval Rabbits: Ancient Symbolism, English Migration, And Manuscript Marginalia. Paragraph 3rd.

[20] Fishes And Other Aquatic Species in The Byzantine Literature: Classification, Terminology and Scientific Names. Introduction. Paragraph 1st.

[21] Fishes and other aquatic species in the Byzantine literature: Classification, terminology and scientific names. Introduction. Paragraph 2nd.

[22] The Hidden Symbolic Meaning of Animals in Western Painting. Paragraph 1st.

[23] The Hidden Symbolic Meaning of Animals in Western Painting. Paragraph 1st.

[24] The Hidden Symbolic Meaning of Animals in Western Painting. Paragraph 1st.

[25] The Routledge Handbook of Human-Animal Relations in the Byzantine World. Descriptions.

[26] The Hidden Symbolic Meaning of Animals in Western Painting. Paragraph 1st.

[27] The Hidden Symbolic Meaning of Animals in Western Painting. Paragraph 1st.

[28] The Hidden Symbolic Meaning of Animals in Western Painting. Paragraph 1st.

[29] The Hidden Symbolic Meaning of Animals in Western Painting. Paragraph 7th.

[30] The Hidden Symbolic Meaning of Animals in Western Painting. Paragraph 19th.

[31] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Practical Usage of Animals in Byzantium. Paragraph 3rd. P26-27

[32] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Practical Usage of Animals in Byzantium. Paragraph 3rd. P26-27

[33] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Practical Usage of Apiculture and Its Place in Byzantine Economy. Paragraph 1st. P27.

[34] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Practical Usage of Apiculture and Its Place in Byzantine Economy. Paragraph 1st. P27.

[35] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Practical Usage of Apiculture and Its Place in Byzantine Economy. Paragraph 2nd. P29.

[36] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Practical Usage of Apiculture and Its Place in Byzantine Economy. Paragraph 2nd. P29.

[37] "And To Every Beast of The Earth and Every Bird of The Heaven and To Everything That Creeps on The Earth": Practical Usage of Apiculture and Its Place in the Byzantine Economy. Paragraph 3rd. P30.

[38] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Role of Sericulture in The Byzantine Economy and Social Life. Paragraph 4th. P35.

[39] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Role of Sericulture in The Byzantine Economy and Social Life. Paragraph 4th. P35.

[40] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Role of Sericulture in The Byzantine Economy and Social Life. Paragraph 4th. P35.

[41] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Role of Sericulture in The Byzantine Economy and Social Life. Paragraph 4th. P35.

[42] "And To Every Beast of The Earth and To Every Bird of The Heaven and To Everything That Creeps on The Earth": Role of Sericulture in The Byzantine Economy and Social Life. Paragraph 9th. P40.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

ECOFEMINISM IN ARCHITECTURE FOR SUSTAINABLE ENVIRONMENT AND GENDER EQUALITY

Ananda Majumdar
University of Alberta
ORCID: 0000-0003-3045-0056

Abstract

Ecofeminism [1] (Bove,2021) originated in the 1970s as part of the feminist movement, aiming to draw connections between women's subjugation and humanity's exploitative treatment of the environment. [2]Throughout the 1980s, ecofeminism significantly influenced feminist and environmental activism and artistic expression. Key figures within the ecofeminist movement included various intellectuals and political leaders. [3]However, by the late 1990s, EEcofeminismfaced criticism for being essentialist and failing to address environmentalism and feminism fully. Critics argued that ecofeminism overlooked crucial socio-economic factors such as race and class, thereby limiting its scope. Ecofeminism specifically addresses environmentalism, and feminism explores the relationship between gender and nature, yet some critics claim that it neglects the influence of race and class. The framework seeks to reevaluate both feminist and environmental movements, examining how gender and nature intersect and challenging false beliefs that perpetuate the subjugation of women and exploitation of nature.

In Ecofeminism, [4]binaries highlight differences, particularly within gender. While this approach can effectively demonstrate disparities between men and women, it may oversimplify the multifaceted relationship between humanity and nature. Despite being widely discussed in academic settings, Ecofeminism struggled to expand beyond scholarly circles due to its perceived complexities surrounding gender differences and nature. [5]In the 1990s, environmental justice emerged as a framework utilized by scholars and activists to advocate for fair treatment of all individuals, irrespective of their identities, in environmental matters such as pollution and food security. This shift aimed to bridge the gap between [6]ecological laws and societal relevance, emphasizing the importance of equity in addressing ecological issues. This paper explores the role of culture in environmentalism and its impact on society. It underscores the need for environmental solutions and societal equity to foster community peace. The methodology employed for this study involves documentary analysis to conduct a comprehensive review of existing literature. Ultimately, this study aims to delve into the relationship between Feminism and the environment, shedding light on the framework's relevance and social significance in addressing environmental challenges.

Keywords: Ecocentrism, Ecofeminism, Environmentalism, Gender Classification, Gender Movement, Collectivism, Society and Gender, Fundamentalism, Climate Action, The Binaries.

Introduction

Ecofeminism and environmental activism are closely intertwined. [7]Ecofeminists believe that the exploitation of nature and the oppression of women are interconnected issues stemming from patriarchal and capitalist systems. Here are some key ways Feminism relates to environmental activism: under a holistic approach, Ecofeminism promotes a [8]holistic view of environmental issues, recognizing that social justice, gender equality, and environmental sustainability are interconnected.

This perspective encourages activists to address the root causes of environmental degradation, such as systemic inequality and exploitation. [9]Empowerment of Women is a symbolic feature of Ecofeminism that emphasizes the role of women in environmental activism. Women, especially in marginalized communities, often bear the brunt of environmental degradation. Ecofeminist activism empowers these women, giving them a voice in environmental decision-making and leadership roles. [10]Cultural and Spiritual Connections are another symbolic feature of many ecofeminists, highlighting the cultural and spiritual connections between women and nature. This can involve reclaiming traditional ecological knowledge and practices that respect and protect the environment. Activism inspired by these values often focuses on preserving biodiversity, protecting sacred lands, and promoting sustainable living. [11]Intersectionality is also a symbolic approach of Ecofeminism, which incorporates an intersectional approach, recognizing that environmental issues affect people differently based on their gender, race, class, and other identities. This leads to more inclusive and equitable environmental activism that addresses the needs and rights of all communities. Grassroots Movements are another part of Ecofeminism that often supports grassroots Ecofeminist activists and are integral to local movements addressing environmental issues such as community gardening, anti-pollution campaigns, and climate change efforts. Their mission is to foster sustainable and resilient communities through grassroots initiatives. Ecofeminism enhances environmental activism by highlighting the interplay of social and ecological justice, advocating for systemic change, and amplifying marginalized voices. Ecofeminist activism is a powerful avenue to drive environmental sustainability and social justice. Here are essential steps to take:

1. Educating individuals: [12] Dive into ecofeminism and its principles. Immerse citizens in impactful works such as "Ecofeminism" by Maria Mies and Vandana Shiva and "The Death of Nature" by Carolyn Merchant.

2. Joining local groups:[13] Seek out and join local environmental or feminist groups aligned with ecofeminist values. Many communities harbour organizations dedicated to sustainability, women's rights, or social justice, offering a wealth of opportunities for involvement.

3. Volunteering:[14] Dedicate citizen's time and expertise to organizations championing ecofeminist causes. Engage in community gardening, environmental clean-ups, or campaigns against ecological injustices.

4. Becoming an advocate:[15] Use the citizen's voice to champion feminist principles. Author articles, speak at events, or use social media to spotlight the vital link between gender equality and environmental sustainability.

5. Supporting women-led initiatives:[16] Extend unwavering support to women steering ecofeminist movements, particularly in marginalized communities, through donations, volunteer work, or amplifying their messages.

6. Practicing sustainable living:[17] Adopt sustainable practices to integrate ecofeminist principles into citizens' daily routines. This encompasses waste reduction, endorsing ethical and eco-friendly products, and fostering biodiversity in your local environment.

7. Networking:[18] Attend conferences, workshops, and events to connect with fellow ecofeminists and activists, forge alliances, and gain insights from their experiences.

8. Engaging in policy advocacy:[19] Harness citizens' influence on shaping policies aligned with ecofeminist goals. Champion legislative changes for environmental protection, gender equality, and sustainable development. By embracing these influential steps, every individual can contribute to building a more just and sustainable world for all.

Literature Review

Ecofeminism has encountered criticism for its perceived essentialism and its shortcomings in fully addressing the intertwined issues of environmentalism and feminism. Critics argue that Ecofeminism fails to consider critical socio-economic factors such as race and class adequately, therefore constraining its scope. Some contend that Ecofeminism overlooks the impact of race and class. Furthermore, the use of binaries within Ecofeminism to underscore differences, especially within gender, has been faulted for oversimplifying the intricate relationship between humanity and nature. Despite being extensively debated in academic circles, Ecofeminism has struggled to reach beyond scholarly realms due to perceived intricacies concerning gender distinctions and nature. Ecofeminism encounters critics and detractors who highlight potential shortcomings like any movement or ideology. Some of the criticisms of Ecofeminism involve concerns that it essentializes women and nature, potentially perpetuating conventional gender norms. Another criticism suggests that it may oversimplify intricate social and environmental issues by attributing them solely to gender dynamics. Additionally, some critics argue that Ecofeminism may need to fully consider the viewpoints and experiences of diverse groups of women, particularly those from non-Western or marginalized backgrounds. While Ecofeminism has gained prominence as a significant perspective for exploring the intersections of gender and the environment, it is not immune to detractors and criticisms.

Methodology

It is crucial to approach Ecofeminism and environmental activism with a comprehensive and inclusive framework. Integrating ecofeminist principles into environmental activism involves understanding the interconnectedness of social and ecological issues and taking holistic steps to address them. A significant aspect of this methodology is employing an intersectional analysis that recognizes how gender, race, class, and other identities intersect with environmental issues. This understanding helps identify how different communities are uniquely impacted by ecological degradation and how to address these disparities effectively. Active involvement and engagement with local communities are emphasized, including working closely with women from marginalized communities to understand their perspectives and experiences regarding environmental challenges and to co-create inclusive and empowering solutions. Advocacy and awareness-building efforts are promoted, involving disseminating information about Ecofeminism, ecological sustainability, and social justice through various channels such as educational initiatives, public events, and media outreach to raise awareness and mobilize support for ecofeminist causes. Fostering partnerships and collaborations with existing environmental and feminist organizations is encouraged to leverage strengths and resources for amplified impact and advancing common goals related to environmental sustainability and gender equality. Acting at individual and collective levels is emphasized, including advocating for policy changes, promoting sustainable practices, and supporting grassroots initiatives embodying ecofeminist principles. Lastly, ongoing evaluation and reflection are vital to assessing ecofeminist approaches' effectiveness in environmental activism. This includes monitoring progress, gathering feedback from diverse stakeholders, and continuously reflecting on lessons learned to improve strategies and interventions.

Discussion

Ecofeminism **is** a fascinating blend of ecological and feminist ideas. [20]Ecofeminist architecture addresses the connections between the built environment, nature, and gender. It encourages gender equality and has gained traction. [21]The improvement of health and safety is prioritized in green buildings, which promote indoor air quality, natural light, and non-toxic materials. These features benefit all occupants, especially women, who are more susceptible to indoor pollution. Well-designed green buildings also include safety measures like well-lit pathways, secure parking areas, and access control systems, creating a safer environment for women. [22]Enhanced accessibility is another way to promote Feminism through universal design principles that ensure equal access for people of all genders, ages, and abilities. Energy efficiency and affordability further justify the concept. Energy-efficient green buildings reduce energy costs, benefiting women disproportionately affected by energy poverty. Affordable housing enables women to allocate resources to other essential needs, promoting financial well-being. Ecofeminist architecture challenges dominant systems within the built environment by rejecting the [23]“man versus nature” dichotomy and emphasizing a holistic view. It moves beyond controlled resource use and wildlife preservation by considering organic processes and interrelationships. Under ecofeminist architecture, feminist principles guide Ecofeminism and advocate for gender equality. It reevaluates non-patriarchal structures and respects intuition, collaboration, and organic connections. Ecofeminist architecture also addresses how women are disproportionately affected by various environmental issues, such as climate change and their dependence on natural resources. Community engagement is vital in ecofeminist architecture, fostering collaboration, empowerment, and sustainable change. Ecofeminist architects actively involve community members, especially women, in the design process. They listen to diverse voices and ensure that the built environment reflects all residents' needs, values, and aspirations. Community involvement allows for consensus-building, shared ownership, and participatory design. [24]One notable example of community-engaged ecofeminist architecture is the work of architect [25]Yasmeen Lari, who aims to replace traditional, highly polluting outdoor stoves with a low-cost, smokeless alternative. By collaborating closely with the community, especially women, she has created a sustainable, gender-inclusive solution that improves indoor air quality and reduces hazards. [26]This project exemplifies how ecofeminist architecture can empower communities, prioritize well-being, and address environmental challenges. The spiritual aspect of Ecofeminism explores the connections between spirituality, culture, and environmentalism. Many ecofeminists view the Earth as sacred and interconnected, emphasizing reverence for nature and advocating for a shift away from patriarchal religious structures. They encourage practices honouring the Earth, such as rituals, meditation, and eco-friendly lifestyles, fostering a deeper connection with nature and challenging dualistic thinking. Ultimately, Ecofeminism invites citizens to recognize the spiritual dimensions of their relationship with the environment.

Conclusion

Ecofeminism is an intersectional movement that emerged in the 1970s. The term was coined by French writer Françoise d’Eaubonne in her book Le Féminisme ou la Mort (1974). It explores the connection between gender, women, and the natural world. Ecofeminism sheds light on the relationship between women and nature, emphasizing the link between the oppression of women and the climate crisis. It reveals how women play a crucial role in caring for nature and communities through their labour and knowledge, yet often face barriers to equitable access to social, political, and economic rights.

The root causes of both gender-based oppression and the climate crisis are linked to the extraction, exploitation, and devaluation of nature and marginalized groups. Centering the voices and experiences of women, particularly those who are BIPOC (Black, Indigenous, and People of Color) and low-income, is essential. Understanding the impact of the climate crisis on women and supporting their leadership are crucial steps.

References

Allison, J. E. (2017). Ecofeminism and Global Environmental Politics. In *Oxford Research Encyclopedia of International Studies*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190846626.013.158

Bove, T. (2021, July 19). *Ecofeminism: Where Gender and Climate Change Intersect*. Earth.org; Earth.org. https://earth.org/ecofeminism/#:~:text=The%20ecofeminist%20movement%20has%20 for%20 decades%20been%20 highlighting

Gishleni, C. (2023, May 16). *Ecofeminism in Architecture: Empowerment and Environmental Concern*. ArchDaily. https://www.archdaily.com/1000291/ecofeminism-in-architecture-empowerment-and-environmental-concern

Ji, S. W. (2023, May 30). *Ecofeminism: Understanding the Connection Between Gender and the Climate Crisis*. Blog.pachamama.org. https://blog.pachamama.org/ecofeminism

Rodriguez, L. (2022, June 28). *The Faces of Ecofeminism: Women Promoting Gender Equality and Climate Justice Worldwide*. Global Citizen. https://www.globalcitizen.org/en/content/ecofeminist-issues-activists-examples/

Team, dormakaba E. (2023, July 26). *Ecofeminism in Architecture: How Green Buildings Can Facilitate Gender Equality*. EN - Dormakaba Blog. https://blog.dormakaba.com/ecofeminism-in-architecture-green-buildings-can-facilitate-gender-equality/

Wikipedia Contributors. (2019, February 20). *Ecofeminism*. Wikipedia; Wikimedia Foundation. https://en.wikipedia.org/wiki/Ecofeminism

[1] Ecofeminism: Where Gender and Climate Change Intersect. Paragraph 1st.

[2] Ecofeminism: Where Gender and Climate Change Intersect. Paragraph 2nd.

[3] Ecofeminism: Where Gender and Climate Change Intersect. Paragraph 3rd.

[4] Ecofeminism: Where Gender and Climate Change Intersect. What exactly is Ecofeminism? Paragraph 3rd.

[5] Ecofeminism: Where Gender and Climate Change Intersect. What exactly is Ecofeminism? Paragraph 8th.

[6] Ecofeminism: Where Gender and Climate Change Intersect. Ecofeminism's Role in Elevating Women. Paragraph 2nd.

[7] Ecofeminism and Global Environmental Politics. Introduction. Paragraph 1st.

[8] Ecofeminism and Global Environmental Politics. Paragraph 1st.

[9] The Faces of Ecofeminism: Women Promoting Gender Equality and Climate Justice Worldwide. Paragraph 1st.

[10] Ecofeminism and Global Environmental Politics. Introduction. Paragraph 1st.

[11] Ecofeminism and Global Environmental Politics. Introduction. Paragraph 1st.

[12] The Faces of Ecofeminism: Women Promoting Gender Equality and Climate Justice Worldwide. Paragraph 1st.

[13] The Faces of Ecofeminism: Women Promoting Gender Equality and Climate Justice Worldwide. Paragraph 1st.

[14] The Faces of Ecofeminism: Women Promoting Gender Equality and Climate Justice Worldwide. Paragraph 1st.

[15] The Faces of Ecofeminism: Women Promoting Gender Equality and Climate Justice Worldwide. Paragraph 1st.

[16] The Faces of Ecofeminism: Women Promoting Gender Equality and Climate Justice Worldwide. Paragraph 1st.

[17] The Faces of Ecofeminism: Women Promoting Gender Equality and Climate Justice Worldwide. Paragraph 1st.

[18] The Faces of Ecofeminism: Women Promoting Gender Equality and Climate Justice Worldwide. Paragraph 1st.

[19] The Faces of Ecofeminism: Women Promoting Gender Equality and Climate Justice Worldwide. Paragraph 1st.

[20] Ecofeminism in Architecture: How Green Buildings Can Facilitate Gender Equality. How Can Ecofeminism in Architecture Facilitate Gender Equality? Paragraph 1st.

[21] Ecofeminism in Architecture: How Green Buildings Can Facilitate Gender Equality. How Can Ecofeminism in Architecture Facilitate Gender Equality? Paragraph 1st.

[22] Ecofeminism in Architecture: How Green Buildings Can Facilitate Gender Equality. How Can Ecofeminism in Architecture Facilitate Gender Equality? Enhanced Accessibility. Paragraph 1st.

[23] Ecofeminism in Architecture: How Green Buildings Can Facilitate Gender Equality. How Can Ecofeminism in Architecture Facilitate Gender Equality? Paragraph 1st.

[24] Ecofeminism in Architecture: Empowerment and Environmental Concern. Paragraph 7th.

[25] Ecofeminism in Architecture: Empowerment and Environmental Concern. Paragraph 7th.

[26] Ecofeminism in Architecture: Empowerment and Environmental Concern. Paragraph 7th.

YAŞ AYRIMCILIĞININ SOSYOEKONOMİK ETKİLERİ

Dr. Öğr. Gör. Murat BAYRAKTAR
İstanbul Esenyurt Üniversitesi, İşletme ve Yön. Bil. Fakültesi. Ekonomi ve Finans Bölümü
ORCID: 0000-0003-4028-192X

ÖZET
Doğum oranlarında beklenen yaşam süresi küresel ölçekte artmaktadır. Öte yandan "yaş ayrımcılığı" olarak tanımlanabilecek bireylere yönelik olumsuz kalıp yargılar, önyargılar ve ayrımcılık da artmaktadır. Yaşlı insanlar, modern ekonomiler tarafından zorunlu emeklilik nedeniyle dışlanmakta ve bu da sosyo-ekonomik statülerinin düşmesine neden olmaktadır. Yaşlanmaya ilişkin kişisel algılar, aktif yaşlanma sonuçları için çok önemlidir. Yaşlandıkça bireyler ve toplum üzerinde yaşlı ayrımcılığının, olumsuz etkileri vardır. 50 yaş ve üzeri işçilerin işgücü piyasasına dahil edilmesinin önünde engeller bulunmaktadır. Bir sosyal dışlanma biçimi olarak yaşlı ayrımcılığı, yaşlı bireyin yalnızlığını, istismarını ve sosyal izolasyonunu artırarak ölüm oranını artırır. Bu nedenle tüm dünyada aktif, ardışık ve sağlıklı yaşlanma için yaşlı ayrımcılığının azaltılması gerekmektedir. Aktif yaşlanma politikası çerçevesi uygulanmalıdır. Yaşlı işçilerin işgücü piyasalarına katılımını teşvik edecek politikalar uygulanmalıdır. Bu nedenle sosyal dışlanmayı ve yalnızlığı azaltacak sosyal sermaye politikaları uygulanmalıdır.
Anahtar Kelimeler: Yaş ayrımcılığı, sosyal sermaye, sosyal içerme.

SOCIO-ECONOMIC EFFECTS OF AGE DISCRIMINATION

ABSTRACT
Life expectancy at birth rates is increasing at a global scale. On the other hand, negative stereotyping, prejudice and, discrimination against individuals which can be defined as "ageism" is increasing. Older people marginalized due to forced retirement by modern economies resulting lowering their socio-economic status. Self-perceptions of aging are crucial for active aging outcomes. Ageism has negative implications for individuals and society as they age. Barriers to the inclusions of workers aged 50 and older to the labor market. Ageism, as a form of social exclusion increases loneliness, abuse, and social isolation of an older individual thus increasing mortality rate. Therefore, ageism must be reduced for active, successive, and healthy aging all around the world. Active aging policy framework must be implemented. Policies to promote older workers to join labor markets should implemented. Social capital policies therefore must implement to decrease social exclusion and loneliness.
Keywords: Ageism, social capital, social inclusion.

SOSYAL SERMAYENİN İNOVASYONDAKİ ROLÜ: SEÇİLMİŞ OECD VE BRICS ÜLKELERİNDEN BULGULAR

Dr. Öğr. Gör. Murat BAYRAKTAR
İstanbul Esenyurt Üniversitesi, İşletme ve Yön. Bil. Fakültesi. Ekonomi ve Finans Bölümü
ORCID: 0000-0003-4028-192X

ÖZET
Sosyal sermayenin yoksulluğun azaltılması, ekonomik büyüme, bilgi aktarımı, bilgi yaratılması üzerinde olumlu etkileri vardır. Sosyal sermaye, bilgi yönetimini destekler, işlem maliyetlerini azaltır, proaktifliği etkiler ve hatta bir toplumu bir arada tutan yapıştırıcı olarak kabul edilir. Sosyal sermaye literatürü, proaktif stratejik davranışla sonuçlanan yenilikçi kapasiteleri destekleyebilecek şirketin iç ve dış ağlarına yoğunlaşmaktadır. Gelişmiş kişilerarası etkileşimler sayesinde sosyal sermaye, faaliyetlerin daha iyi koordinasyonunu teşvik eder. Sonuç olarak, artan topluluk güveni ve ortak vizyon, pazar verimliliğini artırır ve ilgili maliyetleri düşürür.
Bu araştırmanın amacı, sosyal sermayenin ülkelerin inovasyon sürecine yönelik yetenekleri üzerindeki etkisini incelemektir. Çalışma, seçilmiş BRICS ve gelişmekte olan ülkeler için sosyal sermayenin inovasyon üzerindeki faydalı etkisini ortaya koymaktadır. Sosyal sermaye, %1 arttığında patent başvurusu %2,46 artmaktadır. Bu nedenle bu ülkelerin küresel dünyada rekabet avantajı elde edebilmeleri için tüm paydaşlarının kendi içinde ve dışında güçlü bir güven ekosistemi oluşturması gerekmektedir.
Anahtar Kelimeler: Sosyal sermaye, inovasyon, güven, BRICS.

THE ROLE OF SOCIAL CAPITAL ON INNOVATION: FINDINGS FROM SELECTED OECD & BRICS COUNTRIES

ABSTRACT
Social capital has positive effects on poverty reduction, economic growth, knowledge transfer, knowledge creation, backs in knowledge management, reduces transaction costs, influences proactiveness and even considered as the glue that holds a society together. The literature on social capital concentrates on the internal and external networks of the company that may support innovative capacities that result in proactive strategic behavior. Through improved interpersonal interactions, social capital promotes better coordination of activities. Consequently, increased community trust and a shared vision increase market efficiency and lower related costs.
The aim of this research is to examine the influence of social capital on the ability of countries for innovation process. The study has demonstrated the beneficial impact of social capital on innovation mainly for selected BRICS and developing countries. When the social capital increases by 1%, patent application increases by 2.46%. Therefore, these counties must establish a robust trust ecosystem in and out their organizations for all the stakeholders to gain competitive advantage in the global world.
Keywords: Social capital, innovation, trust, BRICS.

ARTIFICIAL INTELLIGENCE AT THE HEART OF MOROCCAN PUBLIC SECTOR REFORM: CHALLENGES AND PERSPECTIVES

Omar TADLAOUI
LIFGOD, National School of Business and Management of Casablanca, University of Hassan II

et Mohamed MACHROUHI
LIFGOD, National School of Business and Management of Casablanca, University of Hassan II

Abstract

Context

The advent of artificial intelligence (AI) in the Moroccan public sector represents an unprecedented opportunity for organizational reform. This communication relies on a rigorous literature review methodology to map existing AI initiatives and assess their potential impact on public service transformation. Through in-depth analysis of academic publications, government reports, and case studies, we have identified key trends, challenges, and opportunities associated with integrating AI in the public sector.

The communication has a dual purpose: firstly, to provide a holistic understanding of Morocco's efforts to incorporate AI into its public structures, and secondly, to offer strategic recommendations for policymakers. By highlighting initiatives such as the Al Khawarizmi Program, the partnership with UNESCO, and the establishment of an international AI center, this communication illustrates how Morocco is embarking on an innovative journey toward a more efficient and responsive public administration.

Problem Statement : How can the integration of artificial intelligence transform the Moroccan public sector in terms of services and governance, while navigating the ethical, regulatory, and skills-related challenges inherent in this emerging technology ?

This problem aims to stimulate reflection on the multiple dimensions of implementing AI in the public sector, including potential benefits for efficiency and transparency, as well as the obstacles to overcome for successful and responsible integration. It also paves the way for a discussion on the necessary strategies to align technological innovations with Morocco's sustainable development goals and societal values.

In conclusion, this study underscores the importance of a methodical approach to understanding the role of AI as a catalyst for change in the Moroccan public sector. It emphasizes the need for intersectoral collaboration and a long-term vision to overcome obstacles and maximize the benefits of AI for Moroccan society.

Keywords: Artificial Intelligence (AI), Moroccan Public Sector, Organizational Reform, Technological Challenges, Technological Innovation, Inclusive Governance.

ISSUES AND CHALLENGES IN OPERATION MANAGEMENT: PERSPECTIVES FROM NORTHERN MALAYSIA TERTIARY EDUCATION INDUSTRY

Intan Radina Ahmad
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

Laila Ajlaa Jamal Abd Mansor
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

Herman Shah Anuar
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

ABSTRACT
This study examines the operational management problems and difficulties faced by the Northern Malaysian tertiary education sector, focusing on Y polytechnic. The study method is quantitative, involving a comprehensive survey of 19 questions towards 12 respondents. Data were gathered from samples of academic staff members at Y polytechnic. The report highlights several significant operational issues, such as resource management, challenges in incorporating contemporary technology into administrative procedures, process optimization and stakeholder management. The data is analyzed using a research framework and the result will be generated using Google Form survey. Thus, this study aims to assess the perspectives from Northern Malaysia Tertiary education industry regarding the issues and challenges in operation management. There are six sections in the questionnaire including demographic information, resource management, technology integration, process optimization, stakeholder management, and the last section is general. The results also highlight how regional socioeconomic conditions affect operational efficiencies, especially regarding student services and resource allocation. The study classifies the main operational challenges and provides insights into their underlying causes through factor analysis. The tertiary education sector in Y polytechnic can benefit from the quantitative evidence to improve operational management practices. The results of this study offer specific recommendations for enhancing resource management, promoting the adoption of new technologies, and resolving regional differences in order to create an environment that is more productive and successful for learning.
Keywords: operational management, education industry, Northern Malaysia

CHALLENGES IN DOCTORAL PROGRAMS IN PAKISTAN: INVESTIGATING QUALITY ASSURANCE ISSUES IN THE QUALITY MANAGEMENT PHD

Zohaib Hassan Sain
Superior University, Faculty of Business & Management Sciences
ORCID: 0000-0001-6567-5963

Abstract
This research thoroughly explores the complex challenges associated with doctoral programs in Pakistan, specifically focusing on the Quality Management PhD program. The primary goal is to critically analyze the contributing factors to these challenges, placing a significant emphasis on quality assurance. Identified challenges include a lack of qualified faculty, inadequately equipped laboratories, insufficient financial support, research obstacles, limited supervisory perspectives, absence of international faculty, an overemphasis on theory, limited internet accessibility, constrained global collaboration, and a misalignment with national priorities. Utilizing a methodological blend, the study employed structured questionnaires to gather quantitative insights from participants in various universities offering Quality Management PhD programs. Simultaneously, in-depth interviews with administrators, faculty, and candidates provided qualitative nuances, offering a comprehensive understanding of challenges and potential solutions. Survey results emphasized a unanimous consensus, underscoring the urgent need to address the myriad challenges facing PhD programs. The study advocates for comprehensive reforms to enhance the quality and effectiveness of doctoral education in Pakistan.
Keywords: PhD Degree Programmes, QM, Supervisors.

CHATGPT FOR POSITIVE IMPACT? EXAMINING THE OPPORTUNITIES AND CHALLENGES OF LARGE LANGUAGE MODELS IN EDUCATION

Zohaib Hassan Sain
Superior University, Faculty of Business & Management Sciences
ORCID: 0000-0001-6567-5963

Abstract
A researcher argues that large language models are critical to the advancement of artificial intelligence and will play a vital role in future progress. Despite criticism and occasional bans, these models are persistent and poised to continue. This analysis delves into the potential benefits and challenges of utilising extensive language models in education, considering perspectives from both students and educators. These models' current status and applications are briefly reviewed, emphasising their use in generating educational material, increasing student engagement, and personalising learning experiences. The discussed challenges include the need for educators and students to develop skills and literacies to understand and navigate the technology and its limitations. Employing a strategic and pedagogical approach that stresses critical thinking and fact-checking is a crucial component of effectively integrating these models into educational institutions. AI applications in education often encounter additional challenges, including potential biases, the necessity for ongoing human oversight, and the risks of misuse. However, these challenges may present educational opportunities for students to become familiar with social biases, complexities, and risks associated with AI. The essay presents solutions for effectively addressing these challenges to ensure the responsible and ethical use of large language models in education.
Keywords: AI Applications, Challenges, Education, Ethical Use, Large Language Models.

HUMAN-CENTRICITY AS A KEY PRINCIPLE FOR USING AI SAFELY

Dr. Asist. Prof. Tetiana BURLAY
Institute for Economics and Forecasting of the NAS of Ukraine, Department of Economic Theory
ORCID: 0000-0003-4530-9151

ABSTRACT
As the article emphasizes, the rapid dissemination of artificial intelligence (AI) models, technologies and systems provides significant advantages for the economic competitiveness and efficiency of modern business models, on the one hand, and generates significant risks of a social, humanitarian and security nature, on the other. The purpose of the research is to reveal the substance and key aspects of the human-centric approach in the field of AI. Achieving the purpose involves the use of systematic, logical-historical and statistical analysis methodology, and also the analysis of social dynamics. The main research objectives are related to clarifying the role of AI in global economic dynamics, substantiating the relevance of a human-oriented approach to the creation, implementation and dissemination of AI technologies and systems, as well as highlighting the social and institutional consequences of their application on the basis of human-centeredness. The author substantiates that the introduction of a human-centric approach contributes to the strengthening of interpersonal trust and human trust in the results of AI using. The article also proves that adherence to the human-centeredness principles in relation to artificial intelligence is a positive factor for accelerating social progress and reducing conflict potential in society, which is fundamentally important for post-conflict countries and countries affected by military conflicts, such as Ukraine.
Keywords: Artificial Intelligence, Human Centric Approach, Human Rights and Fundamental Freedoms, Social Progress, Ecosystem of Trust.

MECHANISMS OF DIGITALIZATION'S IMPACT ON ECONOMICDEVELOPMENT

Professor Volodymyr Mishchenko
Doctor of Economics, Institute for Economics and Forecasting of the NAS of Ukraine

Ievgen Tishchenko
Postdoctoral Fellow, Private Higher Education Institution "European University"

ABSTRACT
The widespread digital transformation has become a general global trend in the development of the economy and society. Permeating and qualitatively improving almost all socio-economic processes, it is an important factor in building a dynamic, stable and growing economy, as well as an important condition for solving social problems.
Digitalization has driven technological progress and innovation, facilitated the globalization of world markets, and enabled the automation and optimization of most business processes. This has led to the emergence of new business models, competitive segments, and market strategies. It has also influenced consumer behavior and companies' customer service approaches, improved management decision-making processes, and increased the transparency of information in society.
However, alongside its positive impacts, digitalization has introduced new challenges and threats, such as increased economic and digital inequality, the need for reliable data protection, and heightened cybersecurity requirements. Therefore, a critical task for economic science is to establish the methodological foundations for developing mechanisms that harness digitalization to foster economic growth, promoting digital technologies and the IT industry.
The authors have classified the types of economic mechanisms, defined the tasks, key principles, methods and tools for the formation and use of the mechanism of influence of digitalization on the economy. It has been proven that the implementation of a systemic approach to the development of the mechanism of influence of digitalization requires the combination and effective structuring of various types of economic mechanisms. A system of indicators is proposed to assess the effectiveness of the functioning of the mechanism of the impact of digitalization on ensuring economic development. The developed recommendations will contribute to the improvement of the institutional components of this mechanism and increase the effectiveness of the implementation of state policy measures in the field of digital transformation and support for the development of the IT sector.
Keywords: digital technologies, mechanism, rooted development, stimulation, security, efficiency.

INTRODUCTION
The digitalization of the economy has become a catalyst for accelerating economic, social, and political processes, emerging as one of the most influential drivers of economic growth. Leveraging digital technologies is crucial for building a dynamic and sustainable national economy. By automating and intellectualizing production, optimizing business processes, creating new business models, organizing enterprise activities and management methods, and developing new market segments, products, services, and jobs, digitalization enhances opportunities for effective business and social development, rooted in stability to achieve national and public interests.

A significant outcome of digitalization is the improvement of the state management system, which enhances the quality of management decisions, ensures timely responses to socially significant challenges, strengthens communication with businesses and citizens, and improves economic relations. Additionally, it supports the development of the information society, thereby increasing the overall national economic competitiveness.

From the perspective of the economy's real needs, the most promising digital developments are in green, climate, and renewable energy sectors, mobile transport, digitization of banking and financial activities, space technologies, cybersecurity, quantum computing, development of new medicines, generative artificial intelligence, and Web 3.0 technologies.

However, the use of digital technologies also brings significant digital risks and cyber threats, potentially causing material and moral damages. Issues such as unequal access to digital technologies, market power concentration among a few tech companies, potential state control, and the need for enhanced protection of personal data and digital assets, cybersecurity, and reducing unauthorized access risks may arise.

The scale, complexity, and inconsistency of digitalization processes, coupled with their growing impact on economic development, highlight the need for effective motivational and organizational-management mechanisms. These mechanisms are essential to maximize the benefits of digital technologies while mitigating their negative consequences.

MATERIALS AND METHOD

In the process of research, the authors used general scientific and specific methods of cognition. In particular, the logical-historical method and the method of comparative analysis were used to analyse the directions of digitalization's impact on economic and social processes; the theoretical generalization method and the structural-functional method were used to determine the goals, objectives and key principles of the formation and functioning of the mechanism; the grouping method was used to classify the types of economic mechanisms; methods of formalization, analysis and synthesis were used to substantiate the system of indicators for evaluating the effectiveness of the mechanism; the method of expert assessment was used to determine the potential and prospects of using the mechanism of influence of digitalization on the reconstruction of the economy of Ukraine, and the method of logical generalization was used to formulate conclusions and develop recommendations.

RESULTS AND DISCUSSION

On the basis of existing approaches to the interpretation and classification of certain types of economic mechanisms, the mechanism of the influence of digitalization on ensuring economic development can be defined as an organizational, economic and management system that unites a set of policies (innovation, investment, budget, tax, credit, export-import, social), strategies (concepts, plans, road maps), methods, tools and processes that are used to stimulate and support the implementation of digital technologies in the economy, social sphere and the public administration system with the aim of increasing the efficiency and competitiveness of the national economy and improving the welfare of citizens (Berg et al., 2023).

Functionally, this mechanism is a motivational and legal system that facilitates the interaction between the state, market participants, and citizens to address tasks related to the design, implementation, and use of modern digital technologies. Its aim is to enhance the efficiency of economic processes, strengthen economic security, and support sustainable development through the integration of digital technologies (Naumenkova & Mishchenko, 2024, p. 296).

The purpose of creating and operating the mechanism for digitalization's impact on economic development is to develop and implement a system of comprehensive strategic decisions in digital transformations. This aims to ensure interdepartmental interaction and coordination among the subjects, objects, and components of the mechanism itself by adopting necessary economic, financial, technological, and management solutions. These solutions are geared towards the effective development of the IT sector and the ethical, reliable, and safe use of modern digital technologies for the benefit of the national economy and society.

The main tasks of this mechanism include developing a system of legislative and regulatory provisions, measures, and incentives designed to promote growth in production and capital structure, increase labor productivity and production efficiency, ensure macroeconomic and macro-financial stability, and foster sustainable development. It also aims to strengthen social communications through modern digital technologies, protect citizens' rights and interests, and ensure an appropriate level of cybersecurity (Hamilton, 2024; Mishchenko et al., 2021, p. 198).

The mechanism for digitalization's impact on economic development sustainability is created by organically combining various types of economic mechanisms and their components into a unified, independent system. This system is institutionally, organizationally, and functionally structured according to the state policy in digital transformation, digital technology use, and IT sector development. It is developed and utilized by various economic actors and objects, including public authorities, the private sector, academic institutions, the public, and stakeholders.

Today, in Ukraine, a comprehensive mechanism of state influence on digital transformation processes, which would effectively support economic development, has not yet been formed, and there are only scattered components of it. The creation of such a mechanism is hindered by: macroeconomic and political instability; the backwardness of domestic science in the field of development of digital technologies; lack of systemic support for the development of the IT sector and information and communication technologies on the part of the state; high level of cyber risks; lack of qualified specialists in the IT sector and others.

The main political, institutional, economic, financial, organizational, managerial, resource, regulatory, and informational components of the mechanism of influence of digitalization on ensuring the stability and security of economic development should be:

1) state strategy and policy in the field of IT sector development and implementation and use of digital technologies;
2) international and national rules, norms and standards of design, implementation and use of digital technologies;
3) legislative and regulatory acts regulating the use of digital technologies;
4) state and market institutions whose powers include regulation, management, control and supervision of the implementation and use of digital technologies;
5) a system of economic and financial levers for stimulating and supporting the introduction and use of digital technologies;
6) national digital infrastructure (cloud services, blockchain, etc.);
7) a system of organizing the ethical, equal, effective and safe use of digital technologies;
8) information provision of the digital transformation process based on the integrated development of communication networks, software, computing capacities and the formation of the necessary databases and data flows;
9) systems of cyber protection and digital security (Bozhkova & Halytsia, 2022, p. 9; Ivanova, 2022, p. 59).

All components of the digitalization influence mechanism on the economy and social life are interdependent and actively interact with each other. This allows all parties to respond promptly and effectively to changes in the digital environment, ensuring stability and security in economic development. It also enables the full utilization of digital transformation benefits while mitigating the negative impacts of cyber threats and risks (Grytsenko, 2021, p. 158).

Practically, the formation and functioning of the digitalization influence mechanism rely on a combination of principles, methods, and rules of state and market regulation regarding the development, implementation, and use of digital technologies and IT sector activities, based on specific methodological principles and approaches.

We believe the key principles for forming and operating the digitalization influence mechanism to ensure national stability and security in economic development should include: systematicity, comprehensiveness, target orientation, standardization, proportionality, balance, flexibility, manageability, efficiency, social orientation, and integration into the global digital economy while maintaining the country's digital sovereignty.

In practice, the mechanism's operation involves using a set of economic and administrative methods and tools to ensure effective interaction among its components and achieve the desired goals (Mishchenko & Naumenkova, 2024, p. 52).

The primary methods for forming the digitalization influence mechanism to ensure national stability and security in economic development include: planning, modeling, standardization, management, regulation, licensing, incentives, administration, protectionism, and others. These methods can be combined and complemented as needed to achieve synergistic effects, depending on specific tasks.

The tools that determine and provide specific aspects of the functioning of the digitalization influence mechanism, in accordance with the context of the tasks to be solved, include:

- economic: distribution of resources, regulations, procurement, support of export-import operations, granting of permits, licenses, conclusion of agreements on product distribution, data exchange, including cross-border, etc.;
- financial: forms of financing and lending, tax and investment incentives, customs levers, grants, vouchers, subsidies and others;
- regulatory: legislative and regulatory acts, standards, innovative policies that regulate the implementation and use of digital technologies, data protection, issues of cyber security organization, etc.;
– management: forms of interaction of individual subjects and elements of the mechanism, advanced methods and practices of managing digitization processes;
– organizational: organizational and management structures, operational management, interaction with other subjects and stakeholders;
– technological: software, Big Data, artificial intelligence, machine learning, blockchain, cloud technologies, Internet of Things, open data portals and others;
- social: forms of cooperation, partnerships, communication networks, communities that facilitate the exchange of knowledge, experience and skills in the field of digital technologies (Barykin et al., 2021, p. 623).

A crucial aspect of forming and utilizing the digitalization influence mechanism to ensure national stability and security in development is the complementary and effective combination of state and market management and stimulation methods and tools. These should interact and complement each other effectively. This is particularly important for voluntary compliance by developers and enterprises with ethical principles in implementing digital technologies, especially artificial intelligence.

It also involves introducing market self-regulation using competition tools, pricing, and the functioning of decentralized digital platforms (e.g., Web 3.0, DeFi, blockchain, etc.).
The assessment of the results of the practical use of this mechanism based on the use of a system of indicators and indicators covering a wide range of potential results of the process of digitization of the economy and social sphere is important for characterizing the impact of digitization on economic and social processes - the economic, social, organizational and managerial efficiency of the functioning of the mechanism of influence digitization to ensure economic development and allow a comprehensive assessment of the effectiveness of state policy measures in the field of digital transformation and support for the development of the IT sector (Ochilov, 2023, p. 34).

CONCLUSION

Digitization of the economy is an important factor in accelerating the pace of development and increasing the level of stability and security of the national economy. An important role in the implementation of these tasks is played by the economic mechanism, the formation and use of which is based on the use of a system of political, economic, financial, technological, organizational, managerial and regulatory measures in the field of implementation of digital technologies and development of the IT sector.
The improvement of the institutional components of the mechanism of influence of digitization should provide for the determination of priorities for state regulation of digital transformation processes, the formation of an appropriate legal framework and an effective national digital infrastructure, the introduction of effective tools and methods of regulation of the IT sphere, the use of digital technologies, ensuring the protection of data and assets, the training of qualified specialists in the field of digital technologies, cooperation of the state with the private sector in order to promote the implementation and use of modern digital technologies.
Prospects for further research consist in clarifying the main directions of the impact of digitalization on economic development and their quantitative and qualitative assessment.

REFERENCES

Barykin, S., Kapustina, I., Kalinina, O., Kozlova, N., Ivanova, E., Borodina, K., Yadykin, V. (2021). Digital Logistics Approach to Energy Service Socio-economic Mechanisms. *Transportation Research Procedia*, 54, 617–627. DOI: https://doi.org/10.1016/j.trpro.2021.02.114

Berg A., Papageorgiou C., Vaziri M. (2023). Some workers will win, others will lose as the use of artificial intelligence grows. F&D. Available at: https://www.imf.org/en/Publications/fandd/issues/2023/12/Technology-bifurcated-bite-Berg-Papageorgiou-Vaziri?utm_medium=email&utm_source=govdelivery

Bozhkova, V., Halytsia, I. (2022). Mechanisms to ensure the development of the economy of the future in the context of global change. *Futurity Economics&Law*, 2 (2), 4–13. DOI: https://doi.org/10.57125/FEL.2022.06.25.01

Deaton, A. (2010). Understanding the Mechanisms of Economic Development. *Journal of Economic Perspectives*, 24 (3), 3–16. DOI: https://pubs.aeaweb.org/doi/pdfplus/10.1257/jep.24.3.3

Grytsenko, A. A. (2021). (Ed.). Complementarity of information-digital and socio-economic transformations as a condition for stable development of society. Kyiv, SO "Institute for Economics and Forecasting of the NAS of Ukraine". ISBN 978-966-02-9574-2 [in Ukrainian]

Hamilton, A. (2024). UK Tech: A forward look to 2024. Blog. Available at: https://dealroom.co/blog/uk-tech-a-forward-look-to-2024

Ivanova, D. (2022). Key Factors of Innovative Development and their Impact on eu Transformations to Sustainable Economy. *The EUrASEANs: Journal on Global Socio-Economic Dynamics*, 6 (37), 53–63. DOI: https://doi.org/10.35678/2539-5645.6(37).2022.53-63

Lipieta, A., Lipieta, A. (2023). The Role of Destructive Mechanisms within Economic Evolution. *PANOECONOMICUS*, 70 (2), 279–301. DOI: https://doi.org/10.2298/PAN190729008L

Mishchenko, S., Naumenkova, S., Mishchenko, V., Dorofeiev, D. (2021). Innovation risk management in financial institutions. *Investment Management and Financial Innovations*, 18 (1), 190–202. DOI: http://dx.doi.org/10.21511/imfi.18(1).2021.16

Mishchenko, V., Naumenkova, S. (2024). Mechanisms of state support for the use of artificial intelligence to ensure the sustainability of economic development. *Economy of Ukraine*, 67, (5), 30–56. DOI: https://doi.org/10.15407/econo myukr.2024.05.030 [in Ukrainian]

Naumenkova, S. V., Mishchenko, S. V. (2024). Innovative Green Finance Tools for Ukraine]. *Economic space*, 189, 291–299. DOI: https://doi.org/10.32782/2224-6282/189-51 [in Ukrainian]

Ochilov, I. S. (2023). Analysis of Foreign Experiences of Evaluating the Efficiency of Organizational and Economic Mechanisms of Agroclusters. *Frontline Journals,* 3 (11), 28–40. DOI: https://doi.org/10.37547/marketing-fmmej-03-11-05

DEPLOYMENT OF LOCAL-GLOBAL CYCLES IN THE CAPITALIST WORLD-SYSTEM

Dr. Asist. Prof. Vasylyna PODLIESNA
Institute for Economics and Forecasting of the NAS of Ukraine, Department of Economic Theory
ORCID: 0000-0002-8435-1013

ABSTRACT
The leading role in the cyclical dynamics of the capitalist World-System is played by global cycles, specifically long cycles of world politics, hegemonic cycles, systemic cycles of capital accumulation and Kondratieff cycles. In the process of their development, a cyclical change of the global geopolitical system's leader occurs. The course of global cycles, especially their crisis-militaristic phases, occurring in the form of world wars, is strongly influenced by local-global cycles of either countries playing the role of world hegemon, or countries claiming this role, or countries that are strategically important from the point of view of localizing military methods of resolving geopolitical contradictions. Local-global cycles in the 19th–20th centuries unfolded in the political-economic systems of Germany and Russia – countries that most vividly expressed the aggravation of contradictions in the world system. The article emphasizes that the unfolding of global cycles of the capitalist World-System in the near future largely depends on the local-global cycles of the USA: the foreign policy cycles of F. Klinberg and the internal institutional cycles. According to the theory of G. Friedman, the internal institutional cycles of the USA, the rhythm of which is set by wars – the War of Independence, the Civil War, the Second World War – last 80 years. The USA status as the capitalist World-System's leader after the Second World War increased the influence of their institutional cycle on the World-System. The research author substantiates that in Ukraine, which has become a space for localizing the resolution of deep geopolitical contradictions by military means, a special three-phase form of political cycles has developed. As the study proves, the historical retrospective of Ukrainian political cycles is a process of forming the grounds for including this country in the global military-economic cycle as a space for localizing the resolution of geopolitical contradictions.
Keywords: local-global cycles, crisis-militaristic phases, capitalist World-System, global hegemony, war in Ukraine.

INTRODUCTION
Currently, a period of deep, painful, systemic transformations begins in the cyclical process of the capitalist World–System development. The cyclical dynamics of the World–System is formed by the unity of the diversity of global cycles, among which the leading role is played by Kondratieff cycles, long cycles of world politics, cycles of hegemony, and systemic cycles of capital accumulation. The dynamics of these cycles are influenced by local-global cycles inherent in the political and economic systems of countries that perform at certain historical stages one of the following functions: leader (world hegemon); contender for the role of the World–System leader; localization space for resolving geopolitical contradictions. At this moment, the local-global cycles of the USA are the cycles of the world-system leader; Germany's are the cycles of a regional leader, formerly a contender for the role of world leader; Russia and Ukraine's are the cycles of the space for localizing militaristic methods of resolving aggravated geopolitical contradictions.

This research outcomes are becoming increasingly relevant under the current conditions of the beginning of the crisis-militaristic stage of the World–System' cyclical development.

MATERIALS AND METHODS

The research uses general scientific methods of cognition, which are used on the basis of a method specific to each science. The basic for this study are logical and historical methods, as well as dialectical ascent from the abstract to the concrete, including general scientific methods of analysis and synthesis, induction and deduction. Considering that cyclical processes have such attributes as structuredness, complexity and dynamism, the author also applied structural-functional and dynamic methods of scientific cognition.

RESULTS AND DISCUSSION

The outbreak of the First and Second World Wars was determined by a special local-global form of the military-economic cycle, consisting of the following phases: (1) war, (2) post-war reforms of the political-economic system, (3) socio-political transformations of a turning point, often perturbative nature. Such local-global cycles in the 19th-20th centuries unfolded in the political-economic systems of Russia (Table 1) and Germany (Table 2) – countries that most vividly expressed the aggravation of contradictions in the world system and claimed an increase in their role in the global geopolitical system.

In Russia and the USSR, the sequence of events forming the local-global military-economic cycle is presented as follows (Table1).

The Crimean War and World War I revealed the technological and socio-economic backwardness of the emerging capitalist economy in Russia and led to the introduction of liberal reforms that were only partially successful. On the contrary, the results of the Second World War testify to the ability of the planned economy to be effective in emergency conditions, requiring a high degree of mobilization of all kinds of resources, its competitiveness in the scientific and technological sphere.

At the same time, it is undeniable that the totalitarian nature of the transformation processes of the 1930s-1950s, on the one hand, allowed, in a short time, to overcome the technological lag of the planned economy from the leading capitalist countries, on the other hand, caused structural disproportions in the economy and in societal life, which later contributed to the collapse of the planned economy.

Table 1: **Military-economic cycles of the socio-economic system of Russia and the USSR**

War	**The ensuing reforms**	**The ensuing socio-political transformations**
The Crimean War 1853-1856	Peasant reform of 1861, zemstvo, judicial and military reforms of 1860-1870s. The reforms of Witte-Stolypin: from 1897 to 1910.	Revolution 1905–1907, Revolution 1917
The First World War 1914-1918	Military communism from 1918, NEP since 1921, Industrialization, collectivization during the first five-year plan of 1928-1932	The formation of a totalitarian state
The Second World War 1939-1945	The continuation of industrialization. Khrushchev-Kosygin reforms: from 1953 to 1970	The building of "Developed Socialism" under a totalitarian system
The war in Afghanistan 1979-1989	Gorbachev's reforms since 1985	The dissolution of the Soviet Union in 1991

Source: compiled by the author

Under conditions of excessive strain of forces and exploitation of human resources, it was possible in a short period of time to move from an agrarian-industrial economy to a highly developed industrial planned economy that set the tone in energy, military, and space technologies. The formation of the planned economy was based on the restoration of the industrial heritage of the Russian capitalist economy and the forced creation of new industrial facilities in the conditions of post-war devastation and the deepest institutional ruptures.

The Cold War initially became a factor that accelerated the scientific and technological development of the USSR under the conditions of a planned economy, which later failed to cope with internal political and economic contradictions, largely caused by the arms race. The results of the war in Afghanistan testify to the catastrophic decline in the effectiveness of the planned economy and the imperfection of the socio-economic reforms taking place in it in the second half of the XX century (Podliesna, 2024).

Germany played a special role in the cyclical dynamics of the capitalist world-system in the XIX-XX centuries (Table 2), which was largely predetermined by its geopolitical position. According to H. Mackinder, the author of the "Heartland" theory, Germany occupies a central strategic position in Europe (Mackinder, 1904).

The internal political and socio-economic processes that took place in Germany during this historical period became one of the most important prerequisites for the deployment of large-scale wars, the results of which determined for quite a long time the balance of power in the world geopolitical space and affected the economic situation on a global scale.

Table 2: **Germany's military and economic cycles**

War	**The ensuing reforms**	**The ensuing socio-political transformations**
Franco-Prussian War (1870-1871)	until 1878 – policy of free-trade under conditions of centralization of power by the monarch since 1879 – economic policy of protectionism, monopolization, militarization	1918 – socialist revolution, establishment of the Weimar Republic
World War I (1914-1918)	since 1924 – economic stabilization and recovery thanks to the Dawes Plan, since 1933 – economic policy of fascism: militarization of the economy, four-year economic planning, centralized economic management, forced syndication, growth of the public sector.	1945 – the state collapse
World War II (1939-1945)	late 1940s – L. Erhard's reforms combining liberalization with the construction of a welfare state; since 1980s – neoconservative turn in economic policy	1990 – German reunification

Source: compiled by the author

Germany emerged as a Challenger (a contender for the role of global leader) during the fifth long cycle of world politics of the capitalist era, which began in 1850. But in the "macro decision" phase (1914-1945) of this cycle Germany was defeated (Modelski, 1995), as its political-economic system was unable to achieve the level of development necessary to become a global leader, as well as due to the presence of strong geopolitical competition from dynamically developing countries, particularly the United States. By the beginning of the XXI century Germany managed to take the place of a regional leader in the geopolitical system, but in the process of unfolding of the modern crisis of the capitalist world-system, in other words, since the end of 2008, the process of slow but inevitable decline of the German political-economic system began.

The unfolding of global cycles of the capitalist World-System in the near future largely depends on the local-global cycles of the modern World-System's hegemon – the USA. The socio-economic and political cycles of this superpower, in particular the foreign policy cycles of F. Klinberg, as well as the institutional and socio-economic cycles identified by J. Friedman, influence the unfolding of global geopolitical processes. Klinberg cycles consist of an "extraversion" phase - the willingness to use direct diplomatic, military, or economic pressure on other nations to achieve American goals - and an "introversion" phase - a focus on the internal problems of American society. The average duration of the introverted phase of such a foreign policy cycle is 21 years, while the extroverted phase lasts 27 years (Schlesinger, 1986). Taking into account the average duration of the extraversion phase (27 years), the 1980s and early 2010s are a period of increased US foreign policy activity.

""Extroverted" phases of F. Klinberg mainly correspond to the upward waves of Kondratiev cycles, while "introverted" phases fall mainly on the downward waves of Kondratiev cycles" (Akaev, Pantin, 2012). The coordination of the chronology of the deployment of phases of Klinberg's foreign policy cycles with the chronology of the deployment of waves of Kondratiev cycles indicates that there is a connection between changes in the economic environment and changes in the nature of U.S. foreign policy (Table 3).

Quite strict chronological correspondence of the extroverted phases of the US foreign policy cycles to the upward waves of the Kondratiev cycles, and of the introverted phases to the downward waves was observed from the 1840s to the early 2010s; this historical period saw the unfolding of the 2nd, 3rd, 4th Kondratiev cycles and the completion of the transition from the upward wave to the downward wave of the 5th Kondratiev cycle.

According to the logic and chronology of the deployment of Klinberg cycles, in the early 2010s the extroverted phase of the foreign policy cycle should have been replaced by an intraverted one, lasting about 21 years, but already in the early 2020s the U.S. foreign policy became more active in the context of using not only "soft power" but also participation in hybrid wars and influence on the unleashing of local-global conflicts.

Table 3: **Kondratiev cycles and cyclicality of U.S. foreign policy**

Kondratiev cycle	**The nature of the Kondratiev cycle wave**	**Time period of the Kondratiev cycle wave**	**The nature of the phase of the U.S. foreign policy cycle**	**Time period of the phase of the U.S. foreign policy cycle**
I	Upward	from the late 1780 until 1810 to 1817	introverted	1776 – 1798
			extroverted	1798 – 1824
	Downward	from 1810-1817 until 1844-1851	introverted	1824 – 1844
II	Upward	from 1844–1855 until 1870–1875	*extroverted*	**1844 – 1871**
	Downward	from 1870–1875 until 1890–1896	introverted	1871 – 1891
III	Upward	from 1891–1896 until 1914–1920	*extroverted*	**1891 – 1918**
	Downward	from 1914–1920 until the mid-1940s	introverted	1918 –1940
IV	Upward	from the mid-1940s to the late 1960s	*extroverted*	**1940-1960s**
	Downward	from the late 1960s to the early 1980s	introverted	1960s – 1983
V	Upward	from the early 1980s to the early 2000s	*extroverted*	**1983 - early 2010s.**
	Downward	from the early 2000s to the late 2010s		

Source: compiled by the author on the basis of: Kondratieff, N. (1926). Die langen Wellen der Konjunktur. Archiv für Sozialwis senschaft und Sozialpolitik, 3, 573–609; Schlesinger, A. (1986). The Cycles of American History. Houghton Mifflin. 498 p.

This transformation of the Klingberg cycle corresponds to the rhythm of unfolding of the current long cycle of world politics, namely the approaching phase of "macro decision", in other words, global war, the ideological justification for which is already being actively formed in the course of information warfare.

The internal institutional cycles of the USA, the rhythm of which is set by wars – the War of Independence, the Civil War, the Second World War – last 80 years (Friedman, 2021). The first institutional cycle began when the Constitution was drafted in 1787, was triggered by the War of Independence and its aftermath, and lasted 78 years – until the end of the Civil War and the amendment of the Constitution in 1865, which created a federal government whose relationship with the states was not fully clarified. The second institutional cycle began in 1865 as a result of the Civil War, lasted until the end of World War II, and resulted in the consolidation of the federal government's authority over the states. The third institutional cycle began in 1945, arising out of World War II; in the process of its unfolding, the power of the federal government expanded significantly and extended not only to the states, but also to the economy and society as a whole (Friedman, 2021).

The USA status as the capitalist World-System's leader after the Second World War increased the influence of their institutional cycle on the World-System. Based on the chronology of the unfolding of this local-global cycle, large-scale transformations are coming in the World-System already after 2025.

kraine has a special form of political cycle consisting of three phases: 1) political crisis; 2) presidential elections that violate the legally defined chronology of the electoral process; 3) a relatively stable electoral process that includes the next presidential election (Table 4).

Table 4: **Medium-term political cycle in Ukraine**

Cycle phase	**Time period**
First cycle	
Political crisis	1993–1994
Presidential elections that violate the legally defined chronology of the electoral process	1994
Sustainable electoral process, including regular presidential elections	1995–2003
Second cycle	
Political crisis	2003-2004
Presidential elections that violate the legally defined chronology of the electoral process	2004
Sustainable electoral process, including regular presidential elections	2005–2013
Third cycle	
Political crisis	2013–2014
Presidential elections that violate the legally defined chronology of the electoral process	2014
Sustainable electoral process, including regular presidential elections	2015-2024
Fourth cycle	
Political crisis	2023-2024

Source: compiled by the author

Since 1993, Ukraine has experienced three political cycles with an average duration of 11 years; the fourth political cycle began in 2023–2024.
The cyclo-forming phase of such a cycle is a political crisis, the socio-economic grounds of which are the aggravation of economic contradictions of political-economic elites, increasing dissatisfaction of the population with the pace and quality of socio-economic transformations, and the political grounds are the competition of elites and the influence of the international political conjuncture.
The historical retrospective of Ukrainian political cycles is a process of forming the grounds for including this country in the global military-economic cycle as a space for localizing the resolution of geopolitical contradictions (Podliesna, 2024).

CONCLUSION

The current extremely unstable state of the world capitalist system indicates that a period of great transformations is beginning in the cyclical process of its development. In 2020-2050s in the development of the capitalist world-system there will be a sharp increase in the amplitude of its cyclical fluctuations, which is due to the coincidence of the crisis-militaristic phases of such global cycles: 6th Kondratiev cycle (upward wave), new systemic cycle of capital accumulation (material phase), modern long cycle of world politics (phase "macro decision"), modern "cycle of hegemony" (period of thirty-year world wars).

The crisis-militaristic phase of the military-economic cycle should be understood as a phase of manifestation of extreme aggravation of contradictions in the system of interactions of certain competing societal organisms, which leads to a military-political conflict, the outcome of which determines the balance of power in a particular regional or global geopolitical system and creates the basis for overcoming the systemic crisis.

The most dynamic and generating many threats to civilizational development are the crisis-militaristic phases of global military-economic cycles. Global capitalism today is immersed in the deepest systemic crisis; the capitalist world-system is close to the bifurcation point. The leading role in these processes is played by the current local-global conflict in Ukraine and the Israeli-Palestinian conflict that is once again flaring up - the spaces of localization of the resolution of deep civilizational, geo-economic and geopolitical contradictions.

At the bifurcation point, any event, even a seemingly insignificant one, can lead to a radical transformation of civilizational development in the near future. Based on modern technical-technological and political-economic assumptions, the most probable forms of future civilizational development should be recognized as:

1) overcoming the global economic and geopolitical crises through militarization of the economy, primarily through the application of military Keynesianism tools by the core countries of the capitalist world-system and the most developed countries of its semi-periphery, and as a consequence - the transition to information-network capitalism;
2) establishment of global neo-feudalism;
3) transition from global capitalism to a hybrid form of global society consisting of elements of capitalism, totalitarianism and feudalism.

REFERENCES

1. Akaev, A.A., Pantin, V.I. (2012). Forecast of geopolitical shifts and major threats to stability in the world. *Geopolitics and security*, 2 (18), 28-40.

2. Friedman, G. (2021). The Storm Before the Calm: America's Discord, the Coming Crisis of the 2020s, and the Triumph Beyond. Anchor. ISBN10: 1101911786, ISBN13: 9781101911785

3. Kondratieff, N. (1926). Die langen Wellen der Konjunktur. *Archiv für Sozialwis senschaft und Sozialpolitik*, 56 (3), 573–609.

4. Mackinder, H. (1904). The Geographical Pivot of History. *The Geographical Journal,* 23(4), 421–437. https://doi.org/10.2307/1775498

5. Modelski, G. (1995). The Evolution of Global Politics. *Journal of World-Systems Research*, 1.(7), 424-467. https://doi.org/10.5195/jwsr.1995.38

6. Podliesna, V. (2024). The Actualization of Military-Economic Cycles in the Process of Societal Development. LAP Lambert Academic Publishing. 120 p. ISBN-13: 978-620-7-47775-3. ISBN-10: 6207477758. EAN: 9786207477753

7. Schlesinger, A. (1986). The Cycles of American History. Houghton Mifflin. 498 p. ISBN 100395378877

ISSUES AND CHALLENGES IN OPERATION MANAGEMENTS: PERSPECTIVES FROM NORTHERN MALAYSIA FOOD & BEVERAGE INDUSTRY NICHE: VENTURING URBAN CAFE IN RURAL AREAS

Associate Professor Dr. Herman Shah Anuar
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

Jonathan Putra Bin Laum
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

Wan Arman Bin Wan Omar
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

ABSTRACT
The food and beverage (F&B) industry in Northern Malaysia is a significant contributor to the region's economy, characterized by a rich cultural heritage and diverse culinary offerings. However, the industry faces numerous issues and challenges in its operations management. Operating an urban café in rural areas presents unique challenges in supply chain management, human resources, customer base, marketing, technology, cultural adaptation, regulatory compliance, and cost management. This research explores these challenges and proposes strategies for sustainable success. Key strategies include local sourcing, community engagement, menu adaptation, effective training, targeted marketing, and technology investments. By addressing these areas, urban cafés can thrive in rural settings, contributing to local economies and offering valuable services to rural communities. This research provides a comprehensive analysis of the operational challenges faced by urban cafés in rural areas and offers practical strategies for overcoming these challenges. By implementing these strategies, café operators can achieve sustainable success, contributing to the local economy and providing valuable services to rural communities. The findings of this research are applicable not only to urban cafés but also to other businesses considering expansion into rural areas, offering valuable insights for successful rural operations.
Keywords: F&B industry, Northern Malaysia, Operational challenges, Urban café, Rural areas, Supply chain, Marketing, Sustainable success, Local sourcing, Community engagement

ESSENTIAL ADVANTAGES OF A SUSTAINABLE BLUE ECONOMY[1]

Radoslav BALTEZAREVIĆ
Senior Research Fellow, Institute of International Politics and Economics, Belgrade, Republic of Serbia
ORCID: 0000-0001-7162-3510

Ivana BALTEZAREVIĆ
Associate Professor, Megatrend University, Belgrade, Republic of Serbia
ORCID: 0000-0003-4605-1420

ABSTRACT
Being the seventh largest in the world, the blue economy is the cornerstone of our civilization's advancement. Because they facilitate key industries including trade, transportation, tourism, and fishing, oceans are essential to the global economy. The blue economy is predicted to have an annual worth of 1.5 billion dollars and to double over the next several years. Because the blue economy has the potential to alleviate poverty and promote sustainable development, stakeholders, lawmakers, and academics are becoming more and more interested in it. Nonetheless, the health of the oceans and wildlife in them is coming under more and more threat from factors including climate change, overfishing, habitat destruction, and global pollution. These issues have had detrimental effects that are becoming more noticeable, such as the loss of livelihoods, biodiversity, and cultural legacy. As a result, an increasing number of nations have put up financial and institutional proposals to incentivize private investment and allot public funds through budgetary measures in order to streamline the shift to a blue economy that is sustainable. International collaboration, as well as the adoption of sustainable fishing and water use practices and financial frameworks for conservation, have an impact on the development of the blue economy and marine fisheries industry. However, a number of factors, such as infrastructure, corruption, and political stability, affect how well the blue economy is implemented.
Keywords: Blue Economy, Oceans, Sustainable Development.

INTRODUCTION
It is difficult to support life on Earth without the oceans since they provide food, oxygen, and water to the biosphere. Oceans are rich resources for genetic pools, minerals, and, more recently, renewable energy. They also play a critical role in providing services for climate management. They are vital to the world economy because they support important sectors including trade, transportation, tourism, and fisheries (Statista, 2024). For thousands of years, the blue economy served as the foundation for the advancement of most of our civilisation. On the other hand, ocean resources are being rapidly depleted by present economic trends. As a result, a new wave of start-ups is starting to emerge to take on the enormous potential of the blue economy, particularly with regard to climate change mitigation and sustainable resource extraction, for great and regenerative blue growth (Dealroom, 2023). The oceans, which make up two thirds of the earth, are extremely important to the climate system.

[1] The paper presents findings of a study developed as a part of the research project “Serbia and challenges in international relations in 2024”, financed by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia, and conducted by Institute of International Politics and Economics, Belgrade during year 2024.

Roughly 90% of the additional energy brought on by fossil fuels and global warming has been absorbed by them. As a result, since 1900, the top 700 meters of the ocean have warmed by roughly 1.5°C. This is contributing to the ocean's rapid reduction in biodiversity, along with pollution and overfishing. Nearly 10% of marine species worldwide were determined to be in danger of going extinct in the most recent assessment, according to the International Union for Conservation of Nature (IUCN) (Dealroom, 2023).

Nine key industries are driving the growth of a blue economy, based on the interdependence and impact on coastal and marine areas: fisheries and aquaculture; ports, shipping, and marine transport; tourism, resorts, and coastal development; oil and gas; coastal manufacturing; seabed mining; renewable energy; marine biotechnology; marine technology; and environmental services (Pemsea, 2015). The ocean economy is the seventh largest in the world, with an estimated annual worth of $1.5 trillion. By 2030, it is predicted to have doubled to $3 trillion. An estimated $24 trillion is the total estimated worth of ocean assets, or natural capital. In comparison to their land area, small island states possess abundant ocean resources, which offers them a significant chance to enhance economic growth and address issues such as food insecurity, poverty, and unemployment. The depletion of marine resources, however, also poses the greatest threat to them (Thecommonwealth, 2024). Early discussion of the implications of a green economy for population growth must be promoted by the government (Baltezarević & Baltezarevic, 2015).

LITERATURE REVIEW

97% of the water resources on Earth are found in our oceans. From space, our planet appears blue due to this magnitude. Half of the oxygen required for life on Earth is found in the oceans and seas. Eighty percent of all life forms on Earth are found in our seas, which also supply food for over half of humanity and are vital for maintaining both physical and mental well-being. The blue economy is an intricate network of economic relationships including oceans. The worldwide blue economy of today has enormous economic power. Regardless of whether the operations are conducted on land, in the sea, or both, it encompasses all businesses and fields that are broadly related to oceans, seas, and coasts (Wasserdreinull, 2024).

The sustainable use of ocean resources for economic growth, better livelihoods, and ocean health is known as the "blue economy," also known as the "ocean or maritime economy." A variety of industries are included in the blue economy, including energy, tourism, shipping, aquaculture, fisheries, and marine biotechnology. It has drawn the attention of stakeholders, academics, and politicians because to its potential to support sustainable development and reduce poverty (Smith-Godfrey, 2016). The blue economy is facing contemporary issues that could jeopardize its viability and advantages. Threats to the health of oceans and their resources include pollution, overfishing, habitat destruction, and climate change. These issues have an impact on the environment and have social, economic, and livelihood implications as well, like the loss of cultural heritage, biodiversity, and livelihoods (Bari, 2017).

As a vital tactic for sustainable development, the blue economy has recently gained traction. One initiative that encourages the sustainable use of marine resources is the European Union's "blue growth" strategy. On the other hand, by utilizing marine resources, the African Union hopes to create jobs, secure food supplies, and sustainable economic growth through the implementation of the blue economy strategy (Henderson, 2019). In 2016, the OECD published a report estimating that the ocean economy boosted the world economy by approximately USD 1.5 trillion.

The report specifically emphasized how new industries like aquaculture, marine biotechnology, and offshore wind energy have the potential to boost employment and stimulate economic growth (Rigaud et al., 2018).

The continued human activities that contaminate water bodies are having an alarming detrimental impact on the health of the seas, notwithstanding the importance of the ocean economy. The amount and quality of fish products are being negatively impacted by a number of issues, such as careless waste disposal, plastics in the water, unsustainable fishing practices, uncontrolled coastal development, and climate change. The health of the oceans has significantly declined as a result of fishing beyond acceptable limits, untreated wastewater from land being dumped into bodies of water, and ongoing ecosystem degradation (Cohen et al., 2019). A number of nations have recently proposed various institutional and finance measures to encourage private capital and commit public resources through budgetary allocations in order to close this gap and facilitate the transition to sustainable blue economies (Tirrell, 2017).

With a variety of sectoral changes, the commitments that different nations have undertaken under SDG 14 seek to instill sustainable fishing practices. Throughout the whole fisheries value chain, there will be significant expenses associated with switching from current practices to more sustainable ones. Obtaining the necessary funding to make this shift possible is still a major obstacle. Although the industry already receives money from the public and commercial sectors as well as official development assistance, it is said that these sources are insufficient to promote sustainability (Bos et al., 2015).

Sustainable fishing is a prime illustration of an attempt within the blue economy. This strategy promotes ethical fishing, lessens bycatch, and supports the long-term health of marine ecosystems as opposed to overfishing fish stocks. Consequently, it helps coastal communities by guaranteeing a reliable and long-term source of revenue (de la Maza, 2024). The development of the blue economy and the marine fisheries industry is influenced by international collaboration, as is the adoption of sustainable fishing and water use practices and a financial structure for conservation (Sarker et al., 2018).

In the context of the 1992 Rio de Janeiro United Nations Conference on the Environment and Development, or ECO-92, the foundations for the future "blue economy" were established (Neumann et al., 2017). The significance of the blue economy has grown beyond the confines of Small Island Developing States and is now a topic of international concern. This has led to a heightened level of discussion among academics, policymakers, civil society, non-governmental organizations (NGOs), the commercial sector, and other stakeholders regarding the significance of the oceans and coastal environment for sustainable development (Voyer et al., 2021).

The degree to which global ocean economies can produce just and long-lasting advantages was investigated by Cisneros-Montemayor et al. in 2021. The study makes clear that the development of a blue economy depends not only on resource availability but also on social conditions and the capabilities of government. The fuzzy logic model was employed in the study to incorporate sustainable, viable, and equitable blue economy indicators. They discovered that the blue economy implementation outcome is influenced by various aspects, including infrastructure, corruption, and national stability. In order to accomplish the objectives of the blue economy, the report recommends that policymakers involve researchers and stakeholders in the promotion of evidence-based strategies (Cisneros-Montemayor et al., 2021).

Agarwala emphasized the necessity of technological advancement in the production of energy from the ocean. The study also made clear how important it is to conduct environmental impact assessments because related technologies have an effect on the environment's biological components. The report emphasized that in order to effectively harness the uncharted territories of marine renewable energy, international cooperation and public-private collaborations are essential (Agarwala, 2022). As a result of urbanization and population growth, ocean resources are becoming increasingly important. Modayil emphasized this point. The study emphasized the necessity of using the ocean to gather resources in order to survive and thrive, as well as the negative implications of climate change on aquaculture. According to the study, the blue economy is a force for growth and transformation in the economy (Modayil, 2019). Any issue that hinders a nation's growth and development must be taken into account in conjunction with the individuals who take part in all institutional procedures. Hiring competent employees is the only way to achieve sustainable economic growth (Baltezarević et al., 2010). We can better understand the blue economy and its significance when we look at it in this larger context. The blue economy is a crucial idea for nations with coastal regions since no nation wants to lose out on possible chances for prosperity. Sensing the significance of these issues, the Seychelles and the United Arab Emirates joined forces to host the Abu Dhabi Declaration summit in 2014, emphasizing the need to cope with and adapt to climate change, preserve the marine environment, and support blue economy systems (Sustainable development, 2014).

An inclusive and sustainable blue economy includes marine-based economic growth that promotes social justice and human well-being while preserving, restoring, and restoring ocean habitats and ecosystem services as needed. All three aspects of sustainability: economic, ecological, and social, should be considered. For example, a sustainable blue economy can play a major role in financing ecologically sustainable marine conservation measures, such the establishment and upkeep of marine protected areas (MPAs) or other successful area-based conservation measures (OECMs). These regions have the potential to support maritime tourism (economic sustainability), and creating jobs via their administration can support social sustainability (Meerwissen, 2024).

The Earth and its oceans are changing in ways that make sustainable resource extraction more difficult, and the environmental effects of this change may need more cautious resource extraction techniques. These are facts that sustainable blue economies must recognize. Science plays a key role in developing blue economies that are sustainable and lessen the risks to coastal communities and ecosystems. Scientific and technological advancements have made it possible for people to detect and identify ocean resources more effectively, as well as to use them, frequently excessively. The knowledge that is at hand must be applied sensibly and responsibly. In an ever-changing world, scientific knowledge is critical to the survival of blue economies; this is especially true given the ongoing changes brought about by human activity to the ocean and coastal regions (Iybssd2022, 2022). Reducing carbon emissions, rethinking waste management, and utilizing renewable resources are all aspects of green technologies that contribute to economic growth and lessen the adverse consequences of human activity on the environment (Baltezarević, 2024).

CONCLUSION

The utilization, conservation, and renewal of the marine environment are together referred to as the blue economy. Any economic activity that has a direct or indirect connection to the seas, oceans, or coastlines is included in the blue economy. By using sustainable methods, it tries to balance economic expansion with environmental preservation.

It is commonly characterized as the sustainable use of ocean resources for economic growth, better livelihoods, and jobs. A shift from unsustainable practices to a more responsible and comprehensive use of marine resources is required by the blue economy. This economy is made up of a number of industries, including as energy, tourism, shipping, aquaculture, fisheries, and marine biotechnology. These problems affect livelihoods, the social and economic spheres, and the environment. Despite the significance of the ocean economy, ongoing human activities that contaminate bodies of water have a frighteningly negative impact on marine health. Many issues, including irresponsible trash dumping, plastics in the water, unsustainable fishing practices, uncontrolled coastal expansion, and climate change, have a detrimental impact on the quantity and quality of fish products. The study unequivocally demonstrates that the growth of the blue economy is contingent upon social conditions, government competence, and resource availability. While international cooperation and public-private cooperation are necessary to develop a sustainable blue economy, policy makers must include researchers and stakeholders in order to realize the aims of the blue economy. Because they can promote social sustainability, job growth, and maritime tourism, coastal regions stand to gain the most from a sustainable blue economy.
In the modern world, scientific knowledge is crucial to the survival of blue economies because of the ongoing changes that human activity is creating to the seas and coastal regions. The idea of a blue economy has great potential, but in order to fully realize it, new funding sources and efficient application of sustainable financing techniques to problems pertaining to the ocean are needed. Funding for blue economy initiatives, which include resilience against climate change, scientific research, technological innovation, and the adoption of sustainable practices, must come from governments, international organizations, and the business sector.

REFERENCES

Agarwala, N. (2022). Powering India's Blue Economy through ocean energy. Australian Journal of Maritime & Ocean Affairs, 14(4), 270-296. https://doi.org/10.1080/18366503. 2021.1954494

Baltezarević, V., Paunković, J., Žikić, S. & Baltezarević, R. (2010). Uticaj komunikacije na održivi privredni razvoj, the Conference on Strategic Management, University of Belgrade-Faculty in Bor, May 30-June 1, 2010 Kladovo, Serbia. Proceedings, pp.749-755. ISBN 978-86-80987-77-4.

Baltezarević, R. & Baltezarevic, V. (2015). European union public sphere and green economy–media as a communication link, In: Toward green economy: opportunities and obstacles for Western Balkan countries, New York: Xlibris, pp. 238-254. ISBN 978-1-503532-946.

Baltezarević, R. (2024). Green innovations as a path towards a more sustainable global economy. 1. Bilsel International Korykos Scientific Researches And Innovation Congress, 27-28 January, 2024, Proceedings: Bisel Congress Book, (Ed. Dr. İlyas Erpay), Mersin -Türkiye: Astana Publications. pp. 348 – 354. ISBN: 978-625-6501-58-4.

Bari, A. (2017). Our Oceans and the Blue Economy: Opportunities and challenges. Procedia Engineering, 194, 5-11. https://doi.org/10.1016/j.proeng.2017.08.109

Bos, M., R. Pressey, and N. Stoeckl. (2015). Marine Conservation Finance: The Need for and Scope of an Emerging Field. Ocean and Coastal Management. https://doi.org/10.1016/j.ocecoaman.2015.06.021

Cisneros-Montemayor, A. M., Moreno-Báez, M., Reygondeau, G., Cheung, W. W., Crosman, K. M., González-Espinosa, P. C., & Ota, Y. (2021). Enabling conditions for an equitable and sustainable blue economy. Nature, 591(7850), 396-401. https://doi.org/10.1038/s41586-021-03327-3

Cohen, P., E. H. Allison, N. L. Andrew, J. Cinner, L. S. Evans, M. Fabinyi, L. R. Garces, S. J. Hall, C. C. Hicks, T. P. Hughes, S. Jentoft, et al. (2019). Securing a Just Space for Small-Scale Fisheries in the Blue Economy. Frontiers in Marine Science. 6 (March): 171. https://doi.org/10.3389/fmars.2019.00171

Dealroom (2023). Blue Economy. Retrieved from: https://dealroom.co/guides/blue-economy (Accessed: 24.07.2024.)

de la Maza, A. (2024). The Blue Economy: definition, opportunities and problems. Retrieved from: https://www.aninver.com/blog/the-blue-economy-definition-opportunities-and-problems (Accessed: 24.07.2024.)

Iybssd2022 (2022). How to develop a sustainable "Blue economy"? Retrieved from: https://www.iybssd2022.org/en/how-to-develop-a-sustainable-blue-economy-in-developing-countries/ (Accessed: 24.07.2024.)

Henderson, J. (2019). Oceans without history? Marine Cultural Heritage and the Sustainable Development Agenda. Sustainability, 11(18), 5080. https://doi.org/10.3390/su11185080

Meerwissen (2024). The Scope of Sustainable Blue Economy. Retrieved from: https://meerwissen.org/themes/sustainable-blue-economy/ (Accessed: 23.07.2024.)

Modayil, M. J. (2019). Blue economy- Outlook for India (1st ed., Vol. 1) [English]. Kerela University of Fisheries and Ocean Studies.

Neumann, B., Ott, K., & Kenchington, R. (2017). Strong sustainability in coastal areas: a conceptual interpretation of SDG 14. Sustainability Science, 12(6), 1019-1035. https://doi.org/10.1007/s11625-017-0472-y

Pemsea. (2015). Blue Economy for Business in East Asia: Towards an integrated understanding of Blue Economy. Partnerships in Environmental Management for the Seas of East Asia. Philippines: Quezon City.

Rigaud, K. K., de Sherbinin, A., Jones, B., Bergmann, J., Clement, V., Ober, K., Schewe, J., Adamo, S., McCusker, B., Heuser, S., & Midgley, A. (2018). Toward a Blue Economy. Open Knowledge Repository. Retrieved from: https://openknowledge.worldbank.org/handle/10986/29461 (Accessed: 25.07.2024.)

Sarker, S., M. A. H. Bhuyan, M. M. Rahman, M. A. Islam, M. S. Hossain, S. C. Basak, and M. M. Islam. (2018). From Science to Action: Exploring the Potentials of Blue Economy for Enhancing Economic Sustainability in Bangladesh. Ocean and Coastal Management. 157. https://doi.org/10.1016/j.ocecoaman.2018.03.001

Smith-Godfrey, S. (2016). Defining the blue economy. Maritime Affairs: Journal of the National Maritime Foundation of India, 12(1), 58-64. https://doi.org/10.1080/09733159.2016.1175131

Statista (2024). State of the oceans 2024. Retrieved from: https://www.statista.com/study/116778/state-of-the-oceans/ (Accessed: 24.07.2024.)

Sustainable development (2014). Small Island Developing States. Retrieved from: https://sustainabledevelopment.un.org/content/dsd/dsd_aofw_sids/sids_sidsnet.shtml (Accessed: 24.07.2024.)

Thecommonwealth (2024). Sustainable Blue Economy. Retrieved from: https://thecommonwealth.org/bluecharter/sustainable-blue-economy (Accessed: 24.07.2024.)

Tirrell, A. (2017). Sociocultural Institutions in Norwegian Fisheries Management. Marine Policy. 77. https://doi.org/10.1016/j.marpol.2016.12.002

Voyer, M., Quirk, G., Farmery, A. K., Kajlich, L., & Warner, R. (2021). Launching a Blue Economy: crucial first steps in designing a contextually sensitive and coherent approach. Journal of Environmental Policy & Planning, 23(3), 345-362. https://doi.org/10.1080/1523908X.2020.1856054

Wasserdreinull (2024). Blue Economy: The oceans as a huge economic system. Retrieved from: https://wasserdreinull.de/en/knowledge/water-and-wastewater/blue-economy/?gad_source=1&gclid=CjwKCAjw74e1BhBnEiwAbqOAjPLI73oDyO6dtL4N-hKfMSxgUr1lcNVzNsDjPG-k503Xq4dhi5KmDBoCJn0QAvD_BwE (Accessed: 24.07.2024.)

BIBLIOMETRIC ANALYSIS OF THE INTERACTIONS BETWEEN POPULATION, MIGRATION AND ECONOMY: TRENDS AND PROSPECTS

Mihaela-Georgiana Oprea
Center for Demographic Research, National Institute for Economic Research "Costin C. Kirițescu"; Romanian Academy, School of Advanced Studies of the Romanian Academy, Doctoral School of Economic Sciences, National Institute for Economic Research "Costin C. Kirițescu"
ORCID: 0000-0002-2339-0772

Mihaela-Irma Vlădescu
[2] Center for Demographic Research, National Institute for Economic Research "Costin C. Kirițescu"; Romanian Academy, School of Advanced Studies of the Romanian Academy, Doctoral School of Economic Sciences, National Institute for Economic Research "Costin C. Kirițescu", Institute of National Economy
ORCID: 0000-0001-8066-4875

ABSTRACT
Since the earliest times, the migration of people has had numerous economic, social and environmental effects, influenced by many causes. Among the economic effects found in most studies are: 1. Labor force - migration can lead to changes in the labor market. For example, migrants can bring new skills and competences to destination countries, contributing to economic development and increased productivity. Migration can also lead to labor shortages in countries of origin; 2. Remittances - migrants send money back to their countries of origin in the form of remittances. These funds can help to boost the local economy, reduce poverty and improve living conditions for families left behind; 3. Investment and entrepreneurship - some migrants may choose to invest in businesses in destination or origin countries. This can generate economic growth, job creation and stimulate innovation in both countries involved in migration. In this study we set out to highlight the evolution of population, migration and economic studies over the period 1990-2022, with the exception of animal and bird. In order to identify the number of studies in the analyzed period we used the existing data in Web of Science, while for their processing we used the VOSviewer program with which we created representative maps for the 2,834 identified studies: authors with the most studies or with the most citations, countries with the most studies, types of studies (books, chapter, articles, etc), keywords used and others. Most studies fall into the Economics category, followed by Geography, Environmental Studies and Demography. Analysis of the data shows that most studies were published in 2020, while most authors are from England, Germany and Canada. Although the link between the three analyzed themes is of greater importance, the interest given to this theme is on a downward slope starting from 2021. This structure ensures a thorough exploration of the topic, using bibliometric methods to provide a detailed and insightful overview of the research landscape.
Keywords: population, migration, economy, studies.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

TECHNOLOGY AND VOCATIONAL EDUCATION: A WAY FORWARD TO YOUTH UNEMPLOYMENT IN NORTH CENTRAL NIGERIA

Kareem, W. B.
Department of Industrial and Technology Education, Federal University of Technology

Mohammed, B M.
Department of Industrial and Technology Education, Federal University of Technology

Abdulrahman, T.S
Department of Education Technology, University of Ilorin, Kwara State

Raji, F.A
Department of Education Technology, University of Ilorin, Kwara State

Hassan, A. M.
Department of Industrial and Technology Education, Federal University of Technology

Abstract
Unemployment is a clear global problem that leaves no nation untouched both developing and developed nation of the world. This scenario is seriously agitating for national attention particularly Nigeria during this economic crisis. This paper has delved into exploitation of technical and vocational education as a way forward towards reducing unemployment in Nigeria. The objectives aimed to identify the causes of youth unemployment and potential solutions for solving the issue. Two null hypotheses were evaluated at the 0.05 level of significance, and two research questions were developed to direct the investigation. A 45-item questionnaire was utilised as the tool to collect data from the two categories of respondents—youth and adults in the research zone—for the study, which employed a descriptive survey methodology. For the study, a population of 485 adults and youth from the North Central zone was used. Two specialists from Federal University of Technology, Minna's ITE Department validated the device. The obtained data were analysed using the mean and standard deviation. According to the study's findings, among other things, the rate of youth unemployment in Nigeria is caused by a lack of vocational and technical abilities that young people in the country need, a lack of guidance regarding careers, and a lack of expertise in entrepreneurial endeavours. For these reasons, the government should pay attention to the issue of unemployment in Nigeria. Based on these findings, it was recommended that parents, NGO, industries and Government at all level that is Federal, State and Local government and Nigeria Society should give adequate recognition to technology and vocational Educational by providing adequate funding to obtain necessary tools, equipment and infrastructure for technical colleges and tertiary institution offering the programme. Quality and adequate human resources needed to be recruited to teach in all vocational technical education institution of learning. In addition to all these, government should be in partnership with industries to create skills centres across the Nation for youth skill development.
Keywords: Technical and Vocational Education, Government, Unemployment.

Introduction

The world have increasingly been eluded with what is rapidly emerging as a global crisis concerning youth unemployment. It is a concern that shows just how different national economies across the glove are with levels of debt which is varying depending on each country's own circumstances. An unemployed person, according to Akintoye (2008) is "one who though able and willing to work but cannot find a job ". In terms of these paper, unemployment would be considered a condition where someone is searching for work but has none yet. This definition is well articulated by Emeh, et al (2012) who defined unemployment as a situation whereby an individual with the ability to work at any wage above minimum but could not find employment appropriate for his or her qualification. Meanwhile unemployment can be easier to observe at the surface level but determining exactly what it means is not always as simple broadly speaking, it is characterized by a lack of employment that is, a person of over 16 years old who does not have work for pay and has gone through the job market, this is a symptomatic of some amount of unemployment which is a huge problem that governments are supposed to fix sooner than later.

A low economy with high unemployment rates, paired up with public housing or the promise of getting out from a crummy apartment in order not face covenant questions are usually popular targets in areas that have both elevated poverty levels and potential cash aid challenges. In the 21st century, unemployment is a key developmental challenge for many countries. According to Patterson et al (2006), this global trend is not alien to Nigeria and unfortunately, the challenge could be more intensified in developing nations with wider social, political, economic and psychological implications. The problem yet to be solved is massive joblessness of youth signals an underlying complexity, Published by Frances Okafor November 29, 2011 who opined that Unemployment in Nigeria can be divided into two types namely: The older individuals who lost their jobs as a result of retrenchment, bankruptcy or redundancy the second are the young and able that unfortunately despite having all to offer for work still have yet unemployed. Of course, when there is a surplus of workers and not enough work to go around that leads to joblessness. Forcing youth to be involved in inadequate formal economic activities, which may result in underemployment and cause crime if they have resort either into capsulizing their work or engaging unorthodox lives at a young age.

Essential Vocational and Technological Education Information for Nigerian Youth.

The youth in Nigeria typically lack access to appropriate guidance information regarding technology and vocational education, which discourages them from pursuing an interest in learning a skill that will enable them to work for themselves. This ignorance of relevant information always results in unemployment. Consequently, inadequate guidance and insufficient information to support young people pursuing postsecondary education lead to unemployment. As a result, they would rather follow any vocation, regardless of whether it aligns with their aptitude, interest, or ability. Nwakomah (2005) argued that the public's poor impression of VTE as education for the underachievers stemmed from these factors. In other words, students who struggle academically are more likely to study VTE topics, and as a result, the majority of parents are reluctant to support their children in doing so since they believe VTE is education for the less fortunate. Therefore, regardless of whether graduates will have access to employment possibilities after graduation, parents want their children to receive an academic education. In actuality, the majority of parents oppose sending their kids to school to acquire trades like auto repairs, machine woodworking, carpentry, bricklaying, and concreting.

The desire for credentials and degrees over VTE abilities because graduates with degree certificates in other professions are given preference over candidates with VTE skills especially when it comes to political nominations, leadership roles, and decision-making. Similarly, low perceptions of blue-collar jobs provided by Vocational Technical schooling prior to and following independence have led to the creation of white-collar positions in Nigerian schooling. Mojo (2008) made the observation that a high unemployment rate and poverty in society were eventually caused by a lack of jobs. It is now evident that information regarding Nigeria's unemployment rate is not easily obtainable. Awogbenle and Iwuamadi (2010) emphasised this idea by pointing out that data from the Federal Bureau of Statistics and the Manpower Board indicates that there are 80 million youngsters in Nigeria, or 60% of the country's overall population. Additionally, 1.6 million of these young people are underemployed and 64 million are unemployed. When someone accepts a job or task that is insufficient to support them, it falls under the category of employment.

The Federal Republic of Nigeria (2014) defines Vocational and Technical Education as components of the educational process that include the study of sciences connected to technology and the acquisition of information, attitudes, and practical skills related to careers in the social and economic spheres. The term VTE was also defined by the ILO (2012) as education that prepares a person for profitable employment as a technician, subprofessional, or semi-skilled worker in a recognised occupation. According to a related development, VTE is the component of education that gives the graduate the fundamental information and practical skills required for entering the workforce as an independent contractor. By fostering the skills necessary for business, industry, agriculture, and economic growth, vocational education helps to create a self-sufficient country. According to Jebba (2012), vocational education is the kind of education that focusses on creating a society that is self-sufficient.

The goal of technical education as a course offered in technical institutions is to lessen poverty and promote sustainable development. Since youth are the world's future, every country does everything in its power to positively engage and prepare them for the global marketplace. This study is provided to students in order to make them productive in the areas of the economy sector, occupational, and specialised work (Okwori, 2012). For this reason, this age group is the target of most entrepreneurs. Regretfully, the reality is that due to a system that inherently places them at a disadvantage, young people around the world are still unable to realise their full potential. The main issue is that children from marginalised or smaller social groups are disproportionately affected by local, national, and international crises. A much bigger global initiative will be needed if youth are to be ready for the difficulties of the future. It also needs an adult and peer support system (a group where honesty is valued).

It can be extended further to say that VTE programs offer ways to meet the demands of the labour market by assisting people in utilising their skills to become more independent and capable of producing jobs rather than just seeking them out. It's interesting to note that using VTE to help someone become a self-sufficient citizen goes beyond viewing it as a way to get educated for a job or as a way to supplement what teachers teach in the classroom. However, in order to give our unemployed youth in Nigeria the opportunity to learn and embrace a life style that is comprehensive in technical and vocational training for sustainable development, the government, non-governmental organisations, society, and all stakeholders must be prepared. In summary, TVET—technical vocational education and training—must be prioritised by Nigeria and many other nations in order to provide adolescents with the technical skills necessary to engage in gainful employment.

Despite the obvious need for technical and vocational services, the United Nations Educational, Scientific, and Cultural Organisation (UNESCO) department for Technical and Vocational Education and Training (TVET, 2015) believed that TVET programs had not done well enough to increase employment. This is undoubtedly caused by the decline in wage employment prospects for skilled labour with technical knowledge.

Importance of Technical and Vocational Education

Additionally, according to the ILO (2012), Technical and Vocational Education Training (TVET) is a component of the educational system that emphasises the study of technologies and allied sciences in order to generate skilled labour for sustainable economic development. According to reports, TVET's primary goal is to teach workers who can meet the demands of the changing industrial landscape and get them ready for the workforce's role in the economy. The developed countries adopted TVET for job creation and used it to the benefit of their citizens; this is not the case in many African countries, particularly Nigeria (Olakunle and Ogedengbe, 2020). This new challenge must be met in order to match the education proposed with vocational demands. But the early 1980s financial and economic crises compelled the continent to embrace TVET as an instrument of adjustments for a sustainable production system in order to address graduate unemployment as well as global economic issues. Based on this premise, a number of nations are overhauling their educational systems in an effort to standardise the way they prepare their young people for the demands of the global market (Fien et al., 2013). In order to make TVET learning resources available to the general people, TVET was thus incorporated into the public and private educational systems as well as the informal sector.

Therefore, by giving underprivileged people the skills and information they need to enhance their economic chances, TVET can aid in reducing poverty and promoting social mobility (Elock, 2019). Additionally, it can support sustainable development by providing training for trades and technical skills applicable to sustainable agriculture and renewable energy, two major drivers of economic growth (Mouzalitis, 2010). Thus, TVET's contribution to sustainable economic growth is in offering a framework for developing a coordinated and harmonised approach to post-secondary education and the creation of the skilled labour force that the nation needs.

Vocational and Technical Education (VTE) includes programs for developing skills and manpower that are intended to provide students the values, cultural awareness, and useful tools they need to be independent in their communities. Maigida (2013) defines vocational training and education (VTE) as educational programs that equip students with the practical skills necessary to succeed in their chosen fields of work. According to Blase (2014), VTE encompasses a variety of subjects like business, technical training, and agricultural education. Its goal is to help adults and children alike acquire the knowledge, skills, attitudes, and abilities needed to succeed in a changing economic environment.

According to the European Commission (2010), VTE makes it possible for people to enrol in skill-based programs that are specific to the jobs they want to pursue, guaranteeing that they get the training they need to succeed and find employment. This study aims to investigate the significance of vocational technical education in creating career prospects and promoting self-reliance among young people in Nigeria.

A stage of education known as Technical Vocational Education and Training (TVET) imparts foundational scientific knowledge together with applied and practical skills. TVET meets the demands of the commercial, agricultural, and industrial sectors and is often offered at the senior secondary or tertiary level.

Technical education is described as an organised course of study that takes employment alternatives into account, encourages the development of critical life and educational skills, and guarantees quality control and ongoing skill improvement in the National Policy on Education (FRN, 2014).

TVET attempts to improve job-relevant skills by emphasising practical training relating to certain vocations, including handcrafts. It gives pupils the skills they need to become independent and significant members of their communities. The National Policy on Education (FRN, 2014) states that the goals of Technical and Vocational Education and Training (TVET) are to prepare people for independence, advance vocational and technical skills for economic and commercial progress, and provide qualified manpower for science, commerce, and technology.

The goal of TVET is to give students the real-world skills they need to be independent and succeed in developing professions. TVET plays an important part in preparing people for technical and sub-professional jobs, which advances social, political, and economic advancement, according to Abdullahi (1993). TVET has advanced slowly in Nigeria because the government has not fully grasped its potential, despite its significance. Many technical colleges have been criticised for being out-of-date and underequipped, and many have been found to lack proper equipment (Gumbari, 2009; Adewale, Ahmid, & Sherifat, 2014).

The National Board for Technical Education (NBTE) introduced entrepreneurship education to polytechnics and monotechnics with the goal of guiding young people towards technical and entrepreneurial skills for self-reliance. This program aims to increase student enrolment in technical programs and generate more highly qualified professionals (NBTE, 2012).

The government has established a number of short-term vocational and technical training programs in addition to formal education through organisations like the National Youth Service Corps (NYSC), the National Poverty Alleviation Programme (NAPEP), the Industrial Training Fund (ITF), and the National Directorate of Employment (NDE). Unfortunately, corruption and a lack of emphasis on formal technical education have made it difficult for many of these initiatives to achieve their goals (Andrew, 2013).

Prior to the industrial revolution, family crafts and apprenticeships were the main sources of vocational education. With the advent of courses in accountancy, industrial training, commercial studies, and stenography in both public and private schools, vocational education gradually gained popularity, particularly in the United States (Duffy, 2007).

To sum up, technical and vocational education is essential in providing Nigerian young with the necessary skills for economic independence and self-sufficiency. Fostering a trained and independent workforce requires addressing the issues and improving the efficacy of these educational initiatives.

Statement of Problem

Unemployment and poverty are increasing in Nigeria almost on daily basis, it is already noted and established that unemployment lead to poverty and has become the major problems facing Nigeria youths and others. Especially in this present economic crisis that comes with bloated hunger in all zones. Idleness has become order of the day by Nigeria youth which obviously involved them in various vices such as Political thuggery, rioting, looting, drug abuse all due to lack of employment and lack of vocational and technical education skills that can enable youth to be self-reliance, most especially when it comes to competences and skill acquisition in the depressed economy and labour market. In another views, the devaluation of Nigeria currency and importation of various goods, corruption among other can lead to unemployment in any nation

This research works was carried out on the basis of identifying viable Technology and vocational skills programme for youth development and self-reliance.

.Objectives of the Study

The study assesses Technical and Vocational skills needs by unemployed youths in Nigeria. Specifically; it is to determine

I. The factors responsible for youth unemployment in North Central Nigeria

II. The appropriate Technical and Vocational skills need by unemployed youth

Research Questions

I. What are the factors responsible for youth unemployment in Nigeria?

II. What are the Technical and Vocational skills needs by unemployed youth in Nigeria?

Hypothesis

Two hypothesis were formulated and tested as 0.05 level of significant

H_{oi} – There is no significant different between the mean rating of youths and adults on factors responsible for youth unemployment in Nigeria

H_{oii} – There is no significant different between the mean rating of youths and adult on the appropriate technical and vocational skills needs by unemployed youths in Nigeria.

Research Methodology

For this study, a survey research design was used. According to Olaitan (1999), survey research entails asking questions via an interview and a well-structured questionnaire in order to get information about respondents' beliefs and behaviours. Because the design has been applied to similar studies in several fields of study and was shown to be excellent, it was deemed appropriate for this particular study. It was utilised by Kareem (2017) to research the training requirements of woodworking technology teachers at Government Technical Colleges in Niger State, Nigeria. Additionally, it was used by Bello, Danjuma, and Adamu (2007) to assess the need for vocational training among Nigerians aged 15 to 25 who are not enrolled in school.

The study was carried out in Nigeria's North Central Zone, which is made up of six states and is located at the meeting point of the rivers Niger and Benue. Benue State, Kwara State, Nasarawa State, Niger State, Plateau State, and Federal Capital Territory, Abuja, are among the six states. The North Central Zone was selected because there are a lot of young people dropping out of school in these states. Four hundred and eighty-five children and adults made up the study population.

The two (2) portions of the instrument used to collect the data were A and B. Twelve items in Section A address the causes of young unemployment, whereas twenty-two items in Section B address the TVE skills that unemployed youth require. Strongly Agree (SA) = 4 points, Agree (A) = 3 points, Disagree (D) = 2 points, and Strongly Disagree (SD) = 1 point were the four-point (4) scale answer modes that were used. To confirm the internal consistency of its use, the instrument was also put through a reliability test. piloted in two states outside of Nigeria's North Central State. According to Louis, Lawrance, and Keth (2007), the data demonstrate a Cronbach alpha analysis reliability coefficient of 0.78, which was deemed reliable. Two specialists from Federal University of Technology, Minna's ITE Department verified the legitimacy of the instrument's face and content. The Z-test was utilised to test the null hypothesis at the 0.05 level of significance. It compares the respondent's significant rating value so that a lower result ($P<0.05$) is interpreted as the hypothesis being rejected. If the responder rating value ($P>0.05$) is high, the hypothesis can then be supported. This study's conclusion, which showed that there was no discernible significant difference, was supported. All of the adults and children in the research region received 485 copies of the questionnaires.

Analyses of the data were conducted using the approximately 96% of returned questionnaires. The questionnaire items were answered using descriptive analysis (means and standard deviation), which involved tabulating and comparing the respondents' responses. The degree of agreement or disagreement was measured using the criterion mean (2.50). The choice was made to score an option positively (agree) if the item mean ($\bar{X}$) exceeds the criteria mean (2.50); items with a mean valve of less than 2.5 are rated negatively (disagree).

Results

Research Question one: What are the factors responsible for youth unemployment in Nigeria?

Table 1: Determine the factors affecting youth unemployment in Nigeria

S/N	Items on the factors	Mean	SD	Decision
1	Government's failure to generate employment opportunities	3.61	0.61	Agreed
2	Reluctance to accept available job positions	3.22	0.88	Agreed
3	Insufficient vocational and technical skills required by the job market	3.44	0.62	Agreed
4	Absence of career counseling and guidance	3.33	0.77	Agreed
5	Excessive number of youths seeking employment	3.67	0.69	Agreed
6	High wage demands by labor unions	3.00	0.97	Agreed
7	Elevated levels of corruption	3.50	0.71	Agreed
8	Lack of capital or funds for youth entrepreneurship	3.28	0.96	Agreed
9	Inability to recognize personal potential	3.28	0.75	Agreed
10	Deficiency in general education	2.22	0.88	Disagreed
11	Lack of knowledge in entrepreneurship	3.56	0.70	Agreed
12	Concentration of resources among privileged groups	3.17	1.04	Agreed

According to Table 1 results on the variables influencing youth unemployment in Nigeria, the respondent agreed with everything but item 10, which had a mean score of 2.22. The other items' mean scores ranged from 3.17 to 3.67. This shows that the majority of respondents were in agreement that all the factors contributing to Nigeria's youth unemployment are to blame.

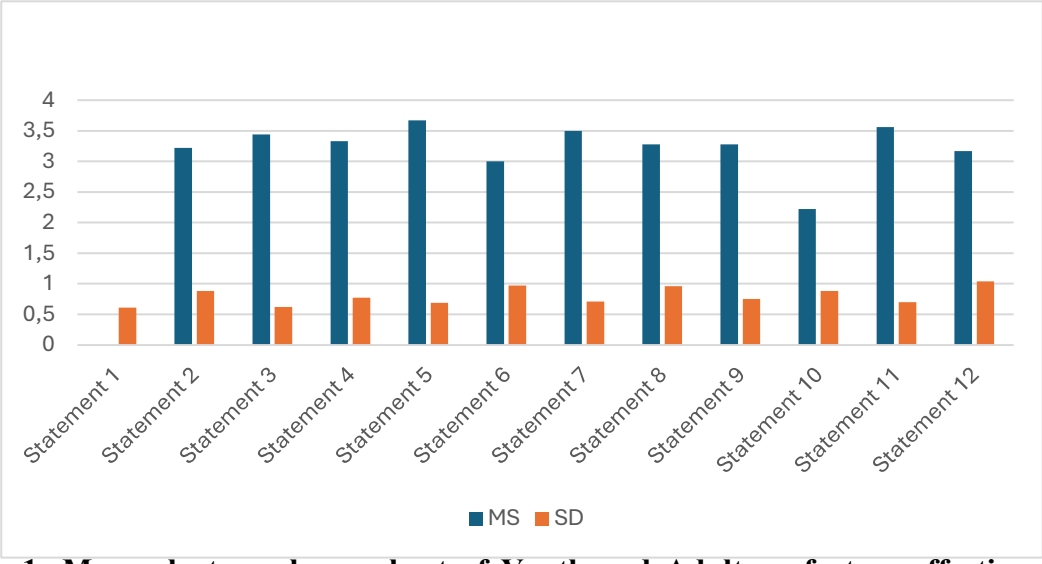


Figure 1: Mean cluster column chart of Youth and Adult on factors affecting youth unemployment in North Central Nigeria

Figure 1: The standard deviation of all items in Table 1 ranges from 0.61 to 1.04; the column indicates that respondents' opinions on the variables influencing young unemployment in North Central Nigeria were in agreement. This indicates that their answers to the question item that is mentioned as the factors impacting youth unemployment in Nigeria are fairly similar, which highlights the urgency of providing quick educational attention to better the lives of Nigerian youth.

Research Question two: What are the Technology and Vocational Education skills needs of youth employment in Nigeria?

Table 2: The vocational skills needs of youth in Nigeria

S/N	ITEMS	Mean	SD	Decision
1	Cabinet Marking	2.76	0.15	Agreed
2	Carpentry and Joinery Works	2.72	1.07	Agreed
3	Wood Pattern making	3.14	0.93	Agreed
4	Wood finishing and Painting	2.45	1.20	Agreed
5	Wood Machining	2.83	0.92	Agreed
6	Furniture crafts/Upholstery Works	3.17	0.99	Agreed
7	Ornamental Wood Design	2.16	0.17	
8	Program Management (including Catering, Photography, and Video Production)	2.19	0.26	Agreed
9	Decoration and Public Relations	3.06	0.94	Agreed
10	Tailoring and Fashion Design	2.56	1.20	Agreed
11	Production of Labeled Body Creams, Lotions, Balms, and Hair Products	2.67	0.97	Agreed
12	Hairdressing and Barbering	3.00	1.14	Agreed
13	Knitting	3.22	1.00	Agreed
14	Graphic Arts (Visual Art)	3.06	0.99	Agreed
15	Textile Trade	3.06	0.94	Agreed
16	GSM Repair and ICT Skills (including Web Development, Programming, Networking, and Customer Support)	3.50	0.62	Agreed
17	Bricklaying and Masonry	3.38	0.91	Agreed
18	Welding and Metal Fabrication	3.11	1.13	Agreed
19	Computer Maintenance	3.39	0.85	Agreed
20	Electrical Installation and Maintenance	3.60	0.50	Agreed
21	Automobile Repair and Maintenance	3.28	0.89	Agreed
22	Repairs of Radios, Televisions, and Other Appliances	2.39	0.98	Disagreed

Table 2 results on the technical and vocational abilities required for youth employment in Nigeria showed that, with the exception of item 28, which has a mean score of 2.39, all of the respondents agreed with the items, with mean scores ranging from 2.56 to 3.60. This shows that the majority of respondents felt that all of the elements are necessary for young people to have job in Nigeria in terms of vocational skills. The discord observed in item 22 may stem from antiquated manual appliance maintenance techniques.

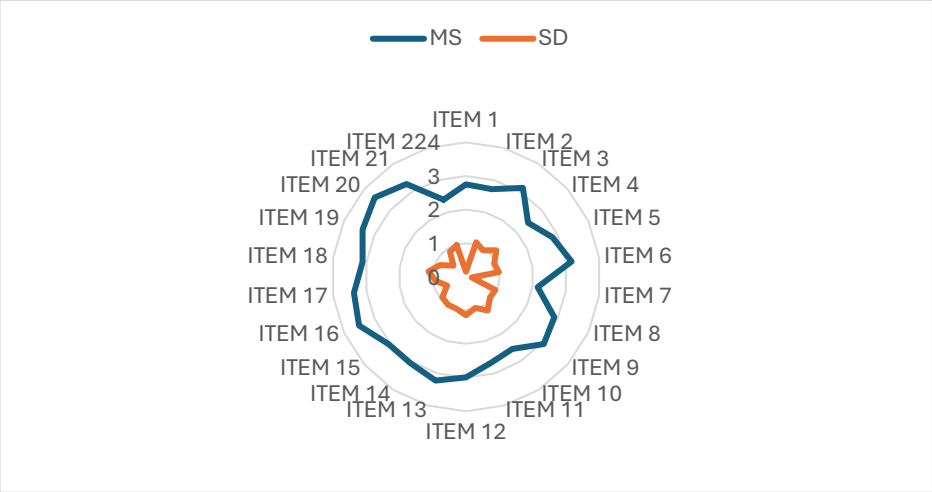


Figure 2: Mean cluster radal response of Technology and Vocational Education skills needs for youth employment in North Central Nigeria.

Figure 2 - The standard deviation of items statement in table 2 range from 0.15 to 0.98, the radal show that the respondent shared the same opinion in their rating on Technology and Vocational Education skills needs for youth employment in North Central Nigeria. This implies that the respondent shared similar idea in the rating of question item listed.

Hypothesis 1

Table 3: *Z-test analyses of the mean responses of rating of youth and adult on factors affecting youth unemployment in Nigeria. N_1-200, N_2-185*

S/N	Items on the factors	$S.D_1$	Z-test	Decision
1	Government's failure to generate job opportunities	0.61	0.65	NS
2	Reluctance to accept available job positions	0.88	1.34	NS
3	Insufficient vocational and technical skills needed in the society	0.62	0.37	NS
4	Absence of career guidance and counseling	0.77	0.7	NS
5	Excessive number of youth seeking employment	0.69	1.55	NS
6	High wage demands by labor unions	0.97	0.37	NS
7	High levels of corruption	0.71	0.89	NS
8	Lack of capital or funds to establish businesses	0.96	0.47	NS
9	Inability to recognize one's potential	0.75	0.36	NS
10	Insufficient general education	0.88	0.14	NS
11	Lack of entrepreneurship knowledge	0.70	0.37	NS
12	Concentration of resources among privileged individuals	1.04	0.08	NS

Key: SD_1- Standard Deviation of Professional, NS – Not Significant

The Z-test in table 3 show that there is no significant difference in the mean response between youth and adult on factors affecting youth unemployment in Nigeria. All items were upheld because the falling rate of Z-test is above 0.05 level of significant.

Hypothesis 2

Table 4: Z-test analyses of the mean responses of rating of youth and adult on the appropriate vocational/technical education skills needs by unemployed youth in Nigeria. N_1-200, N_2-185

S/N	ITEMS	SD	Z-test	Decision
1	Cabinet Marking	0.96	0.75	NS
2	Carpentry and Joinery Works	0.94	1.3	NS
3	Wood Pattern making	1.20	0.07	NS
4	Wood finishing and Painting	0.97	0.56	NS
5	Wood Machining	1.14	0.26	NS
6	Furniture crafts/Upholstery Works	1.00	0.35	NS
7	Wood Ornamental Design	0.99	1.55	NS
8	Event management such as Catering Services, photography and video coverage etc.	0.94	0.37	NS
9	Decoration and public relations	0.62	0.89	NS
10	Tailoring/fashion designing	1.07	0.47	NS
11	Labeled body cream, lotion, balm and hair cream	0.91	0.36	NS
12	Hair Dresser/Barbing	1.13	0.14	NS
13	Knitting	0.85	0.37	NS
14	Graphics Art (Artist)	0.92	0.23	NS
15	Textile trade	0.50	0.26	NS
16	Global System for Mobile Communication (GSM) repairs, Information and Communication Technology (ICT) skills such web development, programming, networking and customer services	0.99	1.31	NS
17	Bricklaying and Concrete work (Mason work)	0.89	0.36	NS
18	Welding and fabrication	0.98	0.64	NS
19	Computer Maintenance	0.97	0.24	NS
20	Electrical Installation and Maintenance Work	1.12	0.46	NS
21	Automobile trade	0.89	0.44	NS
22	Radio, Television and Appliances repairs	0.87	1.35	NS

Key: SD_1- Standard Deviation of Professional, NS – Not Significant

The z-test in table 4 show that there is no significant difference in the mean response between youth and adult on the appropriate vocational/technical education skills needs by unemployed youth in Nigeria. All items were upheld because the falling rate of z-test is above 0.05 level of significant.

Discussion of the Findings

The results from Table 1 indicate that all identified factors, except for item 10, are significant contributors to youth unemployment in Nigeria. The exception of item 10 is attributed to the lack of formal education among the majority of the youth in this zone. To address this issue, research assistants were employed to interpret the questionnaire in a manner accessible to the respondents. This finding supports Seiders (1985), who emphasized that youth represent the future and hope of any nation. Consequently, investing in youth yields both immediate and long-term benefits, making youth programs essential for developing life skills necessary for self-reliance.

Galadima (2003) also noted that "education is the prime creator and conveyor of knowledge in any facet," underscoring the need for quality education that enables youth to become job creators rather than job seekers. Engaging in vocational training is crucial for fostering self-reliance.

Table 2 shows that the majority of respondents agreed with every item with the exception of item 22, which talks about the importance of vocational skill requirements in reducing youth unemployment in Nigeria. This is in line with the findings of Bello, Danjuma, and Adamu (2007), who emphasised the importance of vocational and technical education for the development of young people. These include classes in knitting, hairdressing, tailoring, furniture building, car repair, and electrical installation. The goal of vocational and technical education is to build an independent society (Jebba, 2012). Proficiency in various fields, including graphic arts, computer, fashion design, fashion joinery, upholstery, cabinetry, carpentry, and catering, is essential for the growth of young people and the progress of society. Usman (2014) supports this view, noting that training and skill improvement programs enhance performance and contribute to national economic development.

Conclusion and Recommendation

The study's findings include: (a) a number of variables influencing Nigeria's young unemployment rate. These include, among other things, the government's incapacity to generate job opportunities, the dearth of technical and vocational skills that society requires, and the sheer volume of young people looking for work. The majority of young people in Nigeria (b) are interested in pursuing jobs in information and communication technology, including web creation, programming, networking, and customer service, as well as electrical installation and maintenance and GSM repairs. The conclusion drawn from the data is that a multitude of issues, including the government's incapacity to provide job chances for young people, are contributing to youth unemployment. Additionally, the majority of young people have a tendency to concentrate primarily on technical advancements, ignoring other, equally potential avenues for skill enhancement.

Therefore, it is advised that the Nigerian government at all three (3) tiers outfit vocational and technical colleges across the nation, placing a strong emphasis on hiring qualified teachers to staff these institutions in order to provide these young people with knowledge and skills. Non-Governmental Organisations (NGOs) such as Youth Development & Enlightenment Initiative (YDEI), Youth Empowerments Scheme (YES), Abuse Prevention (CDSAP), Committee on Drug and Substance and Focus on Labour Exploitation (FLEX) should host workshops and seminars to train youth in Vocational and Technical Skill Acquisition. Industries should be ready to begin offering training to young people.

References

Abdullahi, B. (1993). Prospect of Training and Management of Technical Techers. *Unpolished B.Ed Research Project, Dept of Education (Technical)* Kaduna Polytechnic Kaduna.

Andrew, O. (2013). Development Planning and Employment Generations: Achievements Challenges and Prospects in Nigeria. Journal of Research in National Development 34-42.

Awogbenle, A.C., & Iwuamadi K.C. (2010). *Graduate unemployment in Nigeria: concepts and issue.* African Journal of Education and Development Studies: 3(1), 103-111.

Bello, M. I, Danjuma, I. M, & Adamu, A. Y. 2007 - *Journal of Career and Technical Education*, Vol. 23, No. 1, Fall, 2007 – Page 69 *Aggregate Employment in Nigeria's In Industrial Sector.* Paper Presented at the NES Annual National Conference Nigeria.

Bello, T. (2023). Attacking Unemployment Hurdles in the Fragile Economics of the Sub-Saharam Africa: The Experience of Nigeria. A Paper Presented at the Economics for the Future-Conference; On the Occasion of the Celebration of 100 Years of Cambridge Economics; Cambridge, United Kingdom September.

Blase, E. D. (2014). *Learning Technical Education with Ease.* Retrieved 2014 – 02-6 (internet print – http://en.Em Wikipedia. Org/wiki/technology. Enugy I TC publisher.

Duffy, N.F (2022). Essays on Apprenticeship Wisconsin; Center for Studies in Vocational and Technical Education.

Ede, C.E., Ndubisi E.C and Nwankwo, C.A. (2013). Tackling unemployment through private sector. *International Journal of Innovation Research in Management 2(2):* 41-52. ISSN 2319-6912.

Emeh, I. E., Nwanguma, E. O., & Abaroh, J. J. (2012). *Engaging Youth Employment in Nigeria with Youth Development and Empowerment Programs:* Lagos State in Focus. *Interdisciplinary Journal of Contemporary Research in Business: 4*(5), 1125-1141.

European Commission (2010). *New skills for new jobs: Action now*. (2nd ed) Brussels: The Expert Group.

Federal Republic of Nigeria (2014). *National Policy on Education*, 4th edition. Lagos: NERDC Press

Fien, J. & Guevara, J.R. (2013): Skills for a green economy: Practice, possibilities, and prospects. In R. Maclean et al. (eds), Skills Development for Inclusive and Sustainable Growth in Developing Asia-Pacific. New York: Springer.

Fowler, F. J. (2009). *Survey research methods* (4th ed). Thousand Oaks, CA: Sage.

Galadima, 1. (2003). *Disparity between Expected and Actual Outcomes in the Nigerian Educational System.* Nigerian Journal of Curriculum Studies, 10(2), 457 - 460.

Gumbari, J. (2009). The Importance of Skill Acquisition Challenge to Nigerians Legislative Digest, 1(2), 62-75.

ILO (2012). Working toward sustainable development: Opportunities for decent work and social inclusion in a green economy. Geneva: ILO

Jebba, A. M. (2012). Survey of accessibility and usage of information and communication technology among students of technical education in tertiary institutions in Niger State, Nigeria *Journal of Educational and Social Research, 2(7), 45-52.*

Kareem, W.B., (2017). Assessment of Woodwork technologists up-skilling needs using discrepancy modelling tertiary institutions in north-central, Nigeria. Federal University of Technology, Minna, *Unpublished Phd Thesis.*

Louis. C, Lawrence, M. & Keith M. (2001). Research Method in Education New York, Routledge.

Maigida, J. F. Saba, T. M & Namkere, J. U. (2013). Entrepreneurial Skills in Technical Vocational Education and Training as a Strategic Approach for Achieving Youth Empowerment in Nigeria. *International journal of humanities and social science*, 3(5), 303-310.

Moja, T. (Ed). (2000). *Nigeria Education Sector Analysis: An Analytical Synthesis of Performance and Main issues.* New York: New York University.

Mouzakitis, G. S. (2010). The role of vocational education and training curricula in economic development. *Procedia-Social and Behavioral Sciences*, *2*(2), 3914-3920.

National Board for Technical Education

NBTE (2012). The Development of National Vocational Qualifications Framework (NVQF) for Nigeria, Kaduna.

Nwokomah, J. M. (2005). Strategic for Attainment of Functional Vocational and Technical Education in the 21st Century in Nigeria. *Journal of Education in Developing Areas*: 14,53-61.

Okafor, E. E. (2011). Youth Unemployment and Implications for Stability of Democracy in Nigeria. *Journal of Sustainable Development in Africa*: (13), 358-372.

Okwori, R. O. (2012). Mechanisms for Improving the Provision of Facilities for Wood workshops in Colleges of Education in the North Central Zone of Nigeria. *Journal of Emerging Trends in Engineering and Applied Sciences (JETEAS),* 3(3), 455-460. Available online at http://.jeteas.schorlinkresearch.org

Olaitan, S.O., (1999) *Practical Research Methods in Education,* Onitsha: Summer Educational Publishers Ltd.

Olakunle Joseph & Tunde Ogedengbe (2020): UTILIZATION OF ICT AS A PEDAGOGICAL TOOL FOR TVET TOWARDS SOCIO-ECONOMIC DEVELOPMENT AND SUSTAINABILITY. 2nd International Conference, The Federal Polytechnic, Ilaro, November, 2020, Pp 1-8.

Oyebade, S. A. (2003). *Education and Unemployment of Youths in Nigeria: Causes, Impacts and Suggestions.* Abuja: National Economic Empowerment Development Strategy (NEEDS)

Patterson, N.; Okafor, O.& Williams, D. (2006). *Globalization and Employment Generation: Evaluating the Impact of Trade on Aggregate Employment in Nigeria's In Industrial Sector.* Paper Presented at the NES Annual National Conference Nigeria.

Salami, C.G.E. (2011). Entrepreneurship and youth unemployment in Nigeria: The missing link. *Global Journal of Management and Business Research*, 11(5).

Seiders, R. W. (1985). Background Paper: FAO's role in support of rural youth Educational Exchange papers.

UNESCO. (2015). The Global Monitoring Report-Education for All 2000-2015: achievements and Challenges.

UNMASKING THE IMPACT OF INTERNET ADDICTION DISORDER ON EMPLOYEE PERFORMANCE

Dr. Muhammad Waseem Bari
Lyallpur Business School, Government College University Faisalabad

Abstract
In this empirical study, we investigate the intricate relationship between Internet addiction disorder and employee performance. Besides, this study investigates the mediating function of workplace harassment to internet addiction disorder and employees' performance. Drawing upon the theory of planned behavior, we meticulously gathered responses online from 239 employees across various non-governmental organizations worldwide. This paper employed the partial least squares structural equation modeling approach and Smartpls 4 software for analyses. The results show that Internet addiction disorder substantially and adversely impacts employees' performance. Workplace harassment emerges as a critical mediator, it partially mediates the relationship between internet addiction disorder and employees' performance. This study contributes to the prevailing literature by way of shedding light on this complicated relationship. It advances our expertise in Internet addiction disorder's effect on painting-associated results. Organizations can leverage those insights to combat Internet addiction disorder, foster healthier virtual habits, and create supportive work environments that guard employees against the toxic effects of harassment.
Keywords: Internet Addiction Disorder; Employee Performance; Workplace Harassment; Cyber loafing; Planed Behavior; PLS-SEM

CRITICAL SUCCESS FACTORS OF OPERATION MANAGEMENTS: PERSPECTIVES FROM NORTHERN MALAYSIA ELECTRIC & ELECTRONIC INDUSTRY

Jaya Ganesh Thavarajah
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

Munisah Krishansamy
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

Herman Shah Anuar
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

ABSTRACT
The study investigates the critical success factors (CSF's) influencing operational management within Northern Malaysia's Electric & Electronics industries, focusing on X industry. The main objectives are to identify the critical success factors, analyze the impact of operational efficiency and competitiveness and provide actionable recommendations for industry professionals. A quantitative methodology was employed involving a comprehensive survey of 10 questions to professionals from various divisions in X industry. The data is analyzed using research framework of critical success factor (CSF's) and graph generated using Microsoft Excel tool. The key factors are technological innovation, lean manufacturing practices, supply chain integration and stringent quality management processes which are pivotal in enhancing operational efficiency and competitiveness at X industry. Based on the survey, quality management was found to be the most critical success factor in the operation management practices among all the four factors that have been identified. In addition, certified companies experienced better market access, increased in customers satisfaction and improved in terms of operational efficiency. As per the data collected, some challenges which have been identified in operational flexibility and handling significant changes, triggers areas of improvement in terms of quality management. For instance, non-compliance with industry standards and regulations can result in legal action, fines, and penalties. In conclusion, the finding highlights the importance and adaptability of quality management applied by X industry professionals in order to maintain competitiveness in the dynamic Northen Malaysian Electrical & Electronics industry. Future research should focus on exploring the integration of advanced technologies and developing strategies for improving operational flexibility as current technology are moving toward AI which is equally important.
Keywords: Operation management, critical success factors (CSFs), operational efficiency, electrical and electronics industry, quality management, technological innovation.

IMMERSIVE EXPERIENCES: VIETNAMESE TOURISTS' INTEREST IN VIRTUAL REALITY TECHNOLOGY

Kim-Hang TE
Can Tho University

Que-Nhu DUONG
Can Tho University
ORCID: 0000-0002-3734-0960

Nam-Khang Tri NGUYEN
Can Tho University
ORCID: 0000-0001-7361-7560

ABSTRACT
In recent years, tourism destinations have evolved by utilizing advanced technologies, including virtual reality (VR), to market travel experiences by visually communicating information on landscapes, aesthetics, culture, and entertainment (Choi et al., 2018). The issue posed is whether tourists find this new form of destination marketing appealing. This study aims to explore the interest of Vietnamese tourists in destination marketing through virtual reality. Specifically, it investigates the tourists' experiences with virtual reality (including their experiences with virtual reality advertisements), their knowledge of virtual reality, and their level of interest in virtual reality in tourism. The study collected data through direct surveys from 230 Vietnamese tourists using structured questionnaires. The research findings indicate that the majority of Vietnamese tourists (nearly 86%) have heard of the term Virtual Reality. More than half of the tourists (almost 60%) have watched VR videos/movies, with a significant proportion (47.7%) having viewed advertisements through Virtual Reality. These results suggest a considerable level of interest among tourists in virtual reality advertising. However, the percentage of tourists who have seen virtual reality travel advertisements remains relatively low, indicating that virtual reality advertising has not fully realized its potential. Overall, the knowledge of virtual reality among respondents is average, and the surveyed tourists exhibit a moderate level of interest in VR. These findings suggest that Vietnamese tourists have a notable interest in VR-based promotions, presenting growth potential in the future.
Keywords: Virtual reality, VR, tourism, destination marketing, Vietnamese tourists.

INTRODUCTION
With the development of a modern society, the Internet has become an indispensable part of our daily lives. And in Vietnam, according to statistics from We Are Social and Meltwater, as of January 2024, Vietnam has 77.93 million Internet users, equivalent to 79.1% of the total population. The strong development of the digital economy and the demand for digital devices and services are increasing. With the strong pace of development, administrators are also gradually promoting Internet advertising more and more and most prominently, especially on social networking sites. In Vietnam, according to statistics from the General Statistics Office (2024), in the first quarter of 2024, the total number of domestic tourists is 30 million and the total revenue from tourists in the first quarter of 2024 is estimated at 195 trillion VND. And to develop further, marketing with short videos on social networking sites is the most effective tool to attract tourists in today's era of developed digital technology.

Cho & Fesenmaier (2000) argue that tourism is an experiential product, tourists cannot experience the tourism product before they actually visit the destination. In this regard, virtual reality has received significant attention as a new marketing tool to provide tourists with experiences. With the desire to always discover and experience new things, video advertising or virtual reality will easily impact the travel intention of Vietnamese tourists. Therefore, this study was conducted to assess the interest of Vietnamese tourists in virtual reality technology, specifically tourists in the Mekong Delta, Vietnam.

LITERATURE REVIEW

Virtual reality

The commonly accepted definition for VR (Virtual Reality) is the use of a computer-generated 3D environment that the user can navigate and interact with, resulting in a real-time simulation of one or more of the user's five senses (Burdea & Coiffet, 2003; Gutierrez et al., 2008; Guttentag, 2010). More specifically, the three main elements that characterize VR are: (1) Visualization, in which the user has the ability to look around, often using a head-mounted monitor; (2) Immerse yourself in the experience; (3) Interactivity, the degree of control of the experience is often achieved with sensors and input devices such as joysticks or keyboards (Cruz-Neira et al., 1992; Williams & Hobson, 1995). Guttentag (2010) described the VR experience when the user is immersed in a virtual environment.

Guiterrez et al. (2008) argue that VR refers to the ability to move and navigate. VR has been used in six major areas related to tourism: planning and management, heritage conservation, marketing, outreach, education, and entertainment. In addition, as a commercial tool, VR has been applied in the tourism industry to engage with tourists by providing information about destinations (Huang et al., 2013) and online shopping retailers (e.g., Alibaba, Ebay, Ikea, etc…), (Poremba, Rick, 2017).

VR systems are divided into 3 main types: Non-Immersive Systems, Semi-Immersive VR Systems, and Immersive VR Systems. Some other classifications are based on the complexity or mode of operation of the system. The complexity of the system depends on how difficult it is to develop the application. Classification by complexity level includes: entry-level virtual reality system, basic level, advanced level, role-playing level, and level of work as an operating system for the virtual reality environment. The classification of methods includes: simulation-based, projector-based, avatar-image-based, or desktop-based systems.

Virtual reality system

According to Bamodu & Ye (2013), VR systems are divided into 3 main types: Non-Immersive Systems, Semi-Immersive VR Systems, and Immersive VR Systems

Non-Immersive VR System: A non-immersive VR system built for desktop computers. This system is known as Window on World (WoW) or Deskop VR. In this system, the virtual environment is observed through a high-resolution monitor. The interaction is done through means such as: keyboard, mouse or joysticks or keyboards

Semi-Immersive VR System: A semi-immersive VR system consists of a computer system that supports relatively strong graphics that comes with one or more monitors or projector systems to create a large screen. This screen system is placed around the user to create a sense of immersion in a virtual 3D environment.

Immersive VR system: An immersive VR system is a system that creates an experience for users in a virtual environment that is most similar to reality. In this system, users wear special VR devices such as helmets, glasses or gloves to look at the virtual environment. Usually in this system, a set of VR glasses is used that can separate the user from the outside world.

Virtual reality in tourism marketing

Understand the impact of VR tourism on destination marketing in relation to flow as an important part of the user experience and a determinant of traveler behavior (Gao et al., 2017; Huang, 2003; O'Cass & Carlson, 2010; Wang & Hsiao, 2012). Hoffman & Novak (1996) conceptualized flow in CMEs as an important attribute to support user-computer interaction. Novak et al. (2003) found that users experience flow during web surfing (task-based search) or without a specific purpose (entertainment search). Flow often leads to increased levels of enjoyment and constant participation in a particular activity (Hs et al., 2012a). Thus, the success of online marketing is based on the ability to provide opportunities to experience flow (Hsu et al., 2012a). However, by pointing to the lack of studies on flows in tourism, Coffey & Csikszentmihályi (2016) emphasize the need to investigate flows in diverse tourism contexts to enhance the experience of intermediary travel in CMEs.

METHODOLOGY

The study uses primary data through the collection of survey samples from tourists from the Mekong Delta provinces focusing on 4 provinces: Soc Trang, Ca Mau, Hau Giang, Can Tho in direct form with the survey tool being a pre-printed structured questionnaire. The sampling method will be conducted using the convenient sampling method. With this sampling method, the study will select sample elements based on convenience, accessibility, or ease of retrieval of information. This method is often used to help save time and money.

According to Hair et al. (1998), the minimum sample size of the observation/variable ratio to be measured using the exploratory analysis method is 5/1, which means that a measurement variable needs a minimum of 5 observations. And according to that theory, the study uses 30 measurement variables, so the minimum sample size to take is 22 × 5 = 110. The sample size in the study had a total of 230 observations, so it was possible to conduct an exploratory factor analysis.

The population of this study are tourists from provinces in the Mekong Delta from March 2024 to April 2024. In this study, the author chooses a random sampling method, which is convenient to save time and can directly reach the target audience that the author is interested in. However, this method still has certain disadvantages: it depends entirely on the knowledge, experience, and judgment of the interviewer, so the choice of sample units can be subjective. implementation so reliability and accuracy are not high (Mackey & Grass, 2005). To minimize the above disadvantages, the author: (1) Learned relevant information about the sample's demographics and behavior through previous research. (2) Determine the group of respondents to a survey based on the above information. (3) Survey a determined group of respondents by surveying respondents in sessions throughout the day, at many different locations, and rotating many different interviewers to ensure diversity.

RESULTS AND DISCUSSIONS

Sample Description

General information about sample characteristics are illustrated in the table below.

Table 1: Sample characteristics

Variable	Value	N	Percentage	Valid Percent
Gender	Male	93	40.4	40.4
	Female	137	59.6	59.6
Age	18-22	140	60.9	60.9
	23-27	59	25.7	25.7
	Over 28	31	13.5	13.5
Province	Hau Giang	39	17.3	17.3
	Ca Mau	32	13.9	13.9
	Can Tho	59	25.7	25.7
	Soc Trang	43	18.7	18.7
	Other Mekong Delta provinces	57	24.8	24.8
Occupation	Student	115	50.0	50.0
	Office Staff	32	13.9	13.9
	Technical Staff	10	4.3	4.3
	Pharmacist	11	4.8	4.8
	Salesperson	5	2.2	2.2
	State officials	8	3.5	3.5
	Waitstaff	14	6.1	6.1
	Freelancer	29	12.6	12.6
	Other	6	2.6	2.6
Education level	Below high school	3	1.3	1.3
	High school/Intermediate	33	14.3	14.3
	School college/University	181	78.7	78.7
	After University	13	5.7	5.7
Total		**230**	**100.00**	**100.00**

Source: Analysis of data from a live survey of 230 respondents on VR and Video advertising, 2024

In terms of gender: The proportion of males and females of the sample was 59.6% (137/230) and 43% (93/230), respectively. This figure shows that the difference between men and women in access to advertisements, as well as tourism activities is not too large.

In terms of age: The proportion of age groups from 18 to 22, from 22 to 26 and from 26 and over in the survey sample was 60.90%, 25.70% and 13.50%. According to studies, young tourists (aged 18 to 34) are considered to have been "born with technology" with good access to advanced technology techniques and very high exposure to social networking sites. Therefore, there is a quick and highly interactive approach to tourism advertising videos. This is also a group of customers with high travel demand.

According to the survey results, the surveyed respondents from provinces in the Mekong Delta region include representatives of 4 provinces as follows: Hau Giang accounted for 17.3%, Ca Mau with 13.9%, Can Tho with 25.7%, Soc Trang with 18.7% and the rest are other Mekong Delta provinces with 24.8%.

Through the above figures, it can be seen that the number of respondents surveyed in Can Tho is higher than the rest of the provinces. The reason for this problem is that the survey area is in Can Tho city, so the number of tourists in the locality and neighboring localities is quite high, leading to the difference in the proportion of survey subjects.
In terms of occupation: In the survey sample, the proportion of students accounted for 50% while the total proportion of salespeople and other professions was just over 5%. The reason for the above problem is partly because the occupational factor is dominated by factors of age and educational level, and partly because the working environment of this group is often less exposed to technology, on the contrary, the group of students, Office workers have more opportunities to be exposed to these things.
In terms of educational level: To be able to understand and apply the features of new technologies requires users to have a certain level of understanding. Therefore, the number of respondents with a degree below high school, high school/intermediate, college/university and postgraduate or higher corresponds to the following rates of 1.3%, 14.3%, 78.7% and 5.7%. From the data, it can be seen that the percentage of respondents at the college/university and high school/intermediate education levels accounted for more than 3/4 of the total 230 respondents of the sample while below high school only accounted for more than 1/20. This shows that education level has a certain influence on respondents' use of technology and ad viewing.

Virtual Reality Identity
VR is a fairly new tool, not widely applied, especially in travel so being able to identify VR among tourists is also quite important for further analysis.

Table 2: Virtual Reality Identity

	Level	Frequency (People)	Proportion (%)
Hear the term Virtual Reality (VR)	Ever	128	85.9
	Not yet	21	14.1
Have watched Virtual Reality (VR) videos/movies	Ever	89	59.7
	Not yet	60	40.3
Viewing ads with virtual reality (VR)	Ever	71	47.7
	Not yet	78	52.3
View virtual reality (VR) ads for travel	Ever	90	39.6
	Not yet	59	60.4

Source: Data analysis from a live survey of 149 respondents on VR advertising, 202

From the above data, it can be seen that the number of respondents who have heard of the term Virtual Reality accounts for nearly 86% of this number, indicating that virtual reality technology is gradually being known and the respondents surveyed also show that people are gradually interested in new technology. Specifically, this virtual reality technology. Moreover, virtual reality (VR) has received significant attention as a new marketing tool intended to provide travelers with experiences (Cho et al., 2002).
Regarding watching VR videos/movies, the level of respondents who have watched VR videos/movies is nearly 60%, which shows that respondents have a significant interest.

In addition, with the development of technology, users have more and more opportunities to experience more interesting and creative content in the current typical virtual space at cinemas that have had the form of watching virtual reality movies such as at theaters: Lotee Cinema at Aeon Tan Phu Celadon Ho Chi Minh City, etc and in shopping malls, there are now programs to watch action videos/movies or play games.

In addition, the percentage of respondents who have watched ads with Virtual Reality accounts for 47.7% of the figure compared to the percentage of respondents who have watched videos/movies. This can be understood that watching ads with virtual reality is limited when respondents who have not watched the campaign are more likely to understand that their respondents are more interested in things that are more attractive to them, such as watching movies. Moreover, according to the general psychology, users often limit not watching ads because they do not bring real value to viewers or are not attractive to them.

Next, the percentage of respondents who see ads about Virtual Reality in tourism is quite modest, not yet popular in the tourism industry. However, travel companies and event organizers have begun to use virtual reality technology to provide experiences for visitors. However, it is still not very popular through the figure of 60.4% of respondents who have not seen VR ads about travel. Therefore, the level of awareness of VR advertising in tourism is quite low.

Knowledge of Virtual Reality systems

Through the above level of recognition, it can be seen that respondents are somewhat aware of VR and have watched videos/movies at a relative level. Thereby, the author assesses the respondents' knowledge level for VR through 5 levels as follows: very poor, below average, average, above average, and extremely excellent.

Table 3: Knowledge of virtual reality systems

Level	Frequency (People)	Proportion (%)
Very poor	15	10.1
Below average	30	20.1
Average	71	47.7
Above average	29	19.5
Extremely Excellent	4	2.7

Source: Data analysis from a live survey of 149 respondents on VR advertising, 2024

Of the 149 respondents surveyed, when asked about their knowledge of Virtual Reality (VR) systems, the most common answer was "average" (71 people accounted for 47.7%). Next, "below average" (30 people, accounting for 20.1%), the number of respondents with "above average" knowledge (29 people, accounting for 19.5%), "very poor" (15 people, accounting for 10.1%) and "extremely excellent" (4 people, accounting for 2.7%). Statistics show that respondents have "average" knowledge of virtual reality. In fact, respondents will have different levels of understanding of virtual reality, depending on their level of exposure to technology.

Moreover, virtual reality is a new technology and has not been widely applied in industries and professions so when there are few users and learn about this technology, the knowledge of using VR will also be limited, not well known and understood by many people. Therefore, when respondents have little contact with virtual reality, they will also have less experience with virtual reality as well as knowledge of this virtual reality system.

Besides, most of the choice of that respondent is "average". This level of knowledge is not low, accounting for nearly 48%, which clearly reflects that although the level of access to VR technology is not the highest and the extremely excellent level of knowledge accounts for the lowest percentage. However, in general, when respondents have been exposed to this technology, they have a good average knowledge to understand how to use it. Moreover, according to the information shared by a few male respondents, they already know this technology and how to operate and use VR technology. In general, it can be seen that the majority of respondents have a fairly good level of knowledge about this system.

Interest in high-tech and virtual reality technology

Reality technology is a kind of high-end and advanced technology because it creates a vivid and interactive virtual environment, which helps users experience near-realistic sensations without having to be there. Therefore, when respondents have a high level of interest in high technology, this will also mark a good development for virtual reality.

Table 4: High level of interest in technology

High level of interest in technology	Frequency (People)	Proportion (%)
Very uninterested	2	0.9
Not interested	19	8.3
Indifferent	71	30.9
Quite interested	94	40.9
Very interested	44	19.1

Source: Analysis of data from a live survey of 230 respondents on VR and Video advertising, 2024

Through the data collected from the current level of interest in high technology of users of the respondents, it shows that they are quite interested in high technology today, accounting for a total of 230 respondents, up to 94 people are quite interested in technology. This shows that the number is gratifying when most respondents are quite interested in high-tech products, when the standard of living is increasing, people will prioritize good technologies that bring more convenience. In addition, the trend of green consumption is also becoming more and more popular, consumers are increasingly interested in smart and environmental friendly consumer products. This also contributes to increasing the choice of the level of interest in high technology of respondents because of its high applicability.

Besides, when the level of interest is higher, this is a good bright spot for virtual reality technology. In contrast to this level of interest, there were 2 respondents who chose to be very uninterested, when the author asked deeply why they were not interested in high technology. Their answer is that they are not familiar with the use of technology, including phones, so they are not interested in technology products, especially high-tech. However, this is only a small number in the total number of other options, so the majority of respondents are quite interested in high-tech products.

Level of interest in virtual reality technology

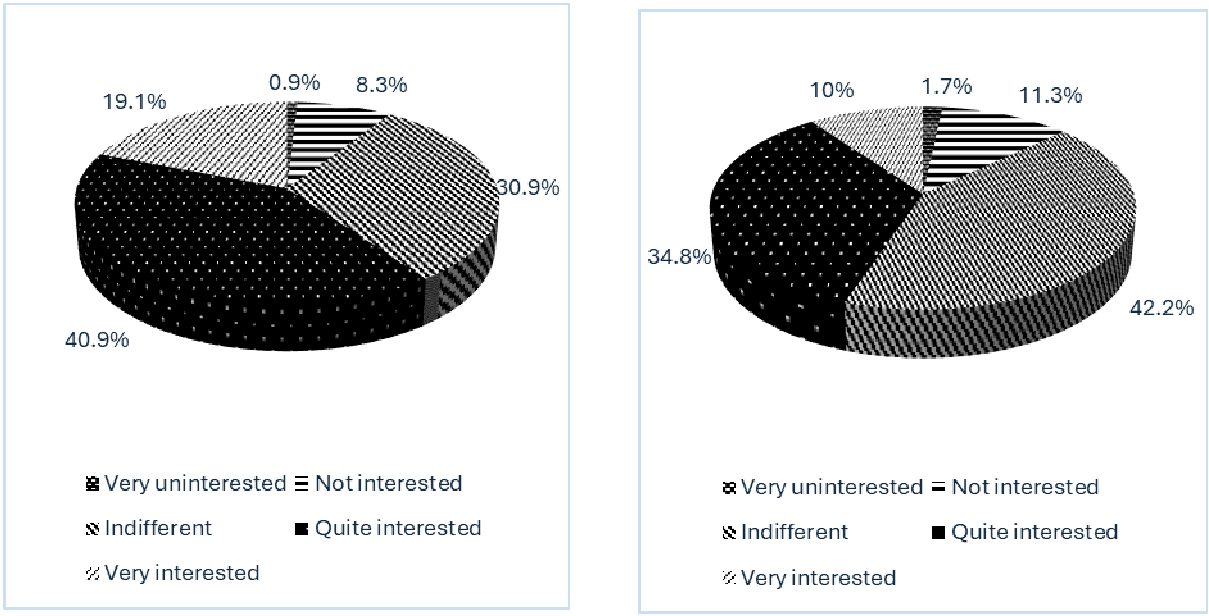
Through the information about the above level of interest in high technology, the author also raises the question of interest in virtual reality technology to make a general conclusion about the interest in this new technology.

Table 5: Level of interest in virtual reality technology

Level of interest in virtual reality	Frequency (People)	Proportion (%)
Very uninterested	4	1.7
Not interested	26	11.3
Indifferent	97	42.2
Quite interested	80	34.8
Very interested	23	10.0

Source: Analysis of data from a live survey of 230 respondents on VR and Video advertising, 2024

Through the data collected, in general, more than 42% of respondents choose to be neutral in caring about virtual reality and nearly 35% of respondents are quite interested in virtual reality technology, the number is at a positive level. Although the majority of respondents are still confused about interest in virtual reality technology, besides being quite interested in high technology, nearly 35% also mark the level of positivity in virtual reality technology that interests users today, especially the surveyed group of respondents. From the data on the level of interest in high technology on the surveyed group of respondents, they are quite interested in high technology so it also affects the interest in virtual reality technology. This is also quite reasonable when there is an impact from the interest from high technology that positively affects virtual reality technology.



Source: Analysis of data from a live survey of 230 respondents on VR and Video advertising, 2024

Figure 1: Level of interest in high technology and virtual reality

The chart shows that the level of interest in high technology is higher than virtual reality technology. This clearly proves that the level of interest in high technology is 40.9%, higher than the level of interest in virtual reality technology is 34.8%. The interest rate of technology is higher than that of virtual reality technology by more than 15%, it can be seen that although the interest in high technology is increasingly popular, however, the product of high technology is diverse, it can be products such as: smartphones, tablets, robot vacuum

cleaners, AI, AR, ... and VR is one of the high-tech technologies that are trending today. Therefore, the high-tech products that respondents are interested in are not necessarily VR.
From the above comparison chart, it can be seen that the level of interest in VR of respondents is at a level that can be seen that respondents are still confused about this new technology. Although the level of interest has decreased, this is still a pretty good level for this new technology. In addition, it can be seen that both have negative interest rates, which accounts for a low part, respondents have a significant interest in high technology, this is a positive trend for advertising with high technology, typically virtual reality technology in the next period. Therefore, VR will be more of a concern in the future if respondents have more access.

CONCLUSION

The purpose of this study is to explore Vietnamese tourists' interest in destination marketing through virtual reality. The results of the study indicate that the majority of Vietnamese tourists (nearly 86%) have heard of the term Virtual Reality. More than half of travellers (nearly 60%) have watched VR videos/movies, with a significant proportion (47.7%) having watched ads through Virtual Reality. These results show a significant level of interest among travelers in virtual reality advertising. However, the percentage of tourists who have seen virtual reality travel ads is still relatively low, indicating that virtual reality ads have not yet reached their full potential. Overall, knowledge of virtual reality among respondents and surveyed travelers showed a moderate level of interest in VR. These findings show that Vietnamese tourists have a significant interest in VR-based promotions, demonstrating future growth potential.

REFERENCES

An, S., Choi, Y., & Lee, C. K. (2021). Virtual travel experience and destination marketing: Effects of sense and information quality on flow and visit intention. *Journal of Destination Marketing & Management*, *19*, 100492.

Bamodu, O., & Ye, X. M. (2013). Virtual reality and virtual reality system components. *Advanced materials research*, *765*, 1169-1172.

Burdea, G. C., & Coiffet, P. (2003). *Virtual reality technology*. John Wiley & Sons.

Cho, Y. H., & Fesenmaier, D. R. (2000, April). A conceptual framework for evaluating effects of a virtual tour. In *Information and Communication Technologies in Tourism 2000: Proceedings of the International Conference in Barcelona, Spain, 2000* (pp. 314-323). Vienna: Springer Vienna.

Coffey, J. K., & Csikszentmihályi, M. (2016). Finding flow during a vacation. *The Routledge handbook of health tourism*, 10.

Cục Du Lịch Quốc Gia Việt nam (2024). Thông tin du lịch tháng 3/2024. https://thongke.tourism.vn/imguploads/documents/thongtindulichthang32024.pdf. (Accessed: 15/04/2024).

Gao, L., Bai, X., & Park, A. (2017). Understanding sustained participation in virtual travel communities from the perspectives of is success model and flow theory. *Journal of Hospitality & Tourism Research*, *41*(4), 475-509.

Guttentag, D. A. (2010). Virtual reality: Applications and implications for tourism. *Tourism management*, *31*(5), 637-651.

Hoffman, D. L., & Novak, T. P. (1996). Marketing in hypermedia computer-mediated environments: Conceptual foundations. *Journal of marketing*, *60*(3), 50-68.

Hsu, C. L., Chang, K. C., & Chen, M. C. (2012). Flow experience and internet shopping behavior: Investigating the moderating effect of consumer characteristics. *Systems Research and Behavioral Science*, *29*(3), 317-332.

Huang, M. H. (2003). Designing website attributes to induce experiential encounters. *computers in Human Behavior*, *19*(4), 425-442.

Kim, J., & Lennon, S. J. (2013). Effects of reputation and website quality on online consumers' emotion, perceived risk and purchase intention: Based on the stimulus-organism-response model. *Journal of Research in Interactive Marketing*, *7*(1), 33-56.

Kim, M. J., Lee, C. K., & Jung, T. (2020). Exploring consumer behavior in virtual reality tourism using an extended stimulus-organism-response model. *Journal of travel research*, *59*(1), 69-89.

Kim, Y. M., Rhiu, I., & Yun, M. H. (2020). A systematic review of a virtual reality system from the perspective of user experience. *International Journal of Human–Computer Interaction*, *36*(10), 893-910.

Marasco, A., Buonincontri, P., Van Niekerk, M., Orlowski, M., & Okumus, F. (2018). Exploring the role of next-generation virtual technologies in destination marketing. *Journal of Destination Marketing & Management*, *9*, 138-148.C. Goossens. Tourism information and pleasure motivation (2000). *Annals of Tourism Research*. https://doi.org/10.1016/S0160-7383(99)00067-5

Mario A. Gutiérrez A., Vexo, F., & Thalmann, D. (2008). *Stepping into virtual reality*. Springer.

Novak, T. P., Hoffman, D. L., & Duhachek, A. (2003). The influence of goal-directed and experiential activities on online flow experiences. *Journal of consumer psychology*, *13*(1-2), 3-16.

O'Cass, A., & Carlson, J. (2010). Examining the effects of website-induced flow in professional sporting team websites. *Internet research*, *20*(2), 115-134.

Schroeder, R. (1993). Virtual reality in the real world: history, applications and projections. *Futures*, *25*(9), 963-973.

Wang, L. C., & Hsiao, D. F. (2012). Antecedents of flow in retail store shopping. *Journal of retailing and consumer services*, *19*(4), 381-389.

Yung, R., & Khoo-Lattimore, C. (2019). New realities: a systematic literature review on virtual reality and augmented reality in tourism research. *Current issues in tourism*, *22*(17), 2056-2081.

Yung, R., Khoo-Lattimore, C., & Potter, L. E. (2021). Virtual reality and tourism marketing: Conceptualizing a framework on presence, emotion, and intention. *Current Issues in Tourism*, *24*(11), 1505-1525.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

CRITICAL SUCCESS FACTORS OF OPERATION MANAGEMENT: PERSPECTIVES FROM NORTHERN MALAYSIA ENGINEERING INDUSTRY

Lim Chong Luen
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

Chia Huai Kang
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

Herman Shah Anuar
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

ABSTRACT
Operations management plays a crucial role in enhancing efficiency and effectiveness within the engineering industry, particularly in Northern Malaysia. This study aims to identify the critical success factors (CSFs) influencing operations management in this region through quantitative methodologies, including questionnaire surveys with industry professionals. The engineering industry encompasses sectors such as electronics and electrical manufacturing, automotive manufacturing, aerospace manufacturing, and medical devices manufacturing, contributing significantly to regional economic growth, employment generation, and technological innovation. The research objectives are to identify these CSFs, evaluate their relative importance from industry perspectives, and provide actionable insights for stakeholders. A quantitative research methodology was employed, utilising a structured survey questionnaire distributed electronically via Google Forms. The questionnaire focused on technological advancement, skilled workforce, supply chain integration, and sustainability practices as key CSFs. A sample size of 10 respondents from Northern Malaysian engineering Industry participated, ensuring robust statistical analysis. Data analysis involved descriptive statistics to interpret survey responses, calculating mean scores for each CSF to gauge its perceived importance. Findings indicate that supply chain integration received the highest average score, highlighting its critical role in enhancing operational efficiency. Technological advancement and skilled workforce also ranked prominently, whereas sustainability practices were perceived as less critical. In conclusion, this study underscores the significance of supply chain integration, technological advancement, and workforce competence in driving operational success within the Northern Malaysian engineering Industry. Recommendations for future research include expanding the study to include qualitative methods for deeper insights and exploring specific challenges and opportunities for sustainable practices implementation. This study provides valuable insights for Industry practitioners, policymakers, and researchers seeking to optimise operations management practices in the dynamic context of Northern Malaysian engineering.
Keywords: Critical Success Factors, Technological Advancement, Skilled Workforce, Supply Chain Integration, Operation Management, Engineering Industry

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

ISSUES AND CHALLENGES IN OPERATION MANAGEMENT: PERSPECTIVES FROM THE NORTHERN MALAYSIA ACCOUNTING INDUSTRY

Siti Anilah Ardenieti
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

Panisha Ssri
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

Herman Shah Anuar
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

Abstract
This article investigates the operational challenges faced by the accounting industry in Northern Malaysia, focusing on operation management. Through a comprehensive study, it identifies and analyse key issues, including the integration of advanced accounting practices, technological adaptation, cultural and structural differences, and the regulatory environment. By employing a quantitative approach, utilizing a structured survey questionnaire distributed via Google Forms, the research uncovers significant barriers and facilitators to effective operation management within accounting firms. The findings reveal that while the integration of advanced accounting practices such as automation and data analytics has the potential to enhance operational efficiency, many firms struggle with the financial investments and strategic planning required for successful implementation. The move towards automation and data analytics promises increased efficiency and accuracy in accounting processes, yet the initial costs and the need for long-term strategic planning often pose significant hurdles. This indicates a gap between the potential benefits of these technologies and the readiness of firms to adopt them. Technological adaptation is crucial for maintaining competitiveness, yet it is often hindered by resistance to change, the high costs associated with new technologies, and the need for continuous staff training and development. Cultural and structural differences within firms, including variations in communication styles, hierarchical attitudes, and work ethics, significantly impact operational efficiency. The diverse cultural landscape of Northern Malaysia requires tailored management approaches to leverage the strengths of this diversity. Additionally, the regulatory environment poses substantial challenges, as firms must continually adapt to evolving compliance requirements, which can strain resources and divert focus from core business activities. The article concludes with actionable recommendations aimed at improving operational strategies within accounting firms. These include investing in technology and training, implementing cultural competency programs, developing robust regulatory compliance systems, employing strategic change management practices, and establishing collaborative networks. These recommendations are intended to guide accounting professionals and policymakers in addressing current challenges, enhancing operational efficiency, and leveraging opportunities for growth within Northern Malaysia's accounting sector. The insights provided by this research offer a roadmap for fostering a culture of continuous improvement and innovation, ensuring the industry remains resilient and competitive in a rapidly evolving global landscape.
Keywords: Issues and Challenges, Advance Accounting Practices, Operation Management, Accounting Industry

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

CRITICAL SUCCESS FACTORS OF OPERATION MANAGEMENT: PERSPECTIVES FROM NORTHERN MALAYSIA TOURISM INDUSTRY

Tan Suan Ching
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

Lee Che Keat
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

Herman Shah Anuar
Othman Yeop Abdullah Graduate School of Business, Universiti Utara Malaysia

ABSTRACT

This study investigates the critical success factors (CSFs) of operation management within the tourism industry of Northern Malaysia, a region known for its rich cultural heritage and natural beauty. This study aims to identify and analyze the critical success factors that contribute to the operational success of tourism businesses in this region. The research utilizes a quantitative approach, gathering data from 20 local community respondents via surveys to understand the operational dynamics within the industry. Key findings identify resource management as a fundamental component, highlighting the need for efficient utilisation of human and material resources to ensure operational continuity. Besides, the integration of technology, such as digital booking systems and data analytics, emerges as another critical factor and it helps to improve customer service and operational efficiency. Service quality is emphasised as a key factor that influences tourist satisfaction and repeat visitation. Well-trained staff are essential for maintaining high service standards and stakeholder collaboration is crucial to create a cohesive operational environment through effective partnerships between tourism operators, government agencies, local communities, and related industries. Next, sustainability practices are highlighted as essential for balancing economic benefits with environmental and social responsibilities. Eco-friendly accommodations, responsible waste management, and community-based tourism initiatives are the key strategies to preserve Northern Malaysia's natural and cultural assets while ensuring long-term viability. This study reveals that investment in staff training, the adoption of digital tools, continuous service quality improvement, and collaborative stakeholder efforts are crucial for enhancing the tourism sector's operational success in Northern Malaysia. In conclusion, effective resource management, technological integration, service quality, stakeholder collaboration, and sustainability are identified as essential CSFs, providing valuable insights and practical recommendations for developing strategies that ensure sustainable growth and competitiveness, contributing to the country's economic development.

Keywords: Critical Success Factors, Resource Management, Technological Integration, Service Quality, Stakeholder Collaboration, Sustainability

INVESTIGATION OF ANTIOXIDANT ACTIVITY OF BEE POLLEN EXTRACT ADDITIVE READY PACK TARHANA

Asst. Professor. Duygu Nur ÇOBANOĞLU
Bingöl University, Department of Crop and Animal Production, Vocational School of Food, Agriculture and Livestock
ORCID: 0000-0002-8583-8114

İkranur FELEK
Research Assistant, Bingöl University, Department of Nutrition and Dietetics, Faculty of Health Sciences
ORCID: 0000-0001-9503-5772

ABSTRACT
Considering today's health problems such as cancer, diabetes, and cardiovascular problems, these conditions have been associated with increasingly unhealthy dietary habits. As a result, consumers have started to prefer functional products at an increasing rate in recent years. Tarhana is a traditional product consumed in certain regions of the Middle East, Asia, and Europe. Although its variety differs from region to region, it is essentially obtained by fermenting yogurt, wheat flour, vegetables, and spices. Tarhana is a nutrient-rich food containing protein, organic acids, free amino acids, macro and micro elements, and B group vitamins. Bee pollen is a bee product that honeybees collect from plant pollens and combine with their own secretions to form pellets. Bee pollen contains carbohydrates, protein, fatty acids, minerals, vitamins, and phenolic compounds. Studies have shown that bee pollen exhibits various biological activities such as antioxidant, antimicrobial, anti-inflammatory, and anticancer due to the bioactive components it contains. Palynological analysis is a fundamental tool in bee pollen studies. It involves examining pollen grains to determine the botanical source of the pollen, which affects the composition and nutritional properties of bee pollen. In this study, different proportions of bee pollen extract, whose botanical source was determined by palynological analysis, were added to ready pack tarhana to examine the effect of bee pollen on the antioxidant composition of tarhana. Further research should be conducted to better understand the properties of new product resulting from the addition of bee pollen extract to tarhana.
Keywords: Bee pollen, tarhana, antioxidant, functional food

INTRODUCTION
The impact of food is considered significant in supporting growth and development, minimizing the risk of chronic diseases, and adapting to a healthy lifestyle. When all these features are considered, it is known that our traditional food, tarhana, is a food with important health benefits (Işık et al., 2023). Tarhana is a traditional Turkish soup made from a mixture of wheat flour, yogurt, yeast, various vegetables, and spices. It is also produced in different countries and known by different names. In Albania, it is called "trahana," in Bulgaria "trahana," in Greece "trahanas," in Egypt "kisk," and in Iran "kushuk" (Ertaş et al., 2009; Göncü, 2024). The tarhana produced in our country varies regionally in terms of production methods and content. The basic principle of tarhana production involves mixing and kneading spices and vegetables with flour and yogurt, followed by fermentation with the help of yeast and yogurt bacteria. The mixture, after the completion of the fermentation stage, is first dried and then ground into a powder.

The obtained powdered mixture is usually consumed as a soup (Coşkun, 2014; Bilgin et al., 2022). Due to its composition from different food groups, tarhana has significant nutritional properties. It is rich in proteins, vitamins, macro, and microelements (Ömeroğlu et al., 2023). Additionally, amino acids, B-group vitamins, and organic acids are present in its structure (Tangüler and Tatlısoy, 2022). Furthermore, various health-beneficial metabolites are released during tarhana fermentation. Esters, aldehydes, ketones, sulfur, and phenols are some of the groups released during tarhana fermentation (Gocmen et al., 2004). Carbohydrates and proteins are partially hydrolyzed through fermentation, resulting in tarhana, a product that is easier to digest (Bilgiçli and İbanoğlu, 2007). The production of exopolysaccharides by lactic acid bacteria through fermentation makes tarhana a valuable food (Şentürk et al., 2020). Due to its good properties, studies investigating the technological features, functional properties, and the effects of drying processes on tarhana are gaining importance (Işık et al., 2023). In literature, various studies have been conducted on the addition of foods like pomegranate seed, grape seed, raspberry, blackberry, blueberry, and rosehip to improve the functional properties of tarhana (Erol and Özdestan Ocak, 2020; Akan and Ocak, 2019; İstek et al., 2021).

Bee pollen is a product made by honey bees from plant pollen (Barbieri et al., 2020). The process of making bee pollen involves honey bees collecting pollen from plants, mixing it with salivary enzymes, nectar and storing it in specific baskets on their hind legs, resulting in the formation of bee pollen granules (Dundar, 2021). Bee pollen is a valuable source of proteins, carbohydrates, lipids, dietary fibers, vitamins, minerals, and phenolic compounds, making it a functional food with potential therapeutic properties (Bakour et al., 2023). Bee pollen is known for containing over 250 biologically active substances, including phenolic compounds, amino acids, carbohydrates, lipids, enzymes, vitamins, and bio-elements, all contributing to its antioxidant properties (Tutun et al., 2021). The nutritional composition of bee pollen can vary based on its botanical origin, with different bee pollen loads exhibiting specific physicochemical properties and spectral profiles related to the plants from which the pollen was collected (Castiglioni et al., 2019). The nutritional profile of bee pollen includes a wide range of secondary plant metabolites such as tocopherol, niacin, polyphenols, carotenoids, and enzymes, making it a valuable dietary supplement with potential health benefits (Denisow & Denisow-Pietrzyk, 2016). Bee pollen is recognized for its therapeutic properties, including being rich in antioxidants and having anti-inflammatory, anticarcinogenic, and anti-infective properties (Denisow & Denisow-Pietrzyk, 2016). Additionally, bee pollen has been studied for its antimicrobial and nutraceutical potential, showcasing its significance in promoting health and combating oxidative stress (Gabriele et al., 2020). Bee pollen can serve as a dietary supplement due to its high content of essential nutrients, Moreover, enriching products with bee pollen can enhance their nutritional and functional properties bee pollen has been considered for fortifying food products such as beef burgers, highlighting its potential as a natural antioxidant in meat products (Heldt et al., 2019). The addition of bee pollen to yogurt has been found to extend the shelf life of the product, improve its appearance, taste, odor, and cohesiveness (Algethami et al., 2022).

In conclusion, products enriched with bee pollen offer a wide array of bioactive compounds that can contribute to human health and well-being. The diverse composition of bee pollen, enriched with essential nutrients and antioxidants, makes it a valuable functional food with potential therapeutic applications.

This study aims to investigate, for the first time, the effect of adding bee pollen extract in varying proportions to tarhana extract on the antioxidant activity and total phenolic content of tarhana.

MATERIAL AND METHODS

Material

Bee pollen was obtained from beekeepers in Bingöl province, Türkiye. Tarhana was also bought from local markets in Bingöl province.

Methods

Palynological Analysis

Analysis of bee pollen using light microscopy was performed using the method of Cobanoglu et al. (2023). Initially, 2 g of bee pollen was homogenized using a 70% ethanol solution (13 mL). Homogenization was performed by holding the sample and ethanol mixture in an ultrasound bath for 5 minutes. After homogenization, the mixture was centrifuged at 3500 rpm for 15 min using an centrifuge to obtain a precipitate. This precipitate was then diluted with a 1:1 water/glycerin mixture.To prepare the samples for light microscopy, 20 µL of the suspension was applied to a microscope slide. The suspension was mixed with glycerin gelatin containing basic fuchsin.The microscope slides were then examined under an LED optical microscope (Leica DM 2500, Leica Microsystems, Germany) at 600X and 1000X magnifications.

The pollen composition of the examined sample has been categorized as follows:

Monofloral: This category includes samples where a dominant pollen type constitutes more than 80% of the total pollen content. If there is no pollen present in the range of 15-45%, the range is extended to 46-80% (Barth et al., 2010).

Bifloral: Bifloral samples contain two different pollen types. One type should constitute 46% to 80% of the total pollen, while the other type should constitute 15% to 45%. This also includes cases where both types fall within the 46-80% range.

Multifloral: The multifloral category includes samples containing more than two different pollen types.

Extracts Preparation

Tarhana and bee pollen samples (5 g) were weighed and dissolved in 50 mL of 70% methanol (1/10: W/V). The mixture was vortexed so that it could dissolve completely. The solutions were kept at room temperature for 60 min in the ultrasonic bath for extraction. Then the mixtures were centrifuged at 3500 rpm for 10 minutes. The supernatant part was removed and passed through the filter paper.

Bee Pollen-Tarhana Formulations

Bee pollen extract was added to the prepared tarhana extract in varying proportions as 0.5%, 1%, 2%, 5%, 7.5% and 10%. Bee pollen-tarhana extract solutions prepared in different proportions were vortexed and complete mixing was ensured. The solutions were stored at -20 °C until the analyses.

Determination of Total Phenolic Content (TPC)

Total phenolic contents of bee pollen, tarhana and bee pollen-tarhana extracts at different concentrations (0.5%, 1%, 2%, 5%, 7.5% and 10%) were made by modifying the Folin-Ciocalteu method. It was prepared with 0.2 N Folin reagent and 7.5% $NaCO_3$ pure water. The results were calculated as gallic acid equivalent. For the gallic acid calibration curve, gallic acid solutions of varying ratios of 7.81-500 µg/mL were prepared with methanol. The pipetting process was carried out in 3 iterations. The specimens were kept in the dark for 2 hours. At the end of the period, absorbance values were recorded with a spectrophotometer at a wavelength of 760 nm (Silinkard and Singleton, 1977).

ABTS•+ (2,2'-azinobis-(3-ethylbenzothiazoline-6-sulfonate)) Analysis

ABTS radical cation activities of bee pollen, tarhana and bee pollen-tarhana extracts of different concentrations (0.5%, 1%, 2%, 5%, 7.5% and 10%) were tested. 7 mM ABTS solution was prepared with 25 mL of pure water by mixing 2.45 mM K2S2O8 potassium persulfate. The solution is kept in the dark for 12-16 hours. The ABTS•+working solution in the absorbance range of 0.750-0.800 was adjusted with ethanol in a spectrophotometer at a wavelength of 734 nm from the prepared ABTS stock solution. The results were calculated as trolox equivalent. For the trolox calibration curve, troloxes solutions at concentrations of 20, 40, 80, 120, 160 and 200 µM were created and used in the standard curve. The pipetting process was performed in 3 repitations. The samples were kept in the dark for 30 minutes and measured at a wavelength of 734 nm and absorbance values were recorded (Re et al., 1999).

DPPH• (2,2-Diphenyl-1-picrylhydrazyl radical) Analysis

DPPH radical activities of bee pollen, tarhana and bee pollen-tarhana extracts at different concentrations (0.5%, 1%, 2%, 5%, 7.5% and 10%) were tested. 0.1 mM DPPH solution was prepared with ethanol. The results were calculated as trolox equivalent. For the trolox calibration curve, trolox solutions at concentrations of 20, 40, 80, 120, 160, 200 and 240 µM were prepared and used in the standard curve. The pipetting process was performed in 3 repitations. The samples were kept in the dark for 50 minutes and measured at a wavelength of 517 nm and absorbance values were recorded (Brand-Williams et al., 1995).

Statistical Analysis

Statistical significance was analyzed by one-way ANOVA followed by Tukey post-hoc test using the program JMP 5.0.1.

RESULTS AND DISCUSSION

According to the palynological analysis, botanical origin of bee pollen sample was given in Table 1.

Table 1. Paynological analysis result of bee pollen sample

Sample	Geographical origin	Collection Date	Botanical Origin	Pollen types and frequency (%)
Bee pollen	Bingöl	2023	Monofloral *Hypericum* spp.	*****: *Hypericum* spp.(81.6)
				****: -
				***: -
				**:*Campanula*(3.5), *Sanguisorba* (3.5), Poaceae (3.5)
				*: *Crepis* (1.8), *Hedysarum* (0.9), *Pedicularis* (0.9), *Plantago* (0.9), Scrophulariaceae (1.8), *Verbascum* (1.8)

Notes: *****: > 80%; **** 46-80%; *** 15-45%; ** 3-15%; * < 3

In total, ten pollen taxa were identified belonging to nine families. Bee pollen was classified as monofloral *Hypericum* spp.(81.6%). The palynological examination of the bee pollen sample from Bingöl revealed *Hypericum* spp. as the predominant taxon.

This finding suggests that the pollen sample was collected in an area where this plant is quite prevelant. The results were consistent with those of the bee pollen studied by Çobanoğlu et al. (2023) which included polliniferous plant species with honeybee from the Bingöl region. TPC, ABTS•$^{+}$ and DPPH• values of the samples are given in table 2.

	TPC	ABTS•$^{+}$	DPPH•
Bee Pollen	12.61±0.59a	2.25±0.05a	1.06±0.03a
Tarhana	1.43±0.16e	1.70±0.07b	1.07±0.09a
0.5%	1.49±0.13e	1.55±0.10b	1.06±0.07a
1%	1.60±0.04de	1.55±0.11b	1.04±0.06a
2%	1.93±0.16cde	1.59±0.07b	1.17±0.01a
5%	2.22±0.06bcd	1.62±0.05b	1.07±0.06a
7.5%	2.50±0.03bc	1.75±0.15b	1.11±0.04a
10%	2.77±0.24b	1.70±0.26b	1.11±0.07a

Table 2. TPC and antioxidant activty of tarhana extracts enriched with bee pollen extracts
Note: TPC results were given as mg GAE/g extract: ABTS•$^{+}$ and DPPH• results were given as mg TE/g. The difference between letters in the same column for ABTS•$^{+}$ and TPC is significant ($P<0.01$). For DPPH•, the difference between the letters in the same column is insignificant ($P=2.2166$)

Bee pollen extract and tarhana extract were used as controls. TPC values varied between 1.43±0.16-12.61±0.59. The highest TPC value was found in bee pollen extract and the lowest TPC value was found in tarhana extract. An increase was observed in the TPC values of tarhana extracts to which bee pollen extract was added. The TPC value of tarhana increased as the concentration of bee pollen extract was increased. The highest ABTS•$^{+}$ value was found in bee pollen extract. There was no significant difference between the ABTS•$^{+}$ values of tarhanas to which bee pollen extract was added and the ABTS•$^{+}$ values of tarhana extract ($P=0.4104$). No significant difference was found between bee pollen, tarhana extract and tarhana extracts supplemented with bee pollen extract.
The Based on the obtained results, it is evident that bee pollen exhibits significantly higher values for Total Phenolic Content (TPC), ABTS•$^{+}$, and DPPH• antioxidant activity compared to tarhana and its various fortifications with bee pollen extracts. Bee pollen recorded the highest TPC (12.61±0.59 mg GAE/g), indicating its superior phenolic content, which is crucial for its antioxidant capacity. The ABTS•$^{+}$ assays further confirmed the potent antioxidant activity of bee pollen, with value of 2.25±0.05 mg TE/g.
In contrast, tarhana, both in its pure form and with increasing concentrations of bee pollen (0.5% to 10%), showed significantly lower TPC values. The TPC increased gradually with the addition of bee pollen, with the 10% fortification reaching 2.77±0.24 mg GAE/g, which is still considerably lower than pure bee pollen. The ABTS•$^{+}$ values of tarhana and its fortifications were also lower compared to bee pollen. The ABTS•$^{+}$ values ranged from 1.55±0.10 to 1.75±0.15, and DPPH• values were between 1.04±0.06 and 1.17±0.01, indicating moderate antioxidant activity.
Eker and Bozok (2017) added mushroom powder to tarhana in different proportions. Similar to our study, an increase in TPC was observed, while in contrast to this study, an increase in DPPH• and ABTS•$^{+}$ antioxidant activities was also observed. In contrast, tarhana enrichment with black carrot extract had higer DPPH• activity (Şahin and Sönmez, 2024).

CONCLUSION

Based on the obtained results, it is evident that bee pollen exhibits significantly higher values for Total Phenolic Content (TPC), ABTS•$^{+}$, and DPPH• antioxidant activity compared to tarhana and its various fortifications with bee pollen extracts. These findings suggest that while the addition of bee pollen to tarhana enhances its phenolic content and antioxidant activity, the levels achieved are still much lower than those found in pure bee pollen. Therefore, fortifying tarhana with bee pollen can improve its nutritional and functional properties, but the enhancement is dose-dependent and does not fully replicate the high antioxidant capacity of bee pollen itself.

REFERENCES

Akan, S., & Ocak, Ö. Ö. (2019). Evaluation of storage time and grape seed extract addition on biogenic amines content of tarhana: A cereal- based fermented food. Food Science, 111, 861–868.

Algethami, J. S., El-Wahed, A. A., Elashal, M. H., Ahmed, H. R., Elshafiey, E. H., Omar, E. M., … & El-Seedi, H. R. (2022). Bee pollen: clinical trials and patent applications. Nutrients, 14(14), 2858.

Bakour, M., Laaroussi, H., Ferreira-Santos, P., Genisheva, Z., Ousaaid, D., Teixeira, J. A., … & Lyoussi, B. (2022). Exploring the palynological, chemical, and bioactive properties of non-studied bee pollen and honey from morocco. Molecules, 27(18), 5777.

Barbieri, D., Gabriele, M., Summa, M., Colosimo, R., Leonardi, D., Domenici, V., … & Pucci, L. (2020). Antioxidant, nutraceutical properties, and fluorescence spectral profiles of bee pollen samples from different botanical origins. Antioxidants, 9(10), 1001

Bilgiçli, N. & Ibanoğlu, S. (2007). Effect of wheat germ and wheat bran on the fermentation activity, phtyic acid content and colour of tarhana, a wheat flour yogurt mixture, Journal of Food Engineering, 78, 681-686.

Bilgin, D. G., Özhanli, H., Mutlu, C., & Erbas, M. (2022). Tarhana as a food aid suggestion to the world food program. Journal of Food & Nutrition Research, 61(2), 107–115.

Brand-Williams W, Cuvelier M E, Berset C (1995). Use of A Free Radical Method to Evaluate Antioxidant Activity. Lebensmittel-Wissenschaft and-Technologie-Food Science and Technology, 28, 25–30.

Castiglioni, S., Astolfi, P., Conti, C., Monaci, E., Stefano, M., & Carloni, P. (2019). Morphological, physicochemical and ftir spectroscopic properties of bee pollen loads from different botanical origin. Molecules, 24(21), 3974.

Coşkun, F. (2014). Tarhananın tarihi ve Türkiye‟de tarhana çeşitleri, Gıda Teknolojileri Elektronik Dergisi, 9 (3), 69-79.

Çobanoğlu, D. N., Temizer, İ. K., Candan, E. D., Yolcu, U., & Güder, A. (2023). Evaluation of the nutritional value of bee pollen by palynological, antioxidant, antimicrobial, and elemental characteristics. European Food Research and Technology, 249(2), 307-325.

Denisow, B. and Denisow-Pietrzyk, M. (2016). Biological and therapeutic properties of bee pollen: a review. Journal of the Science of Food and Agriculture, 96(13), 4303-4309.

Dundar, A. N. (2021). Total phenolic and antioxidant bioaccessibilities of cookies enriched with bee pollen. Journal of Food Processing and Preservation, 46(6).

Eker, T., & Bozok, F. (2017). Effect of edible mushroom powder on antioxidant activity of Tarhana, Indian Journal of Pharmaceutical Education and Research, 51(3), 278-280.

Ertaş, N., Sert, D., Demir, M. K., Elgün, A. (2009). Effect of whey concentrate addition on the chemical, nutritional and sensory properties of tarhana (a Turkish fermented cereal based food), Food Science and Technology. Research, 15 (1), 51-58.

Erol, T., & Özdestan Ocak, O. (2020). Influence of pomegranate seed extract on the formation of biogenic amines in a cereal based fer mented food: Tarhana. Journal of Food Science and Technology, 57, 4492–4500.

Bakour, M., Laaroussi, H., Ousaaid, D., Menyiy, N. E., Hano, C., & Lyoussi, B. (2023). Bee pollen as functional food: insights into its composition and therapeutic properties. Antioxidants, 12(3), 557.

Gabriele, M., Frassinetti, S., & Pucci, L. (2020). Antimicrobial activity and nutraceutical potential of tuscan bee-pollens on oxidative and endoplasmic reticulum stress in different cell-based models. The 1st International Electronic Conference on Food Science and Functional Foods.

Gocmen, D., Gurbuz, O., Roussef, R. L., Smoot, J. M., Dagdelen, A. F., 2004. Gas chromatographic-olfactometric characterization of aroma active compounds in sun-dried and vacuum-dried tarhana, Europien Food Research and Technology, 218, 573-578.

Heldt, L. F. S., Pereira, D., Souza, B. R., Almeida-Muradian, L. B., & Carpes, S. T. (2019). Fortification of beef burger with the addition of bee pollen from Apis mellifera L. Emirates Journal of Food and Agriculture, 31(11), 895-901.

Işık, M. S., Bilgin, R., Gökırmaklı, Ç., Şatır, G., & Güzel-Seydim, Z. B. (2023). Determination of the Effects of Different Drying Methods on Tarhana with Improved Functional Properties. Turkish Journal of Agriculture-Food Science and Technology, 11(3), 460-469.

İstek, Ö., Tomar, O., & Çağlar, A. (2021). Functional properties of forest fruit tarhana. European Journal of Science and Technology, 22, 118 127.

Ömeroğlu, E. E., Can, Ö., Temiz, Ş. N., Al, R., Altunbaş, O., & Yurt, M. N. Z. (2023). Bacterial microbiota and chemical properties of Turkish Tarhana.

Re, R., Pellegrini, N., Proteggente, A., Pannala, A., Yang, M. and Rice-Evans, C.(1999). Antioxidant activity applying an improved ABTS radical cationdecolorization assay, Free Radical Biology and Medicine, 26, 1231–1237

Sahin, Z. and Sönmez, F. (2024). Comparison of physical, chemical and sensory analyzes of tarhana containing black carrot extract and classical tarhana. Turkish Journal of Food and Agriculture Sciences, 6(1), 63-71.

Slinkard, K. and Singleton, V. L. (1977). Total Phenol Analysis: Automation and comparison with manual methods. American Journal of Enology and Viticulture, 28 (1), 49-5.

Şentürk, D. Z., Dertli, E., Erten, H., & Şimşek, Ö. (2020). Structural and technological characterization of ropy exopolysaccharides produced by Lactobacillus plantarum strains isolated from Tarhana. Food Science and Biotechnology, 29(1), 121-129.

Tanguler, H., & Tatlısoy, A. (2022). Evaluation of shalgam residuals as a partial wheat flour substitution in tarhana production as a green food product. Journal of Food Processing and Preservation, 1–12.

Tutun, H., Kaya, M. M., Usluer, M. S., & Kahraman, H. A. (2021). Bee pollen: Its antioxidant activity. Uludağ Arıcılık Dergisi, 21(1), 119-131.

VITAMIN D IN PREGNANCY

Melike DURMUŞ
Şişli Hamidiye Etfal Training and Research Hospital
ORCID: 0009-0002-3554-9944

Assoc. Prof. Dr. Handan ÖZCAN[2]
University of Health Sciences, Faculty of Health Sciences, Department of Midwifery
ORCID: 0000-0002-7131-1856

ABSTRACT
Vitamin D is an essential vitamin that our body needs from birth to death. It ensures that calcium is used actively in the body. It helps in bone and tooth development and strengthens the immune system. The main source of vitamin D is the sun. Vitamin D becomes active by being absorbed through the skin from sunlight. Plant and animal foods meet a small portion of the body's vitamin D needs. Today, vitamin D deficiency has become a significant problem. Lifestyle changes over the years (such as spending long periods indoors and using sunscreen) have led to an increase in the rate of vitamin D deficiency. Vitamin D is an important vitamin that needs to be used during pregnancy. Vitamin D deficiency can lead to maternal and perinatal complications. It can cause tooth decay and deteriorate bone health in pregnant women. It is also believed to be associated with metabolic diseases. The presence of vitamin D deficiency during pregnancy can cause rickets in newborns and children. The daily dosage of vitamin D supplements varies among international organizations. The Ministry of Health has a program for pregnant women to use vitamin D supplements. In our country, it is recommended that both normal and high-risk pregnant women use vitamin D supplements. In primary health care institutions, pregnant women should be informed about the use of vitamin D and supported. Pregnant women with low socioeconomic status should be identified and provided with the necessary support.

INTRODUCTION
Vitamin D is a fat-soluble vitamin that strengthens the immune system, affects growth in infants and children, and enables the utilization of calcium in the body. The main source of vitamin D needed by the body is the sun (90%), with only 10% obtained from food sources (1). For vitamin D to be synthesized, the skin must be exposed to sunlight. Despite many countries being located around the equator, vitamin D deficiency is prevalent today. Although Turkey is one of the countries with long sunlight exposure, the prevalence of vitamin D deficiency is high. In a study conducted by Bozkaya and colleagues, it was found that vitamin D levels were 21.0±9.3 ng/mL in men and 18.2±11.1 ng/mL in women, indicating higher deficiency in women (2). Another study evaluating women aged 14-44 found vitamin D deficiency rates ranging from 40% to 60% depending on their clothing styles (3).
Vitamin D deficiency in women has been reported to bring various risks during pregnancy. Maternal vitamin D deficiency increases the risk of rickets, neonatal hypocalcemia, and reduced bone density (4). Studies have shown that low maternal vitamin D levels increase the risk of low birth weight and cesarean deliveries (5,6). Although studies are insufficient, vitamin D deficiency during pregnancy has been associated with Gestational Diabetes Mellitus (GDM). In a study by Zhang et al., serum vitamin D levels were measured at the 16th week of pregnancy, and it was found that pregnant women diagnosed with GDM at 24-28 weeks had lower vitamin D levels compared to healthy pregnant women (7).

Although there are contradictory studies, vitamin D deficiency has also been linked to preeclampsia. Serum vitamin D levels below 15 ng/mL before the 22nd week of pregnancy increase the risk of preeclampsia by five times (8). Factors contributing to vitamin D deficiency in pregnant women include dark skin, clothing that prevents sun exposure, insufficient sunbathing, spending long periods indoors, excessive use of sunscreen, and disorders in vitamin D metabolism (9,10).

RECOMMENDATIONS

According to the World Health Organization (WHO), pregnant women with vitamin D deficiency are recommended to take 200 IU of vitamin D daily (11). The Institute of Medicine (IOM) in the USA recommends 600 IU of vitamin D daily for healthy pregnant women, with up to 4000 IU for those with a deficiency (12). The Turkish Ministry of Health recommends a single dose of 1200 IU of vitamin D from the 12th week of pregnancy until six months postpartum (13).

A vitamin D support program for pregnant women has been established by the Turkish Ministry of Health. According to this program:

1)Vitamin D supplementation can be started regardless of the pregnant women's blood levels.
2)Vitamin D supplementation begins at the 12th week, continues throughout pregnancy, and is maintained for six months postpartum.
3)The dose to be taken by pregnant women and for six months postpartum is a single dose of 1200 IU (9 drops).
4)Pregnant women are monitored for hypercalcemia, and if necessary, calcium levels in spot urine are checked.
5)Free provision of the medication is planned for pregnant women and women without sufficient socio-economic status.
6)It has been reported that pregnant women can also continue taking multivitamin supplements alongside vitamin D (13).

MIDWIFERY APPROACH TO VITAMIN D SUPPLEMENTATION IN PREGNANCY

Research has found that vitamin D deficiency is associated with many maternal and perinatal diseases. Pregnant women should be informed and supported to take supplements during the preconception period. It should be emphasized that the best source of vitamin D is the sun, and it should be noted that sunbathing for 15-30 minutes a day is beneficial. Pregnant women should be supported to undergo screenings and be informed that these screenings can be performed at the nearest family health centers. Due to diseases and maternal-neonatal adverse effects resulting from vitamin D deficiency in pregnancy, vitamin D supplementation is recommended. Postpartum, mothers should be informed about not overdressing babies and that they need vitamin D to raise awareness.

REFERENCES

1)Reis JP, von Mühlen D, Michos ED, Miller ER 3rd, Appel LJ, Araneta MR et al. Serum vitamin D, parathyroid hormone levels and carotid atherosclerosis. Atherosclerosis 2009; 207(2): 585-90.

2)Bozkaya, G., Örmen, M., Bilgili, S., & Aksit, M. D. (2017). Are we getting enough vitamin D from the sun? Turkish Clinical Biochemistry Journal, 15(1), 24-29.

Alagöl F, Shihadeh Y, Boztepe H, Tanakol R, Yarman S, Azizlerli H, Sandalci O. Sunlight

3)exposure and vitamin D deficiency in Turkish women. J Endocrinol Invest 2000;23(3):173-7.

4)Lapillonne A. Vitamin D Deficiency During Pregnancy May Impair Maternal And Fetal Outcomes. Med Hypotheses 2010; 74: 71-5.

5)Merewood A, Mehta S, Chen T, Bauchner H, Holick M. Association Between Vitamin D Deficiency And Primary Cesarean Section. J Clin Endocrinol Metab 2009, 94 (3): 940–945.

6)Gernand AD, Simhan, HN, Caritis S, Bodnar LM. Maternal Vitamin D Status and Small-for-Gestational-Age Offspring in Women at High Risk for Preeclampsia. Obstetrics & gynecology 2014, 123 (1): 40-48.

7)Zhang C, Qiu C, Hu FB, David RM, Dam RM, Bralley A, et al. Maternal plasma 25- Hydroxyvitamin D Concentrations And The Risk For Gestational Diabetes Mellitus. PLoS ONE 2008; 3 (11): 3753.1-6.

8)Bodnar LM, Catov JM, Simhan HN, Holick MF, Powers RW, Roberts JM. Maternal vitamin D deficiency increases the risk of preeclampsia. The Journal of Clinical Endocrinology & Metabolism. 2007;92(9):3517-22.

9)Landhani S, Srinivasan L, Buchanan C, Allogrove J. Presentation of vitamin D deficiency. Arch Dis Child 2004; 89(8): 781-784.

10)Gannage Yared MH, Chemali R, Yaacoub N, Halaby G. Hypovitaminosis D in a sunny country: relation to lifestyle and bone markers. J Bone Miner Res 2000; 15(9): 1856-1862.

11)World Health Organization (WHO). 2012. Guideline: vitamin d supplementation in pregnant women. Access: http://apps.who.int/iris/bitstream/10665/85313/1/9789241504935_eng.pdf?ua=1 (accessed: 25.11.2017).

12)Ross AC, Manson JE, Shapses SA. The 2011 report on dietary reference intakes for calcium and vitamin d from the institute of medicine: what clinicians need to know. The Journal of Clinical Endocrinology & Metabolism 2011;96 (1):53-8. Doi: 10.1210/jc.2010-2704.

13)Turkish Ministry of Health. 2012. Guide to the vitamin D support program for pregnant women. Access: https://www.saglik.gov.tr/TR,11158/gebelere-d-vitamini-destek-programi.html (accessed: 23.11.2017).

EPILEPSY AND PREGNANCY

Melike DURMUŞ
Şişli Hamidiye Etfal Training and Research Hospital
ORCID: 0009-0002-3554-9944

Assoc. Prof. Dr. Handan ÖZCAN[2]
University of Health Sciences, Faculty of Health Sciences, Department of Midwifery
ORCID: 0000-0002-7131-1856

ABSTACT
Epilepsy is a neurological disease commonly seen worldwide. It can occur in all age groups. The duration and frequency of epileptic seizures can change during women's puberty, menstruation, and pregnancy periods. This situation affects women most significantly during pregnancy. Epileptic pregnant women should plan their pregnancies to minimize adverse effects. The doses of antiepileptic drugs used during the preconception period should be minimized, and maximum seizure control should be achieved. Considering the risk-benefit balance, antiepileptic drugs used by epileptic pregnant women should not be discontinued during pregnancy. The pregnant woman should be monitored for teratogenic effects throughout pregnancy. There are various vitamins (such as folic acid and vitamin D) that epileptic pregnant women should take. The dosage of vitamins for epileptic pregnant women differs from that for healthy pregnant women. After being evaluated in a primary health care center, pregnant women should be referred to specialists. Epileptic pregnant women should be evaluated through the cooperation of family physicians, midwives, nurses, obstetricians, and neurologists. Midwives working in primary care should inform epileptic pregnant women and raise awareness about the conditions they need to pay attention to. Pregnant women should be evaluated with a holistic approach, and the adverse effects of the disease should be mitigated in a way that does not harm the mother or the baby.
Keywords: Epilepsy, pregnancy, vitamins, midwifery approach

INTRODUCTION
According to the International League Against Epilepsy (ILAE), founded in 1909, epilepsy is defined as the occurrence of temporary symptoms due to excessive, abnormal, and synchronous excitation of brain neurons (1). According to the World Health Organization (WHO), epilepsy is a chronic, non-communicable brain disease that manifests with seizures and can occur at any age (2). Epilepsy is one of the most common serious brain diseases, affecting approximately 50 million people worldwide (3).
There are differences in treatment during periods of hormonal changes in women, such as puberty, pregnancy, childbirth, and menopause (4). Epilepsy is particularly important to monitor carefully during pregnancy. According to the United Nations Population Fund (UNFPA), every year, 121 million women worldwide experience unwanted pregnancies without planning (5). In Turkey, 30% of married women do not use modern contraceptive methods (6). It is recommended that epileptic women use contraception methods and plan their pregnancies carefully, as contraceptive drugs can interact with antiepileptic drugs. It is noted that non-hormonal methods of contraception for epileptic women do not have side effects (7).

Epilepsy is a disease affected by hormone secretion. Processes such as menstruation, pregnancy, and childbirth cause fluctuations in estrogen, progesterone, oxytocin, and LH hormones in the body, which can trigger epileptic seizures. It is noted in the literature that the frequency of epilepsy seizures increases by one-third during pregnancy (8). In one study, 63.6% of women with epilepsy showed no change in seizure frequency during the first trimester of pregnancy, while 17.3% had increased seizure frequency, and 15.9% had decreased seizure frequency. It was also noted that there was no significant difference in seizure frequency between trimesters (9). In a retrospective study by Çim et al., the number of abortions in epileptic pregnant women was significantly higher than in healthy pregnant women (10). Although there was no significant difference in the 1-minute APGAR score, the 5-minute APGAR score decreased by 18.5% as the number of seizures increased (10). In a retrospective study by Bay et al., no statistically significant differences were found in delivery method, fetal weight, fetal death, and 1-minute APGAR scores between groups (11). It is emphasized that unplanned pregnancies should be avoided in epileptic women. Women with epilepsy planning pregnancy should be evaluated and monitored by neurologists and obstetricians/gynecologists during the preconception period, and medication doses should be adjusted.

VITAMINS RECOMMENDED FOR EPILEPTIC PREGNANT WOMEN

Folic acid (vitamin B9) is effective in the development and closure of the neural tube. The neural tube develops and closes within four weeks after fertilization. In a normal pregnancy, the recommended daily intake of folic acid is 0.4-1 mg (12). Epileptic pregnant women or those with a family history of neural tube defects should take 5 mg of folic acid. Folic acid should be started three months before pregnancy and continued for three months during pregnancy. Vitamin D is a fat-soluble vitamin that affects bone and tooth development, promotes growth in infants and children, strengthens muscles, and protects the body from infections (13). It is an important vitamin to be used during pregnancy. Even if seizures are controlled during pregnancy, vitamin D deficiency can occur in epilepsy patients (14). Vitamin D deficiency is more common in patients using enzyme-inducing antiepileptic drugs (AEDs) and those on polytherapy, and the severity of epilepsy increases the deficiency (14). A study by Öztürk et al. Reported higher rates of vitamin D deficiency in epilepsy patients (15).

Vitamin K is a clotting factor vitamin recommended for epileptic pregnant women. AEDs with active ingredients like carbamazepine and phenytoin cross the placenta and lower the fetal vitamin K levels (16). To reduce the risk of maternal and perinatal bleeding, it is recommended to start an oral supplement of 10 mg of vitamin K four weeks before delivery and administer 1 mg of intramuscular vitamin K to the newborn (17).

MIDWIFERY APPROACH TO EPILEPTIC PREGNANT WOMEN

Epileptic women are considered a high-risk pregnancy group. During the preconception period, women should be informed about pregnancy planning and supported accordingly. They should be evaluated by necessary specialists, and supplements of folic acid, vitamin D, vitamin K, and iron should be provided. Monotherapy is generally preferred in treatment. The frequency and duration of the pregnant woman’s seizures should be monitored. Sleep irregularity and excessive stress can increase the frequency of seizures in epileptic pregnant women. In counseling sessions with epileptic pregnant women, the importance of getting regular and adequate sleep and avoiding excessive stress and caffeinated beverages should be emphasized.

It is recommended to avoid tasks that require intense effort, to engage in activities that do not tire the body, and to avoid prolonged periods without food (18). Epileptic pregnant women should be evaluated with a holistic approach in collaboration with many healthcare professionals.

REFERENCES

1)Fisher RS, van Emde Boas W, Blume W, Elger C, Genton P, Lee P, et al. Epileptic seizures and epilepsy: definitions proposed by the International League Against Epilepsy (ILAE) and the International Bureau for Epilepsy (IBE). Epilepsia 2005; 46: 470-2.

2)Epilepsy is a chronic noncommunicable disease (2024). World Health Organization. Retrieved from https://www.who.int/news-room/fact-sheets/detail/epilepsy

3)Prilipko L. Atlas: Epilepsy Care in the World. WHO, 2005, pp. 7-9.

4)Öztura İ, Kutlu G, Tezer İ, Ağan K, Çokar Ö. Epilepsi tanı ve tedavi rehberi. Türk Nöroloji Derneği Yayınları-1. Galenos Yayınevi, 2021.

5)Bir kriz açığa çıkıyor (2022). UNFPA. Retrieved from https://turkiye.unfpa.org/sites/default/files/pub-pdf/brosur_tr_0.pdf

6)Çavlin A, Çağatay P. Türkiye'de karşılanmamış aile planlaması ihtiyacı. UNFPA. Hacettepe Üniversitesi Nüfus Etütleri Enstitüsü, 2020.

7)Grubu TNDÇ. Epilepsi Rehberi. Canan Aykut Bingöl C, editor. Türk Nöroloji Derneği Rehber Yayınları, 2007.

8)Thomas SV. Management of epilepsy and pregnancy. Journal of Postgraduate Medicine, 2006; 52(1): 57-64.

9)EURAP Study Group. Seizure control and treatment in pregnancy: observations from the EURAP epilepsy pregnancy registry. Neurology, 2006; 66(3): 354-360.

10)Çim N, Tolunay HE, Karaman E, Güneş Elçi G, Aksin Ş, Boza B, et al. Epilepsinin gebelik sonuçları üzerine etkisi. 2018.

11)Bay F, Alp EC, Ataş AN. Epilepsi Tanılı Gebelerin Gebelik Sonuçları ve Epilepsi Tanısı Olmayan Gebeler ile Perinatal Sonuçların Karşılaştırılması: Retrospektif Araştırma. Jinekoloji-Obstetrik ve Neonatoloji Tıp Dergisi, 2024; 21(2): 62-68.

12)Çakmak P, Minareci Y, Yuvanç O, Var T, Güngör T, Mollamahmutoğlu L. Gebelik Öncesi Dönem ve Gebelikte Folik Asit Kullanımı.

13)Terli EP, Mutlu F, Uluçay C, İrem Kılıç N, Akkır M, Atılgan O, et al. D vitamini: Yapısı, Sentezi ve Çeşitli Hastalıklardaki Önemi. Türk Tıp Öğrencileri Araştırma Dergisi, 2019; 1(1): 1-6.

14)Boz PB. Factors Affecting Serum Vitamin D Level in Epilepsy. Dicle Tıp Dergisi, 2023; 50(2): 156-164.

15)Öztürk O, Söylemez E, Baslo SA, Aksoy D, Ataklı D. Epilepsi hastalarında antiepileptik ilaçlar ve d vitamini eksikliği ilişkisi. Epilepsi, 2020; 26(2): 115-22.

16)Harden CL, Hopp J, Ting TY, Pennell PB, French JA, Allen Hauser W, et al. Management issues for women with epilepsy—Focus on pregnancy (an evidence-based review): I. Obstetrical complications and change in seizure frequency: Report of the Quality Standards Subcommittee and Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology and the American Epilepsy Society. Epilepsia, 2009; 50(5): 1229-1236.

17)Liporace J, D'Abreu A. Epilepsy and women's health: family planning, bone health, menopause, and menstrual-related seizures. Mayo Clinic Proceedings, 2003; 78(4): 497-506.

18)Freeman J, Kelly T, Freeman B. The Epilepsy Diet Treatment. 1996, pp. 36-38.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

TARIM SEKTÖRÜ VE MAKİNE KAYNAKLI KAZALAR

Fatma Zehra KARAKURT
Iğdır Üniversitesi, LEE, İş Sağlığı ve Güvenliği ABD.
ORCID: 0009-0008-1196-5955

Dr. Öğr. Üyesi Okan ÖZBAKIR
Iğdır Üniversitesi, TBMYO, Maden Teknolojisi Programı
ORCID: 0000-0001-8997-9451

ÖZET
Ülkemizde ve dünyada artan nüfusla birlikte tarımsal üretimin de önemi artmaktadır. Hızlı nüfus artışı beraberinde kaynakların yetmemesi sorununu ortaya çıkarmaktadır. Bu sorunun çözümü için de daha fazla tarım alanına ihtiyaç duyulmaktadır. Ancak tarım alanlarının sınırlılığı nedeniyle tarımsal verimlilik denilen az alandan daha fazla ürün almak gerekir. Bu ise tarımsal üretimde makineleşmenin artırılması ile sağlanabilir. Teknolojinin gelişmesiyle birlikte tercih edilen makine kullanımının birçok yararının yanında zararları da bulunmaktadır. Nitekim makinelerin yanlış ve dikkatsiz kullanımı sonucunda meydana gelen kazalar yaralanma hatta ölümle sonuçlanabilmektedir. Tarım sektöründe meydana gelen kazaların artış göstermesi, iş yaşamını da olumsuz yönde etkileyen başlıca sorunlardan biri haline gelmiştir. Tarımsal kazalar ve sonucunda ortaya çıkan yaralanmalar ve ölümler sadece bu makineler ile çalışılırken değil, aynı zamanda makinelerin tamir, bakım, ayarlama, temizleme, tıkanıklıkları giderme gibi işlem basamaklarında da ortaya çıkmaktadır. İş sağlığı ve güvenliğinin en temel amacı, meydana gelen iş kazalarını önceden engellemektir. Bu ise ancak iş kazalarının temel sebeplerinin detaylı bir biçimde araştırılmasıyla anlaşılabilir. Bu çalışmada tarım sektöründe kullanılan makinelerin iş güvenliği açısından tehlike ve risklerinin belirlenmesi amaçlanmıştır. Tarım sektöründe meydana gelen kazalardan örnekler verilerek tarım makinesi kullanıcılarının yaptıkları hatalar belirlenmiştir. Bu değerlendirmeler ışığında, tarımda yaşanan makine kaynaklı kazaların azaltılması için alınması gereken tedbirler ve yapılması gerekenler öneriler kısmında verilmiştir. Kullanıcılara verilecek güvenli makine kullanımı eğitimlerinin, dikkatli makine kullanımlarının ve makine koruyucularının varlığının tarım makineleri ile ilgili kaza risklerini azaltabileceği düşünülmektedir.
Anahtar Kelimeler: İş Sağlığı ve Güvenliği, Kaza, Tarım Sektörü, Makine Kullanımı, Tehlike, Risk.

AGRICULTURAL SECTOR AND ACCIDENTS CAUSED BY MACHINERY

ABSTRACT
With the increasing population in our country and in the world, the importance of agricultural production is also increasing. Rapid population growth leads to the problem of insufficient resources. In order to solve this problem, more agricultural land is needed. However, due to the limitation of agricultural areas, it is necessary to get more products from less area called agricultural productivity. This can be achieved by increasing mechanization in agricultural production. The use of machinery, which is preferred with the development of technology, has many benefits as well as harms. As a matter of fact, accidents that occur as a result of improper and careless use of machines can result in injury or even death. The increase in accidents in the agricultural sector has become one of the main problems that negatively affect business life.

Agricultural accidents and the resulting injuries and deaths occur not only when working with these machines, but also in the process steps such as repairing, maintaining, adjusting, cleaning, removing blockages. The main purpose of occupational health and safety is to prevent occupational accidents in advance. This can only be understood by investigating the root causes of occupational accidents in detail. In this study, it is aimed to determine the hazards and risks of the machines used in the agricultural sector in terms of occupational safety. By giving examples of accidents in the agricultural sector, the mistakes made by agricultural machinery users were determined. In the light of these evaluations, the measures to be taken and actions to be taken to reduce machine-related accidents in agriculture are given in the recommendations section. It is thought that safe machine use trainings to be given to users, careful machine use and the presence of machine protectors can reduce the risks of accidents related to agricultural machinery.
Keywords: Occupational Health and Safety, Accident, Agricultural Sector, Machinery Use, Hazard, Risk.

GİRİŞ

Artan dünya nüfusu, bu nüfusun temel gereksinimlerini karşılayabilmek için daha yüksek üretim kapasitesi gerektirmektedir. Ancak, tarım alanlarının azalması bu ihtiyacı karşılamada zorluk yaratmaktadır. Bu bağlamda, tarımsal üretim süreçlerinde makineleşme tercih edilmektedir. Makine kullanımı, tarımsal üretimde verim artışı sağlamak, iş süreçlerini kolaylaştırmak ve üreticilerin kârını artırmak gibi avantajlar sunmaktadır. Ancak, bu faydaların yanı sıra, tarım makinelerinin eğitimsiz kişiler tarafından kullanımı kazaların başlıca nedenlerinden biri olarak ortaya çıkmaktadır (Dilay ve Özkan, 2020).

İş sağlığı ve güvenliği konusu, Uluslararası Çalışma Örgütü (ILO) ve Dünya Sağlık Örgütü (WHO) tanımlarına göre, tüm mesleklerde çalışan bireylerin bedensel, ruhsal ve sosyal iyilik hallerinin en üst düzeyde tutulması, sürdürülmesi ve geliştirilmesi çalışmalarını içerir. Bu bilim dalı, kaza olduktan sonra müdahale etmek yerine kaza olasılıklarını ortadan kaldırmaya yönelik teknik bir disiplindir (Yılmaz, 2015). Tarım sektöründe çalışan birçok çalışan da çeşitli iş kazalarıyla karşılaşmakta ve bu kazalar yaralanma ve ölümle sonuçlanmaktadır. İş sağlığı ve güvenliğinin konusunda da belirtildiği üzere kaza olasılıklarını ortadan kaldırmak amacıyla çalışanlar için tehlike ve risklerin önceden belirlenmesi ve önlem alınması gerekir.

Tarımda çalışan kesimin yeterli iş sağlığı ve güvenliğinden yoksun oluşunun temel nedenleri az gelişmiş ve gelişmekte olan ülkelerde benzerlik gösterir. Bunlar arasında; çalışanların ortak bir çatı altında olmayışları, eğitim seviyesinin yetersizliği, kadın ve çocuk işçilerin fazla olması, mevsimlik işçilerin bulunması gibi nedenler sayılabilir (Orel ve ark., 2009).

Tarım sektöründeki risklerin anlaşılması ve iş ortamlarının en düşük riskli hale getirilmesi için çalışanların farkındalık düzeyinin artırılması, yöneticilere bilimsel temelli kanıtlar sunma açısından büyük önem taşımaktadır. Bu tür araştırmalar, kazalara neden olan risk ve tehlikelerin belirlenmesini amaçlar, bu risk ve tehlikelerin ortadan kaldırılmasını ve çalışanların farkındalık düzeylerinin artırılmasını hedefler (Ercan, 2010). Elde edilen bilgiler, iş ortamlarının daha güvenli hale getirilmesi için alınacak tedbirleri desteklemek adına değerli bir bilimsel temel oluşturur.

Araştırma, tarım sektöründe makine kullanımına bağlı olarak meydana gelen iş kazalarına karşı alınacak önlemleri ortaya koymaktadır. Bu sektörde çalışan kesimin karşılaşabileceği olası tehlikeleri ve bu tehlikelerden korunma yönünde alınması gereken önlemler konusunda ilgililerin bilgilendirilmesi ve farkındalık düzeylerinin arttırılması amaçlanmıştır.

1) Tarım Sektörüne Genel Bir Bakış

Tarım sektörü, gıda üretimi ve beslenme ile doğrudan ilişkisinin yanı sıra, aktif nüfus ve işgücündeki oranı, milli gelire katkısı ve çevresel sağlığın korunması açısından büyük önem taşımaktadır. Bu özellikleri nedeniyle hem ekonomik hem de sosyal boyutlarda önemli bir sektör olarak varlığını sürdürmektedir (Aybek, 2021).

Tarım, bireylerin sağlıklı ve kaliteli yaşamlarının devamlılığını sağlamak amacıyla başta beslenme ihtiyaçları olmak üzere birçok temel gereksinimi karşılayan kritik bir sektördür. Hızla artan nüfus, gıda ve diğer tarımsal ürünlere yönelik talebin de artmasına yol açmaktadır. Bu talebi karşılamak amacıyla tarım sektörü, diğer sektörlerden daha fazla işgücü gerektiren ve geniş bir iş gücünü istihdam eden bir alan olarak dikkat çekmektedir. Aynı zamanda, ülke ekonomisi üzerinde özel bir öneme sahiptir.

Tarım sektöründe iş sağlığı ve güvenliği standartlarının yeterli seviyeye ulaşamamasının temel nedenleri, az gelişmiş ve gelişmekte olan ülkelerde benzerlikler göstermektedir. Bu nedenler arasında:

- Tarım işçilerinin ortak bir ses ve temsil eksikliği,
- Eğitim düzeylerinin yetersizliği,
- Çalışanların iş sağlığı ve güvenliği konusunda yeterli bilince sahip olmamaları,
- İş sağlığı ve güvenliğine yeterli önemin verilmemesi,
- Çalışma koşullarının uygun olmaması,
- Kadın ve çocuk işçilerin yüksek oranlarda bulunması,
- Mevsimlik işçilerin fazla olması ve bu nedenle yüksek yer değiştirme oranları

yer almaktadır. Bu faktörler, sektörde iş güvenliğinin gelişimini engelleyici etmenler olarak öne çıkmaktadır (Orel ve ark., 2009).

Tarım sektörü aynı zamanda en tehlikeli sektörlerden de biridir. İş kazası sonucu meydana gelen ölümlerde tarım sektörünün payı göz ardı edilemez çoğunluktadır. Birçok tehlikeyi barındıran bu sektörde olumsuzlukları tamamen ortadan kaldırmak mümkün değildir ancak alınacak güvenlik önlemleri ile azaltılabilmesi mümkündür. Bu sebeple öncelikle bu tehlikelerin nedenleri belirlenmelidir. Tarım işlerinde çalışan kişilerin karşılaşabileceği birçok tehlike vardır. Bu çalışmada makine kullanımına bağlı kazalar üzerinde durulmuştur.

2)Tarımda Makine Kullanımı

Tarımda makine kullanımı teknolojinin de gelişmesiyle birlikte her geçen yıl artma eğilimi içerisindedir. Verim artışını sağlamak, yapılan işi kolaylaştırmak gibi faydalarından dolayı tercih edilen makine kullanımı ile üretim artmış ve işçinin yükü azalmıştır.

Tarımsal faaliyetlerde çeşitli makineler kullanılmaktadır. Bunlar arasında traktörler, toprak işleme makineleri, gübre dağıtma makineleri, çapa makineleri, ekim makineleri, hasat ve harman makineleri, çayır biçme makineleri, balya makineleri, öğütücüler, karıştırıcılar ve tarım arabaları öne çıkmaktadır.

Tarım makineleri, genellikle çok sayıda parçadan oluşan, yüksek hızda hareket eden, sıkıştırma, kesme ve döndürme işlevlerine sahip aletlerdir. Bu makinelerin kullanımı sırasında, yanlış kullanım, giysi veya diğer nesnelerin makinelere sıkışması, dikkatsizlik gibi etkenler nedeniyle birçok kaza ve yaralanma meydana gelmektedir. Bu tür kazalar bazen ölümle sonuçlanabilecek kadar ciddi olabilir. Ayrıca, tarımsal kazalar sadece makinelere doğrudan çalışma esnasında değil, aynı zamanda makinelerin tamir, bakım, ayarlama, temizleme ve tıkanıklıkları giderme işlemleri sırasında da ortaya çıkabilmektedir (Öztekin ve Temel, 2020).

Ergonomi, insan çalışma ortamı uyumu olarak tanımlanabilir. İnsan- makine- ortam uyumu sağlanarak iş sağlığı ve güvenliğine dikkat edilip kaza riskleri azaltılır.

Çalışma ortamı insan ölçülerine ve hareket kabiliyetlerine uygun olmalıdır. Birçok tarım makinesi aynı zamanda gürültü kaynağıdır. Bu gürültü sebebiyle çalışanlarda stres, baş ağrısı, dikkat dağınıklığı gibi çalışma yeteneğini azaltan semptomlar gözlenir. Ayrıca makinelerin oluşturduğu titreşimler sebebiyle kas ve iskelet sistemi rahatsızlıklarına yol açabilir. Bu sebeple çalışanın koruyucu ekipman kullanarak maruz kaldığı faktörler azaltılma yoluna gidilmelidir. Makinenin kullanımı, ayarlanması, bakım onarım işlemleri insan tarafından yapılmaktadır. Dikkatsiz çalışma ve koruyucu donanımların eksikliği sonucu kazalar insan kaynaklı kazalardır. Ve bu kazalar sonucu kalıcı sakatlıklar ve ölümler meydana gelmektedir. Bu sebeple makine kullanımında insan faktörünü gözden çıkarmamak gerekir.

Ergonomi açısından doğru makine seçilmelidir. Kullanım kolaylığı, makinenin sağlamlığı, teknik özellikleri makine seçiminde önemli faktörlerdendir. Ekonomik koşullardan dolayı teknik açıdan yetersiz ve kalitesiz makine seçimi, yapılan işi de etkileyecektir.

Tarım makinesinin bulunduğu ortam da önemlidir. Çünkü tarım makineleri bulunduğu ortamla ilişki içindedir. Örneğin toprağın yapısal özellikleri, nem değeri makinenin çalışmasını etkiler. Aynı zamanda zeminin eğimli veya yumuşak olması da makinenin çalışmasını etkiler. Eğimli araziler makinenin ilerlemesini yavaşlatıp yakıt tüketimini arttırırken yumuşak yüzeyde kayma veya patinaj görülebilir.

Makine kullanımının temel amacı, gerçekleştirilen işin nicelik ve niteliğini verimli bir şekilde artırmaktır. Küçük ölçekli arazilerde daha kısa sürede daha yüksek ürün verimi sağlanması, büyük ölçekli arazilerde ise ekonomik ve etkin çalışmalar yapılabilmesi, ancak tarımda makine ve teknoloji kullanımının entegrasyonu ile mümkün olmaktadır. Makine kullanımı, tarımsal faaliyetlerin zamanında ve hızla tamamlanmasını sağlarken, aynı zamanda iş süreçlerini kolaylaştırmaktadır. Bu avantajlar nedeniyle, tarımda makine kullanımı esnasında dikkatli olunmalı ve potansiyel kazaların önüne geçilmelidir.

3)Makine Kullanımına Bağlı Kazaların Sebepleri

Tarım sektöründe meydana gelen ölümlü iş kazalarının büyük kısmı tarım makinelerinin kullanımından kaynaklanmaktadır. Her geçen gün kullanılan makine artmış bu da tehlike ve riskleri beraberinde getirmiştir. Makineli çalışmalarda çalışanın maruz kaldığı birçok tehlike vardır. Maruz kaldığı etkiler hatalara ve bunun sonucunda kazalara yol açar. Kazalar ölüm veya kalıcı hasarla sonuçlanabilen insan kayıplarının yanında işgücü kayıpları ve bunun sonucunda üretimde meydana gelen kesintiyle sonuçlanan istenmeyen olaylardır. İş güvenliği ile bu kazaların gerçekleşmesini önleyecek tedbirler alınmalıdır.

İş kazaları ağırlıklı olarak %88 tehlikeli davranışlardan, %10 tehlikeli durumlardan, %2 kaçınılmaz durumlardan (tabiat şartları) kaynaklanmaktadır. Bu W. H. Heinrich' in geliştirdiği ve günümüzde de kabul gören Domino Etkisi teorisidir. Aslında buradaki sıkıntı hatalı davranışların düzeltilememesi, alışkanlıkların terk edilememesidir. Bu sorunun çözümü ise Güvenlik Kültürünün öğretilmesiyle mümkün olacaktır. Böylece tarım çalışanları tehlikeli davranışları terk ederek güvenli davranışları alışkanlık haline getirecek ve güvenli bir yaşam kültürü oluşturacaktır (Taş, 2021).

Makine kullanırken göz ardı edilen birçok etmen vardır. Örneğin makine onarımlarının bekletilmesi, ihmal edilmesi etmenlerden biridir. Onarımların zamanında yapılmaması daha büyük hasarlara dönüşür ve bu da hem zaman hem de maliyet olarak kayıplara yol açar. Bu sebeple bakım ve onarım işleri bekletilmeden yapılmalıdır. Aynı şekilde makineler doğru ayarlarda çalıştırılmalı aşırı zorlanmalardan kaçınılmalıdır. Makinenin kullanma kılavuzuna göre hareket edilmesi arızaların oluşmasını önleyecektir.

- Ülkemizde tarım sektöründe makine kullanımıyla ilişkili ölümlü kazaların analizi, çeşitli sorunları ortaya koymaktadır. Bu sorunlar şunları içermektedir:
- İşin niteliğine uygun olmayan makinelerin kullanılması,
- Çalışanların iş sağlığı ve güvenliği kurallarına yeterince önem vermemesi,
- Tarım çalışanlarının mesleki becerilerinin yetersiz olması,
- Güvenli çalışma yöntemlerinin izlenmemesi veya uygulanmaması,
- İş sağlığı ve güvenliği standartlarına uygun olmayan bakım ve onarım yöntemlerinin kullanılması,
- Makineyi güvenli bir şekilde durdurma prosedürlerinin uygulanmaması,
- Makine koruyucu ekipmanlarının eksik veya yetersiz olması,
- Operatörlerin yeterli eğitim ve deneyime sahip olmaması,
- Makinelerin periyodik bakım ve kontrollerinin zamanında yapılmaması,
- Birçok makinenin CE işaretlemesine uygun olmadan piyasaya sunulması,
- Yeni alınan makinelerin deneme-yanılma yöntemiyle işletilmesi.
- Yorgunluk, dikkat dağınıklığı
- Talimatlara aykırı davranmak
- Güvenlik tedbirlerinin önemsenmemesi
- Koruyucu donanımların bakım ve onarımlarıyla ilgilenmemek
- Hareketli parçalara takılmak, kazalara neden olan başlıca etkenlerdendir.

4)Tarım Makineleri Kullanımında Oluşan Kazalar

Tarımsal faaliyetlerde geniş bir makine yelpazesi kullanılmaktadır. Yaygın olarak kullanılan bu makineler arasında traktörler, toprak işleme makineleri, gübre dağıtma makineleri, çapa makineleri, ekim makineleri, hasat-harman makineleri, çayır biçme makineleri, balya makineleri, öğütücüler, karıştırıcılar ve tarım arabaları yer almaktadır. Aybek ve Gizlenci (2021) tarafından gerçekleştirilen bir çalışmada, tarım makinelerinden kaynaklanan iş kazalarının işletmelere göre dağılımı şu şekilde belirlenmiştir: İşletmelerin %42,9'u traktör, %17,1'i pulluk, %17,1'i ekim makinesi, %5,7'si gübre makinesi, %5,7'si ilaçlama makinesi, %5,7'si santrifüjlü sulama pompası, %2,9'u biçerdöver ve %2,9'u silaj makinesi ile kazalara maruz kalmıştır.

Tarımsal üretimde makineleşme söz konusu olduğunda, traktörler genellikle ilk akla gelen araçlardır. Traktörler, diğer taşıt araçlarından yapısal olarak belirgin farklar taşır. Güvenliği artırmaya yönelik çeşitli yenilikler ve düzenlemeler yapılmış olmasına rağmen, tarımsal kazalar arasında traktör kazaları ilk sırada yer almaktadır. Özellikle biçerdöver gibi kendi kendine hareket eden tarım makinelerinin güç kaynağı olan traktörlerin tarımda oluşturduğu tehlikeler şu şekilde özetlenebilir:

Traktör kazalarının büyük çoğunluğu (%60) devrilme, takla atma ve şarampole uçma şeklinde gerçekleşirken, %25 oranında başka bir araçla çarpışma kazaları gözlemlenmektedir. Kabinsiz traktörlerde ölüm oranı %34 iken, kabinli traktörlerde bu oran %10'a düşmektedir. Traktör kazalarındaki yaralanmaların %46'sı ölüm, ağır yaralanma veya kalıcı sakatlıkla sonuçlanmaktadır, bu oran diğer tarım makinelerine kıyasla oldukça yüksektir.

Traktör devrilmeleri, ölümcül traktör kazalarının %50'sini oluşturarak birçok kalıcı sakatlık ve önemli yaralanmalara neden olmaktadır. Genellikle operatörün dikkatsizliği nedeniyle meydana gelen devrilmeler, yana veya arkaya doğru olabilir. Araştırmalar, traktör hızının iki katına çıkmasının devrilme riskini dört kat artırdığını göstermektedir. Ayrıca, traktörlerde bulunan kabin sistemi veya güvenlik çerçevelerinin faydalı olmasına rağmen, emniyet kemeri kullanımının da göz ardı edilmemesi gerektiği vurgulanmaktadır (Öztekin, Kayhan ve Baran, 2019).

Biçerdöverler, büyük boyutları nedeniyle geri dönüşlerde sınırlı hareket kabiliyetine sahiptir. Bu nedenle, geri gidiş ve dönüş manevralarından önce makine çevresinde kimsenin bulunmadığından emin olunmalıdır. Motor çalıştırılmadan önce klakson çalınmalıdır. Eğimli arazilerde hasat sırasında ani yön ve hız değişikliklerinden kaçınılmalı, düşük hızlarda bile fren yapmaktan veya keskin dönüşlerden kaçınılmalıdır. Biçerdöverin yüksek ağırlık merkezi nedeniyle bu hareketler tehlikeli olabilir. Uygun yerlerde, yokuş yukarı dönüşlerde geniş bir kavisle dönülmelidir. Dönüş sırasında dümenleme tekerleklerinin kontrolden çıkması, biçerdöverin kaymasına ve devrilmesine neden olabilir.

Bir diğer tarım makinesi olan ekim makineleri, hem çekilir hem de asılır tiplerde olup traktöre uygun şekilde bağlanmalı ve emniyete alınmalıdır. Asılı tip ekim makineleri dönüşlerde mutlaka kaldırılmalıdır. Tohum boruları ve ekici ayakları düzenli olarak kontrol edilmeli ve tıkanmalar giderilmelidir. Tohum ve gübre sandıkları, tamamen boşalmadan önce doldurulmalıdır. Hareketli parçalar ve diğer güvenlik önlemleri her iş molasında kontrol edilmelidir.

Römorklar traktöre takılırken, çeki oku yerine hareket etmeyen noktalar kullanılarak bağlanmalıdır. Çeki oku, yeterli kalınlıkta (30 mm) bir pimle traktöre takılmalı ve yaylı kilitli pimle güvenlik altına alınmalıdır. Yükleme yapılmadan önce yan kapak gerdirme zincirleri takılmalıdır. Römork üzerinde belirtilen tonaj değerini aşmamak önemlidir, çünkü fazla yük frenleme etkisini azaltır ve dümenlemeyi zorlaştırır.

Tarım sektöründe meydana gelen makine kaynaklı bazı kazalar aşağıda verilmiştir:

Tarım makinelerinin işlem gereği öğütme, kırma ve sıkıştırma gibi noktaları genellikle açık durumda olup, bu noktalar çalışanlar için ciddi yaralanma riskleri taşımaktadır. Her yıl bu tür olayların acı örnekleri yaşanmaktadır. Örneğin, 8 Temmuz 2017 tarihinde Denizli'nin Pamukkale ilçesinde kekikleri ayırmak amacıyla patoz makinesiyle çalışan 45 yaşındaki bir çiftçi, dengesini kaybederek makinenin içine düşmüş ve bu kaza sonucunda hayatını kaybetmiştir.

Tarım makinelerinin hareketi ileten aksamları, örneğin dönen miller, zincirler ve merdaneler, insanlarda ciddi yaralanmalara ve ölüme yol açabilmektedir. 21 Temmuz 2014 tarihinde Kars'ta, buğday tanelerini ayırmak için kullanılan bir patoz makinesinin merdane kısmına saçlarını kaptıran 14 yaşındaki bir kız çocuğu, kafa derisinin kopması sonucu Karadeniz Teknik Üniversitesi'nde 12 saatlik bir operasyon geçirmek zorunda kalmıştır.

20 Kasım 2012 tarihinde bir çiftçi, patoz makinesinin içine bacağını kaptırmış ve olayın ardından şöyle ifade etmiştir: "…Otu silaja vuracaktım. O anda ayağımın otun üzerinde olduğunu fark etmedim. Makine otu çekerken ayağımla birlikte çekti… Ayağımın yarısını içine alarak, motor durabildi. Ayağımdan kopan parça motorun içinden saman gibi ufalanarak çıktı."

Bir başka örnekte, 5 Ekim 2016 tarihinde Denizli'nin Honaz ilçesinde, mısır öğüten 45 yaşındaki bir çiftçi, biçerdöverin önündeki tablada sıkışan koçanları eliyle temizlemeye çalışırken ayağını dönen helezona kaptırmıştır.

Aksaray'ın Ortaköy İlçesi, Reşadiye Köyü'nde, 71 yaşındaki bir çiftçi traktör ile çapa makinesinin arasında başını sıkıştırarak hayatını kaybetmiştir.

Bir diğer olayda, bir tarım işçisi tarlada çalışırken, traktörün arkasında bağlı olan tarım makinesinin ipini makine çalışır durumda temizlemeye çalışırken kolunu makinenin bıçaklarına kaptırmış ve yaşamını yitirmiştir.

Diskli biçme makinesi ile çalışan bir işçi, makinenin kesici tarafından fırlatılan bir cismin sol gözüne çarpması sonucu kör olmuştur.

Tarım makineleriyle ilgili yaşanan kazalar, çeşitli nedenlerle ciddi yaralanmalara ve ölümlere yol açabilmektedir. Aşağıda, bu tür kazaların çeşitli örnekleri ve önlenebilir risk faktörleri detaylandırılmaktadır:

1. **Balya Makinesi Kazası:** Balya makinesi ile çalışan bir çiftçi, besleme düzenine elle materyal yerleştirirken kolunu makineye kaptırmış ve bu durum sonucunda kolu kesilmiştir.
2. **Siloya Ürün Boşaltma:** Tarım arabasından siloya ürün boşaltma işlemi sırasında, onarım yapmakta olan bir çiftçi silo içerisine düşmüş ve silo gazlarının etkisiyle boğulmuştur.
3. **Drenaj Kanalı Kazası:** Drenaj kanalının yanında otları tamburlu biçme makinesi ile biçerken, traktörün drenaj kanalına devrilmesi sonucu ölüm gerçekleşmiştir.
4. **Traktör Devrilmesi:** Traktörün setten kayarak devrilmesi sonucu (traktörün koruyucu çatı sistemi olmasına rağmen) kişinin fırlayıp koruyucu çerçeve ile toprak arasında sıkışarak hayatını kaybetmesi olmuştur.
5. **Traktörde Ezilme:** Vitese takılı durumda traktöre binmeden traktörü yerden çalıştıran bir çiftçi, ezilerek yaşamını yitirmiştir.
6. **Helezonlu Tarım Arabası Kazası:** Helezonlu bir tarım arabasından mısır boşaltırken, ceketinin koruması olmayan kuyruk mili şaftına kaptırılması sonucu çiftçi her iki kolunu kaybetmiştir.
7. **Patates Hasat Makinesi Kazası:** Patates hasat makinesinde çalışırken sağ eli ve kolu patates ayırıcısı ile kesek silindiri arasına sıkışan bir çalışan ciddi şekilde yaralanmıştır. Makine koruyucuları zamanla eskimiş ve bakım yapılmadığı için koruma sağlayamamıştır. Makine koruyucularının her zaman çalışmadan önce kontrol edilmesi, sökülmüş veya hasar görmüş koruyucularla çalışılmaması gerekmektedir.
8. **Rotavatör Kazası:** Otları/sapları parçalamak için kullanılan ve makine koruyucusu bulunmayan tarım makinesine sıkışan taşı temizlemek amacıyla makinenin gücünü kesmeden müdahale eden bir çiftçi, rotavatör bıçakları arasına sıkışan taşı çıkardıktan sonra makinenin bıçakları dönmeye devam etmiş ve bu durumda çiftçi iki bacağını makineye kaptırmış, bir bacağı kesilmiştir. Diş korumalarının mevcut olması ve makine güvenli bir şekilde durdurulduktan sonra taşın çıkarılması, kazayı önleyebilirdi.
9. **Rotavatör Bakım Kazası:** Bir operatör traktöre monte edilmiş rotavatörü tamir ederken, makineyi desteklemek için koyduğu odun parçasına çarpmış ve makine çalışanın üzerine düşmüştür. Metal sehpa kullanımı bu kazanın önlenmesine yardımcı olabilirdi. Bakım ve onarım işlemleri sırasında, üzerine düşebilecek veya kendi kendine çalışmaya başlayabilecek herhangi bir makine ekipmanının güvenli duruma getirilmesi ve uygun ekipmanın kullanılması gerekmektedir.

Bu tür kazalar, tarım makinelerinin güvenli kullanımının önemini ve uygun koruyucu önlemlerin alınmasının gerekliliğini vurgulamaktadır.

Tarım makineleri ile çalışmaya başlamadan önce yapılması gereken genel kontroller ve değerlendirmeler aşağıdaki şekilde özetlenebilir:

1. Makinenin Uygunluğu: Kullanılan makine, gerçekleştirilecek işe uygun mu? Makinenin işin türüne ve büyüklüğüne uygun olup olmadığı değerlendirilmelidir.
2. Bakım ve Onarım: Makinenin düzenli bakım ve onarımı yapılmış mı? Bakım kayıtları kontrol edilmeli ve makinenin teknik durumunun iyi olduğundan emin olunmalıdır.
3. Koruyucu Ekipman: Makine koruyucuları mevcut ve işlevsel durumda mı? Koruyucu kapaklar, ağlar ve diğer güvenlik donanımları yerinde ve sağlam olmalıdır.
4. Kullanıcı Yeterliliği: Kullanıcının makineyi kullanmak için yeterli tecrübesi ve geçerli bir sürücü belgesi var mı? Operatörün gerekli eğitimleri aldığı ve makineyi güvenli bir şekilde kullanma yeteneğine sahip olduğu doğrulanmalıdır.

5. Kullanım Kılavuzu: Makinenin kullanım kılavuzu okundu mu? Kılavuzdaki talimatlar ve güvenlik bilgileri anlaşılmalı ve uygulamaya konulmalıdır.
6. Uyarı İşaretleri: Makine üzerindeki uyarı işaretleri yerinde duruyor ve görsel özelliklerini koruyor mu? Uyarı işaretleri temiz ve okunabilir olmalıdır.
7. Kişisel Koruyucu Donanım: Makine kullanılırken doğru kişisel koruyucu donanım (ayakkabı, gözlük, eldiven, kulaklık vb.) kullanılıyor mu? Kişisel koruyucu ekipmanlar eksiksiz ve uygun şekilde kullanılmalıdır.
8. Aksesuarların Çıkarılması: Makineyi kullanmadan önce kişisel aksesuarlar (yüzük, kolye vb.) çıkarıldı mı? Aksesuarlar makineye sıkışma riskini azaltmak için çıkarılmalıdır.
9. Çevresel Güvenlik: Makine çevresindeki çalışan kişilerin güvenliği düşünüldü mü? Makine etrafında güvenli bir çalışma alanı oluşturulmalı ve diğer kişilerin tehlikeden uzak tutulması sağlanmalıdır.

Bu kontroller, tarım makinelerinin güvenli bir şekilde kullanılmasını sağlamak ve olası kazaların önüne geçmek amacıyla önem arz etmektedir.

SONUÇLAR

Ülkemizde tarımsal faaliyetler hızla mekanize olmakta, tarım iş makinelerinin çeşitlenmesi ve teknolojik ilerlemeler, çok fonksiyonlu yapılarla birlikte iş kazalarının artışına yol açmaktadır. Bu teknolojik gelişmelere rağmen kırsal bölgelerdeki eğitim seviyesinin düşük olması, kazaların artmasına önemli bir katkı sağlamaktadır. Bu kazalar, maddi kayıpların yanı sıra can kayıplarına da neden olmakta olup, maddi zararlar telafi edilebilirken can kayıplarının telafisi mümkün değildir.

Özellikle iş sağlığı ve güvenliği önlemlerinin hayatımızın bir parçası haline getirilmesi, kazaların önlenmesi açısından kritik öneme sahiptir. Bu bağlamda aşağıdaki önlemler önerilmektedir:

- Tarım İşçilerini Koruyan Yasa: Tarım işçilerini yaş, iş yeri istihdam sayısı gibi sınırlamalar olmaksızın koruyacak kapsamlı bir yasa hazırlanmalıdır.
- Kayıt ve Denetim: Tarım işçilerinin kayıt altına alınması sağlanmalı, bu konuda denetimler gerçekleştirilerek caydırıcı cezalar uygulanmalıdır.
- Eğitim Programları: Tarım makinelerinin kullanımı, bakımı ve temizliği konularında eğitimler düzenlenmeli ve bu eğitimlere gerekli katılım sağlanmalıdır.
- Makine Bakımı: Tarım makinelerinin bakımları, ilgili kamu kurumları tarafından düzenli olarak yapılmalıdır.
- İş Sağlığı ve Güvenliği Eğitimleri: Kamu kurum ve kuruluşları tarafından iş sağlığı ve güvenliği ile ilgili eğitimler düzenlenmelidir.
- Uygunsuz Taşıma: Tarım işçilerinin trafikte uygunsuz şekilde taşınmasını engellemek için caydırıcı cezalar getirilmelidir.
- Elektrik Tesisatı Kontrolleri: Elektrik düzeneklerine bağlı çalışan makinelerde tesisat ile ilgili gerekli kontroller yapılmalıdır.
- Çalışma ve Dinlenme Saatleri: İşverenler tarafından çalışma ve dinlenme saatleri uygun şekilde düzenlenmelidir.
- İlk Müdahale Eğitimleri: Olası yaralanma ve hastalık durumlarında yapılacak ilk müdahaleye yönelik eğitimler düzenlenmelidir.
- Kişisel Koruyucu Donanım: Makine kullanırken, olası tehlikelere karşı mutlaka iş ayakkabısı giyilmelidir. Çelik burunlu ayakkabılar veya benzer dayanım direncine sahip ayakkabılar, ayakların korunmasında önemli rol oynar.
- Giyilecek Kıyafetler: Makinenin herhangi bir parçasına, özellikle hareketli aksamlara takılmayacak şekilde uygun kıyafetler tercih edilmelidir.

- Kullanım Kılavuzu: Makinenin kullanım kılavuzu dikkatlice okunmalı ve saklanmalıdır.
- Risk Değerlendirmesi: Operatör, makine için yapılan risk değerlendirmesi hakkında bilgi sahibi olmalıdır.
- Mekanik Kontroller: Mekanik eksiklikler tespit edilmeli ve giderilmelidir. Özellikle makinenin fren ve tekerlekleri düzenli olarak kontrol edilmelidir.
- Makine Koruyucuları: Makine koruyucularının doğru şekilde takılıp takılmadığı ve koruyucuların durumları kontrol edilmelidir. Bozuk veya hasarlı koruyucular, makine kullanılmadan önce tamir edilmeli veya değiştirilmelidir.
- Koruyucu Ekipman Durumu: Makine koruyucusu çalışmıyorsa veya zarar görmüşse, iş derhal durdurulmalı ve koruyucu çalışır hale gelene kadar makine kullanılmamalıdır. Koruyucular tamir veya bakım sonrası tekrar kontrol edilmelidir.
- Güvenli Kullanım: Makine çalıştırılmadan önce işçi güvenli bir şekilde yerini almalı ve makine kullanılmadığı durumda mutlaka durdurulmalıdır.

Tarım sektöründeki kazaların önlenmesi için etkili önlemler alınabilmesi, kazaların oluşumunda rol oynayan faktörlerin anlaşılması ile mümkündür. Bu faktörlerin bilinmesi, kazaların önlenmesi veya tekrarlarının engellenmesi için kritik bir adımdır. Tehlikeli kaynaklar işletme tarafından tanımlandıktan sonra, bu kaynakların sürekli olarak denetlenmesi ve gözden geçirilmesi büyük önem taşır. İş güvenliği araştırmaları bu bağlamda önemli bir rol oynamaktadır. Bu araştırmalar, iş kazalarının önlenmesine katkıda bulunabilir. Belirli bir program dahilinde yürütülen iş güvenliği araştırmaları, hatalı ve eksik koşulları raporlar aracılığıyla belirler ve sistemdeki yetersizlikleri ortaya koyar. Bu sayede, potansiyel kazalara yol açabilecek durumlar önceden tespit edilir ve gerekli önlemler alınabilir.

KAYNAKLAR

Dilay, Y., & Özkan, A. (2020). Karaman İlinde Meydana Gelen Tarım Makinelerinden Kaynaklı Kazalarının Değerlendirilmesi. Tarım Makinaları Bilimi Dergisi, 16(1), 32-39.

Öztekin, Y. B., & Temel, U. (2020). Bitki Koruma Makineleri Kullanımının Tarımda İş Güvenliği Açısından Değerlendirilmesi. Anadolu Tarım Bilimleri Dergisi, 35(1), 67-76. https://doi.org/10.7161/omuanajas.627038

Benal Öztekin, Y., Kayhan, İ., & Baran, M. F. (2020). Tarım Makinalarının Kullanımında Meydana Gelen İş Kazalarının Tespiti ve Değerlendirilmesi (Kırklareli İli Örneği). Tarım Makinaları Bilimi Dergisi, 15(1), 19-34.

Gizlenci, İ., & Aybek, A. (2021). Doğu Akdeniz Bölgesi Tarım İşletmelerinde Oluşan İş Kazaları ve Etkili Faktörler. Kahramanmaraş Sütçü İmam Üniversitesi Tarım Ve Doğa Dergisi, 24(5), 1068-1083. https://doi.org/10.18016/ksutarimdoga.vi.801602

Taş, B. (2021). ÜLKEMİZ TARIM SEKTÖRÜNDE KARŞILAŞILAN BAZI İŞ GÜVENLİĞİ SORUNLARI. Uluslararası İnsan Ve Sanat Araştırmaları Dergisi, 6(4), 481-489.

OREL, A. G. O., GÖLBAġI, M., EMĠNOĞLU, A. G. M. B., ACAR, A. Ġ., & ÖZTÜRK, R. TARIMDA Ġġ SAĞLIĞI VE GÜVENLĠĞĞ.

YURTLU, Y. B., ÖZ, E., ALAYUNT, F. N., ÇAKMAK, B., & ŞİMŞEK, Z. TARIMDA İŞ GÜVENLİĞİ VE SAĞLIĞI.

https://kahramanmaras.tarimorman.gov.tr/Belgeler/%C4%B0SG%20FAYDALI%20B%C4%B0LG%C4%B0LER/tarimdaissagligiveguvenligi.pdf

https://acikders.ankara.edu.tr/pluginfile.php/27384/mod_resource/content/0/13.%20Hafta%20%C4%B0%C5%9F%20G%C3%BCvenli%C4%9Fi.pdf

https://www.csgb.gov.tr/media/9472/tarimmakineguvenlicalisma.pdf

https://www.tbb.org.tr/Content/Upload/Dokuman/8960/Tarim_Sektor_Raporu_130723.pdf

https://calismaortami.fisek.org.tr/icerik/tarim-makineleri-ve-yarattigi-riskler-boyle-mi-olmali/

https://www.siirt.edu.tr/dosya/personel/tarim-makinalari-ders-notlari-siirt-2019101116620529.pdf

https://samsun.tarimorman.gov.tr/Belgeler/Yayinlar/Kitaplarimiz/tarim_makineleri_kullanim_guv.pdf

https://guvenlitarim.csgb.gov.tr/media/eg2f4cgp/tar%C4%B1m-sekt%C3%B6r%C3%BC-i%C5%9F-kazalar%C4%B1-2021.pdf

0-6 YAŞ GRUBUNDA EV KAZALARI VE YÖNETİMİ

Nalan YALÇINKAYA SEZER
Sakarya Üniversite, Sağlık Bilimleri Enstitüsü Ebelik EABD
ORCID: 0009-0006-9871-2453

Doçent Doktor Öznur TİRYAKİ
Sakarya Üniversite, Sağlık Bilimleri Fakülte, Ebelik Bölüm
ORCID: 0000-0001-8788-3077

ÖZET
Ev kazaları; ev içerisinde veya bahçe, garaj gibi evin etrafındaki alanlarda, meydana gelen yaralanmalar, düşmeler, zehirlenmeler, yanıklar, kesilmeler, boğulmalar gibi durumları içerir. Ev kazalarına bağlı ölüm veya sakatlık riski yüksek olduğu için halk sağlığı açısından oldukça önem arz etmektedir. Ev kazaları hem ülkemizde hem de dünyada ciddi bir halk sağlığı sorunudur. Tehlikelerin farkında olmayan 0-6 yaş grubu çocuklar ev kazalarında önemli bir risk grubudur. Çocuklar bilişsel, anatomik ve fizyolojik olarak yetişkinlerden farklı oldukları için riskli grupta yer alırlar. Çocuklar fiziksel, bilişsel, duyusal, psikososyal ve nöromotor gelişimlerini tamamlarken bir taraftan merak ve keşfetme duyguları ile karşılaşmaktadırlar. Çocukların tehlikenin farkında olmaması, çok hareketli olmaları ve yaşam alanlarında uygun güvenlik önlemlerinin eksikliği, ev kazalarının bu yaş grubu çocuklarda daha yaygın olmasının sebeplerindendir. Bu nedenle kazalarla karşılaşma olasılıkları da artmaktadır. Ebeveynler çocuklarını ev kazalarından korumak için güvenli bir alan oluşturmalıdır. Ev kazası durumunda, ilk karşılaşan ve ilk müdahalede bulunan kişiler ebeveynler olup genellikle annelerdir. Kaza ile karşılaşan annelerin sakin kalarak doğru müdahalede bulunmaları beklenir. Bu bağlamda annelerin güvenliği ve ev kazalarına müdahale hakkında kendilerini yeterli hissetmeleri önemlidir. Çocukları ev kazalarından korunmak için tedbirlerin alınması, ev içi ve çevresinin güvenliğin sağlanması gerekir. Bu güvenlik tedbirlerinin alınmasında ebeveynlere ya da primer bakım vericilere büyük sorumluluk düşmektedir.
Anahtar Kelimeler: Ev kazası,0-6 yaş, Ebeveyn

HOME ACCIDENTS AND MANAGEMENT IN 0-6 AGE GROUP

ABSTRACT
Domestic accidents include injuries, falls, poisoning, burns, cuts, cuts, drowning, etc. that occur inside the house or in areas around the house such as gardens and garages. Since the risk of death or disability due to home accidents is high, it is very important for public health. Home accidents are a serious public health problem both in our country and in the world. Children in the 0-6 age group who are not aware of the dangers are an important risk group in home accidents. Children are in the risk group because they are cognitively, anatomically and physiologically different from adults. While children complete their physical, cognitive, sensory, psychosocial and neuromotor development, they also experience feelings of curiosity and discovery. Children's lack of awareness of danger, their high mobility and the lack of appropriate safety measures in their living spaces are among the reasons why home accidents are more common in this age group. Therefore, they are more likely to encounter accidents. Parents should create a safe space to protect their children from home accidents. In the event of a home accident, the first people to encounter and intervene are parents, usually mothers. Mothers who encounter an accident are expected to stay calm and intervene correctly.

In this context, it is important that mothers feel competent about their safety and intervention in home accidents. In order to protect children from home accidents, precautions should be taken and safety should be ensured in and around the home. Parents or primary caregivers have a great responsibility in taking these safety measures.
Keywords: Home accident, 0-6 years old, Parent

GİRİŞ

Türk dil kurumunun tanımına göre kaza; istem dışı veya beklenmedik bir olay yaşanarak bir kimsenin, bir nesnenin veya bir aracın zarara uğraması olarak tanımlanır. (TDK, 2024) Kazalar; aniden gelişen, sebepleri ve sonuçları belli olan; tahmin edilemez ama önlenebilir olaylardır. Günlük insan yaşamının olduğu her alanda özellikle ev, okul, trafik ve işyerinde sık görülür. (Kılıç vd., 2019) Çocuk yaş dönemlerine göre kazalara bağlı ölüm nedenlerine bakıldığında; 1-4 yaş arası çocukların %27'sinin, 5-14 yaş arası çocukların %47'sinin yaralanmaya bağlı hayatlarını kaybettiği bilinmektedir. (DSÖ, 2019). Ülkemizdeki bir kuruluşun yaptığı araştırmaya göre 1-4 yaş arası çocukların %12,7'sinin kazalar nedeniyle öldüğü vurgulanmıştır. (TÜİK, 2023)

Ev kazaları; ev içerisinde veya bahçe, garaj gibi evin etrafındaki alanlarda, meydana gelen yaralanmalar, düşmeler, zehirlenmeler, yanıklar, kesilmeler, boğulmalar gibi durumları içerir. Ev kazalarına bağlı ölüm veya sakatlık riski yüksek olduğu için halk sağlığı açısından oldukça önem arz etmektedir. Çocukluk dönemlerine göre özellikle 0-6 yaş grubunu daha çok etkileyen istenmeyen bir durumdur. (Abbassinia vd., 2020; Şentepe 2022) Ebeveynler çocuklarını ev kazalarından korumak için güvenli bir alan oluşturmalıdır. Ev kazası durumunda, ilk karşılaşan ve ilk müdahalede bulunan kişiler ebeveynler olup genellikle annelerdir. Kaza ile karşılaşan annelerin sakin kalarak doğru müdahalede bulunmaları beklenir. Bu bağlamda annelerin güvenliği ve ev kazalarına müdahale hakkında kendilerini yeterli hissetmeleri önemlidir. (Aral N, Gürsoy F, Aysu B. 2020; Demirköse, 2022)

KAZANIN TANIMI VE ÇEŞİTLERİ

Kaza, öngörülemeyen, ani, planlanmamış olarak ortaya çıkan, ancak önlenebilen bir durumdur. Kaza ve yaralanmaları kategorize etmek için DSÖ'nün "Uluslararası Hastalık Sınıflandırması" için önerisi kullanılmaktadır. (ICD 10; Tanır ve Mete, 2020)

Kazaların Sınıflandırılması

Kazalar olayların yaşandığı mekâna ve sebebe göre sınıflandırılırlar;

- Ev kazaları
- Araç içi kazalar
- İş yeri kazaları
- Endüstriyel/Sanayi kazaları
- Spor kazaları
- Okul kazaları (ICD 10) (International Classification of Disease - Uluslararası Hastalık Sınıflandırması)

Ev Kazaları

Çocukluk dönemi, yaşlılık dönemi veya fiziksel/zihinsel engellilik durumu olan bireyler ev kazası açısından riskli grupta yer almaktadırlar. (Balcı ve ark. 2020) Çocuklar bilişsel, anatomik ve fizyolojik olarak yetişkinlerden farklı oldukları için riskli grupta yer alırlar (Elmas ve ark. 2020). Çocuklar fiziksel, bilişsel, duyusal, psikososyal ve nöromotor gelişimlerini tamamlarken bir taraftan merak ve keşfetme duyguları ile karşılaşmaktadırlar.

Bu nedenle kazalarla karşılaşma olasılıkları da artmaktadır. (Demirköse ve ark. 2022) Okul öncesi dönem çocuklar genellikle evde oldukları için bu yaş grubundaki çocukların ev kazalarıyla sık karşılaşırlar. (Haytoğlu, 2021) Çocukların yaş gruplarına ve yaşadıkları topluma göre ev kazaları sıklığı değişiklik göstermektedir. (Elmas, Durna, Akın, 2020)
Yapılan bir sistematik derleme çalışmasına göre ev kazalarına neden olan düşme, yanık ve zehirlenmelere bağlı morbidite ve mortalite oranlarının arttığı ifade edilmiştir. (Abbassinia, Barati, Afshari, 2019)
Evde en sık mutfak ve merdivenlerde kazalar yaşanmakta olup kaygan zeminde, yetersiz aydınlatmanın olduğu, sabitlenmeyen eşyaların olduğu alanlar risklidir. Kış aylarında özellikle yanıklarla karşılaşırken, ilkbahar ve yaz aylarında boğulma, zehirlenme ve düşme görülmektedir. (Ergin, 2022.)
Kazalar fiziksel, psikolojik ve sosyal bakımdan çocukların hayatını olumsuz yönde etkilediği için çocukluk dönemi kazaları, önemli bir toplum sağlığı problemidir. (Üçüncü ve Toprak, 2019) Güvenli bir çevrenin oluşturulması, koruyucu tedbirlerin alınması ve yaralanmaların olmasını önlemek erişkinlerin sorumluğundadır. (Celep G,2021)
Bu bağlamda ev kazalarını önlemek için toplumsal bilinçlenme ve özellikle annelerin ev kazaları hakkında bilinçlendirilmesi, farkındalık kazandırılması çok önemlidir. (Üçüncü vd., 2019) Genellikle kaza anını ilk gören kişiler olan annelerin, güvenlik ve ev kazalarına müdahale konularında kendilerini yeterli hissetmeleri beklenir. (Celep G, 2021.)

Dünyada ve Türkiye'de Ev Kazaları Görülme Sıklığı

Ev kazaları hem ülkemizde hem de Dünya'da ciddi bir halk sağlığı sorunudur. Ülkelerde maddi ve manevi büyük kayıplara sebep olmaktadır. İngiltere'de evde meydana gelmiş ölümlerin %30'nun ev kazasından kaynaklandığı öngörülmektedir. (Thenmozhi, Sabeetha, Nandhini,2020.)
İran'da yapılan bir çalışmada yaşanan 307.064 ev kazasına bağlı yaralanmanın %25.2'nin çocuklarda yaşandığı, bu yaralanan çocuklarında %70'inin 1-5 yaş arasında olduğu bildirilmiştir. (Amini, Kalvandi, Khodaveisi, Tapak , 2021) Mısır'da yapılmış bir çalışmada, 5 yaş altı çocuklarda ev kazalarının %42.4 oranında görüldüğü yaralanma sebebine bakıldığında ise %51,1'inin kesilme şeklinde yaralandığını tesbit etmişlerdir. (Anwar MM, Mostafa ZM, Elareed HR., 2021.) Brezilya'nın güney bölgesinde yapılan bir araştırmada 2 yaş çocuklardaki yanık vakası oranı %23 olarak saptanmıştır. (Barcelos,2018) Rusya'da yapılan çalışmada, 0-6 yaş grubunda düşmelerin %49'nun evde yaşandığı ve düşme nedeniyle bu yaş grubu çocukların acil servislere başvuru oranının fazla olduğu belirlemiştir. (Unguryanu ve ark.,2020) Türkiye'de trafik kazalarından sonra en çok ev kazalarının (%25) görüldüğü bilinmektedir. (Türkiye Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü, 2022) Ülkemizde ortalama altı milyon insan ev kazası ile karşılaşmakta ve bu kazalar sebebiyle ortalama dört bin kişinin hayatını kaybetmektedir. (Altunbaş, 2022.)
Türkiye'de en fazla görülen ev kazaları; çarpma, düşme, yanma, kesici delici alet yaralanması, zehirlenme, boğulma, yabancı cisim ile aspirasyonudur. (Yeniyapı ve Tokur 2023) Güleryüz ve arkadaşlarının yaptığı çalışmalarında acil servise başvuran 0-6 yaş pediatri hastalarının %,46'sının ev kazası nedeniyle başvurduğunu, bu sayısın bir yılda %24,43' e yükseldiğini tespit etmiş ve ev kazalarının bir yılda yaklaşık 3 kat arttığını bildirmişlerdir. (Güleryüz ve ark.,2021)
Ülkemizde 0-6 yaş arası çocukların dahil edildiği retrospekrif bir çalışmada, covid-19 salgınının yaşandığı dönemde ev kazaları nedeniyle acil servise yapılan başvurular incelenmiş olup önemli ölçüde acile başvuru oranının azaldığı ifade edilmiştir.

Bu azalmanın,virüs bulaşma korkusu ile hastaneye gelmeme ve evde kal çağrılarının dikkate alınmasından dolayı olabileceği düşünülmekte olup ,evde ilk müdahaleyi ebeveynlerin yaptıkları ifade edilmiştir. (Suzan, Ö. K., Tabakoglu, P., Elmas, B., & Çınar, N. (2022)

Çocuklarda Kaza Oluşumundaki Risk Faktörleri

Çocuklarda kaza ve yaralanma oluşumundaki risk faktörleri aşağıdaki gibi gruplandırılmaktadır. (Torbacı, 2019)

Risk Faktörleri	***Açıklama***
Bireysel faktörler	Çocuğun kendisine ait özellikleri
Aileye yönelik faktörler	Aile ile ilgili durumlar
Çevresel faktörler	Çocuğun bulunduğu ortam

Bireysel Faktörler

Yaş

Yaş gruplarına göre karşılaşılan kaza türleri;

- 0-1 yaş: Yabancı cisim aspirasyonu, boğulma, yanıklar,
- 1-4 yaş: Suda boğulma, düşme, zehirlenme, trafik kazaları,
- 5-9 yaş: Trafik kazası, boğulma, zehirlenme,
- 10-14 yaş: Spor kazası, trafik kazası, boğulma ve zehirlenmelerdir (Haytaoğlu, 2021.)

Cinsiyet

Erkek cinsiyetin kazalar için risk faktörü olduğu çalışmalarda gösterilmiştir. Erkek çocuklarının, kız çocuklarına nazaran ev kazası geçirme prevelansının yüksek olduğu yapılan literatür incelemelerinde görülmüştür. Bu durumun, kız çocuklarının hareket kontrolü, ince motor becerileri, erkek çocuklarına göre daha becerikli olmaları, erken olgunlaşma göstermelerinden dolayı olduğu düşünülmektedir. Ayrıca kız çocuklarına doğumdan itibaren ebeveynleri tarafından daha korumacı bir tavır gösterilmesi de kaza riskini azalttığı yönünde görüşler sunmuştur (Önal, 2019.; Doğan ve Öztürk, 2021.)

Çocuğun Fiziksel ve Psikolojik Özellikler

Kronik hastalıklar ve engellilik durumlarının varlığı da ev kazaları riskini arttırır. Bu durumlar, çocuğun fiziksel yeteneklerini, mobilizasyonunu veya algılama yetilerini etkileyebilir, çocuğun günlük yaşam aktivitelerini gerçekleştirirken zorlanmasına neden olabilir. Örneğin, motor becerilerinde kısıtlılık olan bir çocuk, denge sorunları yaşayabilir ve düşme riski artabilir (Önal,2019; Tatar ve İnce 2020)

Aileye Ait Faktörler

Evde gerekli hazırlıklar yapılarak koruyucu önlemlerin alınması, yaşam alanı güvenliklerinin denetlenmesi ebeveynlere ya da bakım vericilere düşmektedir. Çocuklar ile en çok vakit geçiren kişi anneler olduğu için annelerin ev kazalarında koruyucu önlemleri bilmeleri önemlidir. Ancak annenin sorumluluğu olduğu kadar, baba ve diğer aile bireyleri de bu sorumluluğu üstüne almalıdır. (Aral N, Gürsoy F, Aysu B., 2020.;Üçüncü & Toprak,2019)

Çevresel Faktörler

Çocukların yaşam alanı olan ve sosyalleştiği çevrelerde, ev kazalarını önlemek amacıyla alınan önlemlerin, çocuğun ev kazası geçirme riskini azalttığı bilinmektedir (Uğur Baysal, 2022). Çocuklar için, ev ortamı kompleks bir alandır. Evin içindeki; mobilyalar, prizler, mutfak, balkon, temizlik maddeleri, halı vb. materyaller tehlikenin farkına varma yetileri henüz tam tamamlanmadığı için 0-6 yaş grubu çocuklarda risk faktörlerindendir (Yorulmaz ve Özbay, 2021).

Çocuklarda sık karşılaşılan ev kazası çeşitleri

Düşmeler

Dünya çapında yaralanmalara bağlı mortalite ve morbiditiye yol açan en yaygın kaza sebebi düşmelerdir. Ev içinde mobilyalara bağlı (tırmanma, yüksekten atlama vb) yaralanma sık görülmektedir (Unguryanu ve ark., 2020). Nepal'de yapılan bir çalışmada yaralanmaların en fazla düşme sebebiyle gerçekleştiği raporlanmıştır (Keays ve Debbie, 2020).Başka bir çalışmada ebeveynler çocukların en az bir kere (%45,6) ev kazası deneyimlediğini, en sık düşme (%71) sebebiyle ev kazası yaşadıklarını bildirmişlerdir. (Aksöz,2023)

Yanıklar

Yanık, ısı etkisiyle doku bütünlüğünün bozulması veya hasar görmesi olarak tanımlanmaktadır (Çalışır ve Çalışkan 2020). Yanıklar çoğunlukla sıcak su veya buhar teması, sıcak katı maddelere temas, asit veya alkali gibi kimyasal maddelere temas, elektrik akımı etkisi ya da radyasyon gibi sebeplere bağlı yaşanmaktadır (Akay ve Tüfekçi 2023).

Yanıklar 0-6 yaş çocukluk döneminde önemli sağlık sorunlarına ve ölümlere neden olabilir. (Yöndem ve Tunçbilek 2020). En sık 0-4 yaş çağında olan yanık vakasını görürüz ve yanık şekli çoğunlukla sıcak yüzeylere temas ve haşlanma şikayetiyle en çok karşılmaktadır. (Şahin,2023) Yaşları 0-6 arasında değişen çocuklarla yapılan bir çalışmada %41,2'sin yanık nedeniyle acil servise getirildiği bildirilmiştir (Ahmedov, Y.,& Ortabağ, T.,2023).

Zehirlenmeler

Zehirlenme, vücuda alınmış yabancı maddelerin hayati değerleri etkilemesi ve organizmaya zarar vermesi olarak tanımlanmaktadır (Öztürk 2020)

Zehirli bir maddeyi yutmak, deriye dökmek, göze püskürtmek/sıçratmak veya solumak zehirlenmeye neden olabilir. (Aksöz,2023).

En çok rastlanan zehirlenmeler sindirim yoluyla oluşmaktadır ancak, solunum yoluyla ve cilt yoluyla da zehirlenme meydana gelebilmektedir. (Şenses 2020). Çocuklukların (1-4 yaş) zehirlenme nedenlerin incelendiği bir çalışmada vakalarının en sık ilaç ve koroziv madde içtikleri, zamanlama olarak temmuz ve mayıs ayında daha fazla görüldüğünü bulmuşlardır. (Günay ve ark,2019.)

Boğulma ve Yabancı Cisim Aspirasyonu

Hava yolunun katı ya da sıvı herhangi bir yabancı madde ile mekanik olarak tıkanması sonucu meydana gelen sağlık sorununa boğulma denir. Boğulma sonucunda oksijenizasyon ve ventilasyon bozulur, kana yeterince oksijen giremez ve dokular oksijensiz kalır. (Abdullayev 2021).

Yabancı cisim aspirasyonları (YCA), trakeobronşial sisteme bir nesnenin kaçması olarak tanımlanabilir. Aniden gelişir ve hava yolu tıkanıklıklarının da en sık karşılaşılan nedenidir. Çocuklarda yabancı cisim aspirasyonunu riskinin yüksek olmasının nedeni dişlerinin tam oluşmaması, çocukların ağız içinde yiyecek partikülleri varken ağlamaları veya oyun oynamaları gibi nedenlerdir. Bununla birlikte özellikle 0-4 yaş çocuklarda ağız ve yutma koordinasyon mekanizmalarının tam olarak gelişmemesi de riski arttırmaktadır. (Çoban H,2024)

Kesici Delici Alet Yaralanması

Kesici-delici alet yaralanması; makas, bıçak, jilet gibi kesici delici aletlerin cildin doku bütünlüğünü bozması ve tahribat oluşturmasıdır (Topgül ve Elibol, 2019). Oyun oynarken çevreyi tanımaya çalışır, merak dolu davranışlar sergiler, böylece kesici delici aletlerle daha çok karşılaşabilir ve yaralanma riski bulunmaktadır (Abubakar ve ark. 2018).

Genellikle yaralanmaya maruz kalan ekstremiteler çocukların elleri ve parmaklarıdır,sebebi ise çocukların parmaklarını kullanarak oyun oynama, çevreyi keşfetme, meraklı hareket etmeleri bu yaralanmalara ortam hazırlar. (Aslansofuoğlu, 2022)

EV KAZALARININ ÖNLENMESİNDE EBEVEYNLERİN ROL VE SORUMLULUKLARI

Tehlikelerin farkında olmayan 0-6 yaş grubu çocuklar ev kazalarında önemli bir risk grubudur. (Şahin E, 2023). Çocukların tehlikeleri farkedememesi, çok hareketli olmaları ve yaşam alanlarda uygun güvenlik önlemlerinin eksikliği, ev kazalarının bu yaş grubu çocuklarda daha yaygın olmasının sebeplerindendir. (Demirköse ve Özkan 2020)

Çocukları ev kazalarından korunmak için tedbirlerin alınması, ev içi ve çevresinin güvenliğin sağlanması gerekir. Bu güvenlik tedbirlerinin alınmasında ebeveynlere ya da primer bakım vericilere büyük sorumluluk düşmektedir. (Şekerci ve İnal, 2019; Şahin, 2023)

Çocuklarda ev kazalarının önlenmesi için alınması gereken önlemler şunlardır:

- Bebeği yüksek bir yerde korumasız ve yalnız bırakmayınız.
- Düşme riskini azaltmak için bebeğin bezini ve giysilerini yerde değiştiriniz.
- Bebeğinizi mama sandalyesine, çocuk arabasına veya bebek arabasına sabitlerken mutlaka 5 noktalı emniyet kemeri kullanınız (iki omuz askısı, iki kalça kemeri ve bir kasık kemeri).
- Çocuklarınızı evde yalnız bırakmayınız
- Pencerelerde güvenlik önlemleri alınız, çocuk kilitleri kullanınız.
- Düşebilecek mobilyalar sabitleyiniz.
- Mobilyaların uçları sivri olmamalı, uç kısımlara koruyucu aparat takınız mobilyalar üzerinde çekip düşürebilecekleri objeler bulundurmayınız.
- Zeminlerinizi kaygan ve ıslak bırakmayınız.
- Halı ve kilimlerin kaymaması için sabitleme yapınız.
- Güvensiz alana açılan kapılar kilitleyiniz.
- Merdiven basamaklarınız, eşit yükseklikte ve trabzanları olmalıdır.
- Balkon kapılarınızı kapalı tutunuz ve korkuluklarınız çocuklarınızın tırmanmasına müsait olmamalıdır.
- Elektrik prizlerinizin kapalı ya da prizlerde çocuk korumalarınızın olmasına dikkat ediniz.
- Elektrik kablolarını açıkta bırakmayınız.
- Elektronik eşyalar çocuklarınızın yetişemeyeceği yükseklikte konumlandırınız.
- Çocukların bulunduğu ortamda sigara içmeyiniz, kibrit, çakmak ulaşılabilir bir yerde bırakmayınız.
- Sobaları çocuklarınızın dokunamayacağı güvenli bir bölgede bulundurunuz.
- Binalarınızda acil çıkışlarınız olmalıdır ve duman dedektörleriniz zorunlu olmalıdır.
- Çocuğun sıcak sıvı ya da yiyecek taşımasına izin vermeyiniz.
- Yemek yapılırken çocuklar için güvenli alan oluşturunuz.
- Bıçak, delici-kesici aletlerin çocukların ulaşamayacağı güvenli alanlarda muhafaza ediniz.
- Yabancı cisim aspirasyonuna karşı küçük parçalı besinler, fındık, fıstık, leblebi, patlamış mısır gibi yiyecekleri vermeyiniz.
- Çocukları banyoda/küvette tek bırakmayınız.
- Klozet kapağını kapalı tutunuz.
- Evin bahçesinde çukur ya da su dolu çukurlar bulundurmayınız.
- Bahçe kapısı çocukların açamayacağı şekilde olmalıdır.
- Altı Yaşından küçük çocukları ranzada yatırılmayınız.
- Temel kardiyopulmoner resüsitasyon ve su kurtarma becerilerini, ayrıca Heimlich manevrasını öğreniniz.

- Bardaklar ve kaseler gibi cam nesneleri ulaşamayacakları yüksek bir dolapta tutunuz.
- Bulaşık makinesini doldururken ve boşaltırken dikkat ediniz. Diğer zamanlarda bulaşık makinesi kilidi kullanınız.
- Mümkünse, mutfak çöp kutusunu emniyet mandallı bir dolap kapağının arkasında tutunuz.
- Aynaların duvara sağlam bir şekilde takıldığından emin olunuz. (Aksöz,2023; Aslan ve Parlatan,2021; Reis ve ark.,2021; Rumhi ve ark.,2020; Önal,2019; Üçüncü ve toprak ,2019; Yöndem 2020)

SONUÇ VE ÖNERİLER

Ev kazaları dünya genelinde bir halk sağlığı sorunudur. Ev kazaları, önemli bir ölüm ve hastalık nedenidir. Özellikle 0-6 yaş grubu çocuklar bu konuda risk altındadır. 0-6 yaş grubu çocuklar için güvenli alanların sağlanması ve yaşam alanlarının güvenlik tedbirlerini almak yetişkinlerin sorumluluğundadır. Çünkü bu yaş grubundaki çocuklar gelişimsel olarak kendilerini kaza ve yaralanmalardan koruyamazlar, erişkinlerin desteğine ihtiyaç duyarlar. Ebeveynler ev kazalarına karşı bilinçli ve eğitimli olmalıdır. Ülkemizde en sık görülen ev kazası tipi düşmelerdir, bunu yanıklar izlemektedir**.** Düşmenin literatürde en sık görülen ev kazası olması, 0-6 yaş arası çocukların vücut dengesinin tamamen gelişmemiş olmasından kaynaklanabilir. Hastaneye ev kazaları şikayetiyle başvurmuş çocukların ailelerine mutlaka ev kazalarını önlemeye yönelik eğitimler verilmelidir. Annelere, çocuklarının olası ev kazası geçirme durumlarında uygun adım atmaları için temel ilk yardım eğitimleri verilmesi, verilecek eğitimlerin devamlılığı sürdürülmelidir. İlk yardım içerikli eğitimler sadece annelere değil tüm aile fertlerine ve tüm topluma bu konuda eğitim verilmelidir. Ev kazaları; ölüm de dahil olmak üzere telafisi mümkün olmayan kritik sonuçlara sebep olabilir.

Bu bağlamda, ebeveynlere kitle iletişim araçları yardımıyla da ev kazaları ve ev kazalarına karşı alınması gereken güvenlik önlemleri konusunda bilgi ve farkındalıklarını arttırmaya yönelik eğitimlerin verilmesi önerilmektedir. Evde alınabilecek güvenlik tedbirleri alınması gerekir. Ev kazalarına yönelik farkındalık yaratmak için kamu spotlarına, bilbortlara, otobüslere, okullara, sağlık kuruluşlarına; poster, video vb. dikkat çekici içerikler sağlanabilir. 0-6 yaş grubu çocuklara temel ilk yardım bilgisi; animasyon, çizgi film, kitap veya broşür gibi yaşına uygun ve dikkat çekici şekilde düzenlenmiş içeriklerle aktarılmalıdır. Bu yaş grubu çocuklara örneğin düşme kazasıyla karşı karşıya kaldıysa hemen en yakınındaki yetişkine haber verip yardım istemesi konusunda bilgilendirilmelidir. İlkyardım çantası gösterilmelidir, içeriği anlatılmalıdır. 112'yi ne için aradığımız ve hangi bilgileri verdiğimiz bu yaş grubu çocuklara öğretilmelidir.

KAYNAKÇA

Abbassinia M, Barati M, Afshari M. Effectiveness of interventions in the prevention of home injuries among children under 5 years of age. A systematic review. Arch Trauma Res, 2019, 8: 190-7.

Abdullayev G (2021) Pediatrik Yaş Grubu Yabancı Cisim Aspirasyonlarında Tanı Ve Tedavi. Kocaeli Üniversitesi Tıp Fakültesi Göğüs Cerrahisi Anabilim Dalı,Uzmanlık Tezi, Kocaeli.

Abubakar S, Ahmed A, Farouk Z, Gadanya M, Jimoh ML (2018) Prevalence and Pattern of Unintentional Domestic Accidents and Trauma Amongst Children Attending Public Hospitals in Kano, Nigeria. Sahel Medical Journal, 21 (1): 6-16.

Ahmedov, Y., & Ortabağ, T. (2023). 0-6 Yaş Grubu Çocukların Ev Kazası Nedeniyle Acil Servise Başvurma Sıklığı ve Ebeveynlerinin İlk Yardım Uygulamalarının Belirlenmesi. *Ege Üniversitesi Hemşirelik Fakültesi Dergisi*, *39*(3), 315-323.

AKSÖZ TAŞ H (2023). "DİYARBAKIR KAYAPINAR İLÇESİNDE 0-6 YAŞ ÇOCUKLARDA EV KAZASI SIKLIĞI VE EBEVEYNLERİN EVKAZALARI HAKKINDA BİLGİ VE TUTUMLARININ DEĞERLENDİRİLMESİ". Uzmanlık Tezi. Dicle Üniversitesi Tıp Fakültesi,Diyarbakır

Akay G, Tüfekçi FG (2023) Türkiye'de Çocuklarda Görülen Tandır Yanıkları; Kültürel Bir Çalışma (Tandır Burns In Chıldren In Turkey; A Cultural Study). Journal of Health Sciences and Management, 3(2): 36-41.

Altunbaş S. Türkiye'de Kaza İstatistikleri Alarm Veriyor. https://www.generali.com.tr/docs/basin-bultenleri/turkiyede-kaza-istatistikleri.pdf. 9 Mart 2022.

Amini R, Kalvandi N, Khodaveisi M, Tapak L. İnvestigation of the effect of education based on the theory of planned behavior on the mothers' preventive practices regarding toddler home ınjuries. Home Health Care Management & Practice 33(4): 250 –25, 2021

Anwar MM, Mostafa ZM, Elareed HR. Maternal knowledge and attitude about home-related ınjuries in children under the age of five years. Egyptian Family Medicine Journal (EFMJ) 5(2):91-105, 2021.

Aral N, Gürsoy F, Aysu B. Özel gereksinimli çocuğa sahip annelerin ev kazaları konusundaki düşüncelerinin incelenmesi. Erzincan Üniversitesi Sosyal Bilimler Enstitüsü Dergisi 13(2):229-241, 2020.

Aslan D, Parlatan M E. Evde güvenlik sorunu: Annelerin güvenlik hakkındaki kaygıları, uygulamaları ve ihtiyaçları. International Primary Educational Research Journal 5(3):260-271, 2021.

Aslansofuoğlu,2022. "ANNELİK ROLÜNÜN EV KAZALARI FARKINDALIĞI VE İLK YARDIM ÖZ YETERLİĞİ İLE İLİŞKİSİ"Yüksek Lisans Tezi. ATATÜRK ÜNİVERSİTESİ SAĞLIK BİLİMLERİ ENSTİTÜSÜ.ERZURUM

Barcelos RS, Del-Ponte B, Santos IS. Interventions to reduce accidents in childhood: A systematic review. J Pediatr (Rio J)94(4):351-367, 2018.

Celep G, Yardımcı F. Annelerin evde gerçekleşen istenmeyen yaralanmaların önlenmesine ilişkin aldıkları güvenlik önlemleri. STED, 2021, 30: 96-106.

Celep G, Yardımcı F. Annelerin evde gerçekleşen istenmeyen yaralanmaların önlenmesine ilişkin aldıkları güvenlik önlemleri. Sürekli Tıp Eğitimi Dergisi 30(2):0–2, 2021.

Çalışır Ö, Çalışkan Z (2020) Çocuklarda Akılcı İlaç Kullanılmasının Önemi ve baysal

Çoban H,(2024). "ÇOCUK YANIK MERKEZİNDE TEDAVİ GÖREN 0-6 YAŞ GRUBU ÇOCUKLARINANNELERİNE VERİLEN EV KAZALARINIÖNLEME EĞİTİMİNİN ETKİNLİĞİ " Yüksek lisans tezi. Sağlık bilimleri üniversitesi Hamidiye Sağlık Bilimleri Enstitüsü. İstanbul

Demirköse H, Yapar D, Özkan S. 0-6 yaş grubu çocuğu olan annelerin sağlık okuryazarlığı düzeyi ve çocukların ev kazası geçirme durumu ile ilişkisi. Sağlık ve Toplum 31(2):74-82, 2021.

Demirköse H, Dikmen AU, Özkan S (2022) 0-6 Yaş Grubu Çocuğu Olan Annelerin Ev Kazalarına Yönelik Güvenlik Önlemlerini Tanılama Düzeyleri İle Sağlık Okuryazarlığı İlişkisi. ESTÜDAM Halk Sağlığı Dergisi, 7(1):112-121.)

Doğan M, Öztürk MA. 0-6 yaş arasındaki çocuklarda travma dışı ev kazalarının önlenmesi. The Journal of Current Pediatrics 19:23-9, 2021.

Elmas EG, Durna Z, Akın S. Çocuğu olan annelerin ev kazalarına yönelik güvenlik önlemleri ve ilk yardım uygulamaları konusundaki bilgi ve tutumlarını değerlendirilmesi. Jaren, 2020, 6: 267- 79.

Ergin, A. Ev Kazaları. http://www.aile hekimince.com/gevkazalari.html. 10 Mart 2022.

Güleryüz, O., Colak, O., Güneysu, S. T., & FİDANCI, İ. (2021). The home accident cases applying to the Pediatric Emergency Department during the Covid-19 pandemic: what did the pandemic change?. *Authorea Preprints*

Günay A, Uğurlu Z, Ceylan A, Ayten N. 2012-2017 yılları arasında Başkent Üniversitesi Ankara hastanesi çocuk acil servise başvuran zehirlenme olgularının geriye dönük olarak incelenmesi. J Pediatr Emerg Intensive Care Med 6:13-17, 2019.

Haytoğlu Z. Ev kazaları ve korunma. Cukurova Med J, 2021, 46: 1-3.gü2021.

ICD 10. https://icd.who.int/browse10/2019/en. Erişim Tarihi: 11/07/2024

Keays G, Debbie F, Gagnon I. Pediatric injuries in the time of COVID-19.Health Promotion and Chronic Disease Prevention in Canada Research, Policy and Practice 40(11-12): 336-341, 2020.

Kiliç E, Bayazit T, Gündoğdu G, Koşaroğlu NE, Sümer H. Sivas il merkezi kreş ve anaokulu çocuklarında ev kazası geçirme sıklığı ve etkileyen faktörler. Cumhuriyet Üniv. Sağ. Bil. Enst (4)1:14-25, 2019

Önal H. 0-6 yaş grubu çocuklarda ev kazaları sıklığı ve etkileyen faktörler. Erciyes Üniversitesi Sağlık Bilimleri Enstitüsü, Halk Sağlığı Anabilim Dalı Yüksek Lisans Tezi, Kayseri, 2019.

Özdemir E.(2023).” ANNELERİN EV KAZALARINA YÖNELİK ALDIKLARI GÜVENLİK ÖNLEMLERİ VE EV KAZALARINDA İLK YARDIM ÖZ-YETERLİLİK DURUMLARININ BELİRLENMESİ”.Yüksek Lisans Tezi.Çanakkale On Sekiz Mart Üniversitesi Lisansüstü Eğitim Enstitüsü.Çanakkale

Öztürk A (2020) Çocuklarda Zehirlenme Yönetimi. Aksaray Üniversitesi Tıp Bilimleri Dergisi, 1(özel sayı): 1-5.

Reis TS, Oliveira I S, Jesus Santos JM, Costa Farre AGM, Verdes Rodrigues I D C, Leite A M, Freita C K A C. Ciênc. saúde coletiva 26(3):1077-1084, 2021.

Rumhi AA, Awisi HA, Buwaiqi MA, Rabaani SA. Home accidents among children: a retrospective study at a tertiary care center in oman. Oman Medical Journal 35(1):85, 2020.)

Şahin E,(2023). “EV KAZALARI NEDENİYLE ÇOCUK ACİL SERVİSE BAŞVURAN 0-6 YAŞ GRUBU ÇOCUĞU OLAN ANNELERİN İLK YARDIM ÖZYETERLİLİĞİ DÜZEYLERİNİN BELİRLENMESİ”Yüksek Lisans Tezi.aslan Bülent Ecevit Üniversitesi Sağlık Bilimleri Enstitüsü. Zonguldak

Şekerci E, İnal S. Hastanede yatan 0-6 yaş grubu çocukların annelerinin ev kazaları konusundaki bilgi ve uygulamalarının incelenmesi. HSP 3(3):160-172, 2019

Şenses O (2020) 2014-2019 Yılları Arası Kırıkkale Üniversitesi Tıp Fakültesi Çocuk Acil Servisine Başvuran Zehirlenme Vakalarının Epidemiyolojik, Demografik Özeliklerinin ve Klinik İzlemlerinin İncelenmesi. Kırıkkale Üniversitesi Tıp Fakültesi Hastanesi Çocuk Sağlığı ve Hastalıkları, Uzmanlık Tezi, Kırıkkale.

Suzan, Ö. K., Tabakoglu, P., Elmas, B., & Çınar, N. (2022). The Effect of the Covid-19 pandemic on emergency service home service calls due to home accidents in children aged 0-6 in Sakarya, Türkiye?. *Malawi medical journal*, *34*(4), 239-244.

Tanır F, Mete B. Yaralanmalar/kazalar ve ilk yardım. Ed: Tanır F, Demirhindi H. s.299-314. Halk Sağlığı Temel Bilgiler, Akademisyen Kitabevi, Ankara: 2020.

Tatar AA, İnce OT (2020) İzmir İl Merkezinde Dokuz Eylül Üniversitesi Çocuk Sağlığı ve Hastalıkları Hastanesine Başvuran 0-5 Yaş Arası Çocuklarda Ev Kazası Prevalansı ve İlişkili Faktörler. Dokuz Eylül Üniversitesi Tıp Fakültesi Çocuk Sağlığı Ve Hastalıkları Anabilim Dalı, Tıpta Uzmanlık Tezi, İzmir.

Türk Dil Kurumu. Kaza. http://tdkterim.gov.tr/bts/. 11 Temmuz 2024.

Thenmozhi P, Sabeetha S, Nandhini R. Knowledge and practice on prevention of domestic accident among mothers of under five children: Descriptive 52 study.Asian Journal of Research in Nursing and Health 3(4):65-70, 2020.

Topgül Ç, Elibol GC (2019) Kurum Bakımı Altındaki 0-6 Yaş Çocukların Yaşama Mekânlarının Ev Kazaları Açısından İncelenmesi. Toplum ve Sosyal Hizmet 30(1):121-146.

Torbacı F A. Ev kazaları konusunda okul öncesi dönemdeki çocukları eğitici ve yönlendirici bir hareketli grafik uygulaması. Hacettepe Üniversitesi Güzel Sanatlar Enstitüsü, Grafik Ana sanat Dalı Yüksek Lisans Tezi, Ankara, 2019.

Türkiye Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü 2022

Uğur Baysal, S., (2022). Çocuk Güvenliği: Yaralanmaların Önlenmesi ve Kontrolü. PEDİATRİ, İzmir Dr. Behçet Uz Çocuk Hastanesi içinde (ss. 60-61), Ankara Nobel Tıp Kitapevi.

Unguryanu T, Grjibovski A, Trovik T, Ytterstad B, Kudryavtsev AV. Mechanisms of accidental fall injuries and involved injury factors: a registry-based study. Injury Epidemiology 7: 8, 2020

Üçüncü, M., Üçüncü, M., & Toprak, D. (2019). 0-6 YAŞ GRUBU ÇOCUĞU OLAN ANNELERİN EV KAZALARI VE KORUNMA YOLLARI KONUSUNDAKİ BİLGİ, TUTUM VE DAVRANIŞLARI İLE SOSYODEMOGRAFİK ÖZELLİKLERİN BUNA ETKİSİ. Journal of Istanbul Faculty of Medicine, 82(4), 219-228.

Yeniyapı A, Tokur Kesgin M (2023) Anaokulu Çocuklarının Annelerinin Ev Kazalarına Yönelik Aldıkları Güvenlik Önlemleri ile Sağlık İnancı Arasındaki İlişki: Kesitsel ve Korelasyonel Çalışma. Turkiye Klinikleri Journal of Nursing Sciences, 15(1): 89-97

Yorulmaz DS, Özbay SÇ. Türkiye'de ev kazası temalı 2000-2020 yılları arasında yapılan lisansüstü tezlerin incelenmesi. Derleme. THDD 2(2):88-99, 2021.

Yöndem Z, Tunçbilek Z (2020) "Çocukluk Çağında Yanık Önleme Programı"nın Bakım Vericinin Bilgi Düzeyine ve Ev Ortamı Risk Faktörlerinin Azaltılmasına Etkisi. Hacettepe Üniversitesi Sağlık Bilimleri Enstitüsü, Yüksek Lisans Tezi, Ankara

WHO. Global report on falls prevention in older age 2018. https://www.who.int/news-room/fact-sheets/detail/falls. 09 Mart 2022.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

JİNEKOLOJİK KANSER FARKINDALIĞINI ETKİLEYEN FAKTÖRLER

Doç. Dr. Nursel ALP DAL
Munzur Üniversitesi, Sağlık Bilimleri Fakültesi, Ebelik Bölümü
ORCID: 0000-0002-9364-3683

Ebe Gamze DENİZ
Munzur Üniversitesi, Sağlık Bilimleri Fakültesi, Ebelik Bölümü
ORCID: 0009-0001-5161-6417

ÖZET
Küreselleşen dünyada kanser kaynaklı ölüm oranlarındaki artış her geçen gün giderek ivme kazanmaktadır. Bu kanserler arasında jinekolojik kanserler, mortalite ve morbidite nedenleri arasında önemli bir yer kaplamaktadır. Jinekolojik kanserler, kadın üreme organlarından köken almaktadırlar. Bu organlarda kontrolsüz bir şekilde çoğalan ve anormal bir yayılım gösteren kanser türlerinin semptomları ve şikayetleri farklılık göstermektedir ancak köken aldığı risk faktörleri ortaktır. Bu risk faktörlerinin bazıları bizim kontrolümüz dahilindeyken bazıları bizim kontrolümüz dışında gelişir. Yaş ve genetik gibi bizim dışımızda gelişen risk faktörlerine müdahale mümkün olmazken; sigara alkol kullanımı, hareketsiz yaşam, çevresel bireysel etmenler gibi faktörlere dışarıdan müdahalede bulunularak bu riskler en aza indirgenebilir. Kadının bu riskleri ekarte edebilmesi için kadına farkındalık kazandırılmalıdır.Çünkü jinekolojik kanserler, özelde kadına ve ailesine ; genelde topluma, sağlık sistemine ve ülkeye oldukça fazla fiziksel, psikolojik ve mali yük getirmektedir. Kanser, önlenebilir hastalıklar grubunda bulunması sebebiyle erken tanı ve tedaviyi gerekli kılmaktadır. Erken devrede teşhis konulabilmesi ve tedaviye başlanılabilmesi için de kadına bu konuda bilgi verilip farkındalık kazandırılmalıdır. Kadına kazandırılan farkındalık temelde jinekolojik kanserlere yönelik olsa da kadınla paylaşılan risk faktörleri kronik hastalıklar başta olmak üzere birçok hastalığa zemin hazırlar konumda olduğu için bunlara yönelik de farkındalık kazandırılmış olacaktır. Ancak çeşitli faktörler kadının farkındalık kazanmasını etkilemektedir. Bunlardan başlıcaları: yaş, kadının ve eşinin eğitim durumu, çalışma durumu, gelir durumu, sosyal güvencesi, gebelik sayısı, menopoz durumu, alkol ve sigara kullanım durumu, hareketsiz yaşam, yaşanılan coğrafya ve ailede kanser öyküsü olarak sıralanabilmektedir. Bu faktörler, farkındalık oluşumunu engellediği gibi teşhis ve tedavi sürecine de geç kalınmaya sebebiyet vermektedir. Bu faktörleri belirleyip bunlara yönelik çözüm bulunulması kadının yaşam kalitesini artırır, ülkenin sağlık seviyesini yükseltir ve sağlık sistemine getirilen mali yükünde önüne geçilmiş olur.
Bu derlemede, kadınların jinekolojik kanserler ile ilgili farkındalığını ve farkındalığı etkileyen faktörler belirlenmiş, belirlenirken de literatürden destek alınarak hazırlanmıştır.
Anahtar Kelimeler: Jinekolojik Kanser, Farkındalık, Kadın

FACTORS AFFECTING GYNECOLOGICAL CANCER AWARENESS

ABSTRACT
In the globalizing world, the increase in cancer death rates is gaining momentum day by day. Among these cancers, gynecological cancers have an important place among the causes of mortality and morbidity. Gynecological cancers originate from the female reproductive organs. Symptoms and complaints of cancer types that grow uncontrollably and spread abnormally in these organs vary, but the risk factors they originate from are common.

While some of these risk factors are within our control, some develop beyond our control. While it is not possible to intervene in risk factors that develop outside of us, such as age and genetics; These risks can be minimized by external intervention on factors such as smoking, alcohol use, sedentary life, and individual environmental factors. Awareness should be raised in women so that they can rule out these risks. Because gynecological cancers affect women and their families in particular; It generally imposes a significant physical, psychological and financial burden on society, the healthcare system and the country. Cancer requires early diagnosis and treatment because it is in the group of preventable diseases. In order to be diagnosed at an early stage and to start treatment, women should be informed and raised awareness about this issue. Although the awareness raised to women is mainly about gynecological cancers, awareness will also be raised about the risk factors shared with women, as they pave the way for many diseases, especially chronic diseases. However, various factors affect women's awareness. The main ones can be listed as age, education level of the woman and her husband, employment status, income level, social security, number of pregnancies, menopause status, alcohol and cigarette use, sedentary life, geography and cancer history in the family. These factors prevent the formation of awareness and diagnosis. and causes delays in the treatment process. Identifying these factors and finding solutions for them improves the quality of life of women, increases the health level of the country and prevents the financial burden on the health system.

In this research, women's awareness of gynecological cancers and the factors affecting awareness were determined, and the determination was prepared with support from the literature.

Keywords; Gynecological Cancer, Awareness, Women

GİRİŞ

Kanser, anormal hücrelerin kontrolsüz bir şekilde büyüyüp hücre, doku ve organlara yayılım gösteren bir hastalık grubu olarak tanımlanmaktadır. Bu hastalık grubundan olan jinekolojik kanserler, kadın üreme organlarından köken almaktadırlar. Jinekolojik kanserler, kadınlarda morbidite ve mortalitenin nedenleri arasında önemli bir yer kaplamaktadır. Görüldüğü bölgeye göre isim alan jinekolojik kanserler: endometrium, serviks, over, vajen, vulva ve fallop tüpü kanserleri olarak sıralanmaktadır (Karabaş, 2023). Dünya çapında görülen jinekolojik kanserlerin görülme oranları; en fazla serviks, uterus ve over kanseri olarak sıralanmaktadır. Jinekolojik kanserler, yaklaşık olarak yıllık 3,6 milyondan fazla görülme sıklığı ve 1,3 milyonu aşan ölüm hızı ile dünya çapında görülen bütün kanser vakalarının %40'ını ve bütün kanserler kaynaklı ölümlerin ise %30'undan fazlasını meydana getirmektedir (Sung ve ark. 2021; Çınar, 2022). Jinekolojik kanser türleri, dünya çapında yılda 450 bin, Türkiye'de ise 4500 kadının ölümüne sebep olmaktadır. GLOBOCAN 2020 verilerine göre ülkemizde jinekolojik kanserlerin görülme oranına baktığımızda bütün kanserler içerisinde uterus kanseri %5,6 oranı ile 5.sırada, over kanseri %3,7 oranı ile 7. Sırada ve serviks kanseri %2,5 oranı ile 9. Sırada yer almaktadır (Globocan ,2020). Ülkemizde görülen jinekolojik kanser türlerinden olan uterus kanseri, en çok görülme sıklığına sahip olan kanserken ölüm hızı en yüksek olan kanser ise over kanseri olarak karşımıza çıkmaktadır (Tuncer, 2023). Jinekolojik kanser açısından tüm kadınlar risk grubunda yer alıp risk, yaş ilerledikçe artmaktadır (CDC, 2021). Uluslararası Kanser Araştırmaları Ajansı (IARC) 2020 verilerine göre, her 11 kadından 1'i kanser nedeniyle yaşama veda etmekte ve global açıdan kanser yükünde artış görülmektedir (Bouvard ve ark.2021).

Gelişen teknolojiye rağmen her geçen gün kanser teşhisinin ve kanserin sebebiyet verdiği ölümlerin yaygınlaşması, önemli bir halk sağlığı sorunu haline gelen jinekolojik kanserlerin yayılımının önüne geçilmesi konusunda topluma alarm vermektedir (Balkan ve ark.2023). Çünkü bu kanserler, özelde kadına ve ailesine; genelde topluma, sağlık sistemine ve ülkeye oldukça fazla fiziksel, psikolojik ve beraberinde mali yük getirmektedir. Bunun önüne geçebilmek için jinekolojik kanserlerin sebebiyet verdiği mortalite ve morbidite oranlarının düşürülmesi gerekmektedir (Çınar , 2022). Bunun için kadına en başta jinekolojik kanserler hakkında bilgi verilip neden olan risk faktörlerinin neler olduğuna dair farkındalık kazandırılmalıdır. Bu kanserlerin göstermiş olduğu semptom ve şikayetler farklılık gösterebilir fakat köken aldıkları risk faktörleri ortaktır (Cambo ve ark.2015). Bu risk faktörlerinin bazıları bizim kontrolümüz dahilindeyken bazıları bizim kontrolümüz dışında gelişir. Yaş ve genetik gibi bizim dışımızda gelişen risk faktörlerine müdahale mümkün olmazken; sigara ve alkol kullanımı, hareketsiz yaşam, çevresel bireysel etmenler gibi faktörlere dışarıdan müdahalede bulunularak bu riskler en aza indirgenebilir (Dal ve Ertem, 2017).

Birey değiştirebileceği risk faktörlerine karşı farkındalık kazandığı zaman hastalık erken devrede tanımlanabilecek ve uygun tedavi ile beraber hem hastalığın seyri değişecek hem de bireyin yaşam kalitesi artacaktır (Dal ve ark.2020). Çünkü jinekolojik kanserlerde birçok hastalık gibi önlenebilen hastalıklar grubunda yer almaktadır. Kadına kazandırılan farkındalık sayesinde erken tanı ve tedavi ile beraber mortalite ve morbidite oranlarında düşüş yaşanacaktır. Kadına kazandırılan farkındalık, temelde jinekolojik kanserlere yönelik olsa da kadın ile paylaşılan risk faktörleri kronik hastalıklar başta olmak üzere birçok hastalığa zemin hazırlayacağı için bunlara yönelik de farkındalık kazandırılmış olacaktır (WHO,2015). Ancak çeşitli faktörler kadının farkındalık kazanmasını etkilemektedir. Bunlardan başlıcaları: yaş , kadının ve eşinin eğitim durumu, çalışma durumu, gelir durumu, sosyal güvencesi, gebelik sayısı, menopoz durumu, alkol ve sigara kullanım durumu, hareketsiz yaşam, yaşanılan coğrafya ve ailede kanser öyküsü olarak sıralanabilmektedir. Bu faktörler, farkındalık oluşumunu engellediği gibi teşhis ve tedavi sürecine de geç kalınmaya sebebiyet vermektedir. Bu faktörleri belirleyip bunlara yönelik çözüm bulunulması; kadının yaşam kalitesini artırır,ülkenin sağlık seviyesini yükseltir ve sağlık sistemine getirilen mali yükünde önüne geçilmiş olur.

JİNEKOLOJİK KANSER FARKINDALIĞINI ETKİLEYEN FAKTÖRLER

Yaş: Jinekolojik kanser farkındalığını etkileyen faktörlerin başında yaş gelmektedir. Yapılan çalışmalarda farklı yaş gruplarında bulunan kadınların jinekolojik kanser farkındalığının değiştiği görülmüştür (Atlas,2020;Dal,2022;Gözüyeşil ve ark.2019;Kaya Şenol ve ark.2021,Karabaş,2023). Karabaş (2023)'ın yapmış olduğu çalışmada 40-49 yaş aralığındaki kadınların, Gözüyeşil ve arkadaşlarının (2019) yapmış olduğu çalışmada 30-39 yaş aralığındaki kadınların, Kaya Şenol ve arkadaşlarının (2021) yapmış olduğu çalışmada 36-50 yaş aralığındaki kadınların, Atlas(2020)'ın yapmış olduğu çalışma 29 yaşından küçük kadınların, Atlas ve Güneri (2022) 'nin çalışmasında 18-29 yaş aralığındaki kadınların jinekolojik kanserlere yönelik farkındalıklarının yüksek olduğu saptanmıştır. Teşkereci ve arkadaşlarının (2021) yapmış olduğu çalışmada jinekolojik kanser farkındalığının artan yaş aralığı ile doğru orantılı olarak artış seyrettiği sonucuna ulaşılmıştır.

Eğitim Düzeyi: Jinekolojik kanser farkındalığını etkileyen faktörlerden bir diğeri eğitim düzeyidir. Eğitim düzeyi arttıkça jinekolojik kanser farkındalığı da paralel olarak artar. Çelebi (2021)'nin, Dal (2022)'ın çalışması ve Karabaş (2023)'ün çalışmaları yukarıda verilen bilgiyi destekleyip yürüttükleri çalışmalarda paylaşılan bilgiye yakın sonuçlar elde etmişlerdir.

Eğitim düzeyinin yükselmesi kadında araştırma bilinci oluşturup , sağlık okuryazarlığını artıracağından jinekolojik kanser farkındalığını da arttırır.

Çalışma Durumu: Çalışma durumunun jinekolojik kanser farkındalığını etkilediği literatür doğrultusunda tespit edilmiş olup yapılan çalışmalarda çalışma hayatında aktif rol alan kadınların jinekolojik kanser farkındalıklarının yüksek olduğu görülmektedir (Atlas ve Güneri, 2022; Kaya Şenol ve ark. 2021; Öz, 2021). Yurt dışında yapılmış olan bir çalışmada çalışan kadınların yumurtalık kanseri semptomları ve risk faktörleri hakkında daha fazla bilgi sahibi olduğu sonucuna ulaşılmıştır (Okunowo ve Adaramoye, 2018). Çalışma hayatında aynı ortamı paylaşan kadınların kurmuş oldukları iletişim; başta aile,ekonomi,sağlık gibi birçok konu hakkında bilgi alışverişinde bulunmalarında etkin bir rol oynadığından jinekolojik kanser farkındalığını da arttırır. Sosyal güvencenin bulunma durumu jinekolojik kanser farkındalığını etkileyen faktörlerden biridir.Sosyal güvencenin bulunması kadında jinekolojik kanser farkındalığını arttırır. Şahin (2009)'in çalışmasında sosyal güvencesi emekli sandığı olan bireylerin jinekolojik kanser farkındalığının da yüksek olduğu görülmüştür (Şahin, 2009). Akkoyun (2020)'un çalışmasında sosyal güvencesi olan kadınların jinekolojik kanserlerden korunmaya yönelik farkındalık düzeyleri sosyal güvencesi olmayan kadınların farkındalık düzeyinden daha yüksek bulunmuştur. Dal ve arkadaşlarının(2023) yapmış olduğu çalışmada sosyal güvencesi olmayan kadınların jinekolojik kanser farkındalıklarının sosyal güvencesi olan kadınların farkındalık düzeyinden daha düşük bulunmuştur. Karabaş (2023)'ın yapmış olduğu çalışmada sosyal güvencesi olan kadınların jinekolojik kanser yüksek olduğu sonucuna ulaşılmıştır. Sosyal güvencesi bulunmayan kadınların muayene ücretini karşılayamaması, herhangi bir belirti-bulgu varlığı söz konusu olduğunda sağlık kuruluşuna gitmeyi ertelemesine neden olup beraberinde jinekolojik kanser farkındalığını da olumsuz etkiler. Gelir durumu jinekolojik kanser farkındalığını etkileyen faktörlerden bir diğeridir. Gelir durumu iyi olan kadınların jinekolojik kanser farkındalığı da yüksektir (Karabaş,2023; Çelebi, 2021; Dal, 2022; Gözüyeşil ve ark. 2020; Öz, 2021).Yurt dışında Sullivan ve arkadaşlarının (2021) Hindistan'da yürütmüş olduğu kohort çalışmasında gelir durumu kötü olan kadınların %92,9'unun kanser taramasının yapıldığına dair bilgisinin olmadığı ve daha önce hiç kanser taraması yaptırmadığı saptanmıştır (Sullivan ve ark. 2021). Bireyin gelir durumunun iyi olması bireyin sağlık hizmetlerine ulaşımını kolaylaştırarak jinekolojik kanserlere yönelik farkındalığı da paralel olarak arttırır.

Eş Eğitimi: Kadınların eşlerinin eğitim seviyeleri ile jinekolojik kanser farkındalıkları arasındaki ilişki literatür doğrultusunda net olmamakla birlikte kadınların eşlerinin eğitim seviyesinin yüksek olması , kadınlara sağlayacakları imkan doğrultusunda verecekleri destek ile birlikte jinekolojik kanser farkındalıklarının yüksek olacağını gösteren çalışmaya rastlanmıştır (Karabaş,2023).

Sigara-Alkol: Jinekolojik kanser farkındalığını etkileyen bir diğer faktör sigara alkol kullanımıdır. Sigara- alkol kullanımının jinekolojik kanser farkındalığını etkilediğine dair yapılan çalışmalarda farklı sonuçlar karşımıza çıkmaktadır. Karabaş (2023)'ın yapmış olduğu çalışmada sigara içmiş fakat şuan içmeyi bırakan kadınların jinekolojik kanser farkındalığının yüksek düzeyde olduğu saptanmıştır. Atlas (2020)'ın çalışmasında sigara kullanan ile kullanmayan kadınlar arasında jinekolojik kanser farkındalığına yönelik anlamlı bir şekilde fark saptanamazken; Dal (2022)'ın çalışmasında sigara kullanmayan kadınların jinekolojik kanser farkındalıklarının yüksek düzeyde olduğu görülmüştür. Yurt dışında Mwaka ve arkadaşlarının (2016) Uganda'da yaptığı çalışmada ise tütün ve sigara türlerinden herhangi birini kullanan kadınlarda, serviks kanserinin belirti,bulgu ve risk faktörlerine yönelik bilgi düzeylerinin yüksek olduğu saptanmıştır (Mwaka ve ark, 2016).

Sigara birçok hastalığa zemin hazırladığı için, sigara içip sonradan bırakan bireylerde ortaya çıkabilecek sağlık sorunlarının daha erken ortaya çıkması bireyi sağlık kuruluşuna başvuru yapmaya iteceğinden jinekolojik kanserlere yönelik farkındalığı da arttır.Yapılan çalışmalar incelendiğinde benzer sonuçlar elde edilmiş olup , çalışmalarda alkol kullanan bireylerin jinekolojik kanser farkındalıklarının yüksek düzeyde olduğu bulunmuştur (Atlas, 2020; Atlas ve Güneri, 2022; Karabaş, 2023). Genellikle alkol kullanan bireylerinin eğitim düzeyinin yüksek olması , gelir durumunun iyi olması bireyde jinekolojik kanser farkındalığını yükseltir.

Egzersiz: Egzersiz, literatür incelendiğinde jinekolojik kanser farkındalığını etkileyen faktörlerden biri olarak karşımıza çıkmaktadır.Yapılan çalışmalarda egzersiz yapan bireylerin jinekolojik kanser farkındalık düzeylerinin yüksek olduğu görülmüştür. Dal ve arkadaşlarının (2020) yapmış olduğu çalışmada fiziksel egzersiz yapan kadınların farkındalıklarının yüksek düzeyde olduğu sonucuna ulaşılmıştır. Burucu ve Kıyak (2022)'ın üniversite öğrencileri ile yapmış olduğu çalışmada egzersiz yapan öğrencilerin jinekolojik kanser farkındalığının yüksek olduğu saptanmıştır. Egzersiz yapan kadınların sağlık algısının yüksek düzeyde olması beraberinde jinekolojik kanser farkındalığını da arttırır.

Kronik Hastalık: Kronik hastalık varlığının jinekolojik kanser farkındalığını etkilediğine dair literatürde net bir bilgi olmamasına rağmen bazı çalışmalarda kronik hastalığı bulunan kadınların jinekolojik kanser farkındalıklarının yüksek olduğu görülmektedir. Burucu ve Kıyak (2022)'ın yapmış olduğu çalışmada diyabet hastası olan öğrencilerin jinekolojik kanser farkındalığının yüksek , solunum sistemi hastalığı bulunan öğrencilerin ise jinekolojik kanser farkındalığının düşük olduğu sonucuna ulaşılmıştır.

Aile Planlaması: Literatür incelendiğinde jinekolojik kanser farkındalığını etkileyen faktörlerden biri aile planlaması olarak karşımıza çıkmaktadır. Literatür kapsamında yapılan çalışmalar incelendiğinde aile planlaması kullanan kadınların jinekolojik kanser farkındalığının yüksek olduğu görülmektedir (Çelebi,2021;Dal,2022; 2012; Dal ve ark.2023;Öz, 2021; Başoğlu, 2020;Karabaş, 2023; Kaya Şenol ve ark, 2021). Brezilya'da Albuquerque ve arkadaşlarının (2014) yapmış olduğu bir çalışmada, etkin bir aile planlaması yöntemi kullanan kadınların serviks kanser taramasına yönelik bilgi düzeylerinin anlamlı derecede yüksek olduğu saptanmıştır (Albuquerque ve ark, 2014). Aile planlaması yöntemi kullanan kadınların sağlık algılarının yüksek düzeyde olması, sağlık kuruluşları ile temas halinde olmaları beraberinde jinekolojik kanserlere yönelik farkındalığı da arttırır.

Gebelik Sayısı: Gebelik sayısı jinekolojik kanser farkındalığını etkileyen faktörler arasında yer almaktadır. Gebelik sayısının artması ile beraber jinekolojik kanser farkındalığının azaldığı görülmektedir. Karabaş (2023)'ın yapmış olduğu çalışmada gebelik sayısının artmasıyla beraber jinekolojik kanser farkındalığının azaldığı , Atlas ve Güneri (2022)'nin yapmış olduğu çalışmada gebelik sayısı 1-2 olan kadınların jinekolojik kanser farkındalığının yüksek , Dal (2022) ve Atlas (2020)'ın yapmış oldukları çalışmada 2 ve altı gebeliği bulunan kadınların jinekolojik kanser farkındalığının , 3 ve üstü gebeliği bulunan kadınlara oranla daha yüksek olduğu görülmüştür . Bu durumda gebelik sayısının artmasıyla farkındalık arasında ters bir orantı olduğu görülmüştür.

Çocuk Sahibi Olma: Literatüre bakıldığında çocuk sahibi olmanın jinekolojik kanser farkındalığını etkilediği , çocuk sahibi olmayan kadınların jinekolojik kanser farkındalıklarının daha yüksek olduğu görülmüştür. Karabaş (2023)'ın yapmış olduğu çalışmada çocuk sahibi olma durumu ile jinekolojik kanser farkındalığı arasında anlamlı bir şekilde fark saptanamamış fakat çocuğu olmayan kadınların farkındalıklarının yüksek olduğu sonucuna ulaşılmıştır . Çelebi(2021) 'nin yapmış olduğu çalışmada da çocuğu olmayan kadınların jinekolojik kanser farkındalığının yüksek olduğu saptanmıştır.

Dal (2022)'ın çalışmasında çocuk sayısı ile jinekolojik kanser farkındalığı arasında anlamlı bir şekilde fark bulunamamıştır. Öz (2021) ve Atlas (2020)'ın yapmış olduğu çalışmalarda benzer sonuçlar elde edilmiş olup , bu çalışmalarda 2 ve altında çocuğu olan kadınların jinekolojik kanser farkındalıklarının , 3 ve üstü çocuğu bulunan kadınların farkındalıklarından anlamlı şekilde yüksek bulunmuştur. Bazı çalışmalar çocuk varlığının farkındalık üzerinde anlamlı bir şekilde etkisi olmadığını savunurken bazı çalışmalarında çocuk varlığının farkındalık düzeyi üzerinde azımsanmayacak bir rolü olduğunu savunmaktadır.

Menopoz: Menopozun jinekolojik kanser farkındalığını etkilediğine dair yapılan çalışmalar incelendiğinde farklı sonuçlara ulaşılmıştır. Karabaş (2023)'ın yapmış olduğu çalışmada menopoza girmemiş kadınlarda jinekolojik kanser farkındalığının yüksek olduğu saptanmıştır. Atlas (2020), Dal(2022), Kaya Şenol ve arkadaşlarının (2021) ve Şenol ve arkadaşlarının (2021) yapmış olduğu çalışmalarda da benzer sonuçlar elde edilmiştir. Gözüyeşil(2020)'in yapmış olduğu çalışmada menopozdaki kadınların jinekolojik kanser farkındalıklarının anlamlı bir oranda yüksek olduğuna dair bir sonuca ulaşılmamıştır. Başka bir çalışmada ise menopozda olan kadınların jinekolojik kanserlere yönelik farkındalıklarının yüksek olduğu saptanmıştır (Öztürk ve ark, 2021). Öz (2021)'ün yaptığı çalışmada bunu destekler niteliktedir. Çalışmalarda farklı sonuçların elde edilmesinde bölgesel farklılıklar,eğitim düzeyi,çalışma durumu gibi faktörler etkili olmuştur.

Ailesel Öykü: Ailede kanser öyküsünün olmasının jinekolojik kanser farkındalığını etkileyen faktörler arasında yer almakla birlikte yapılan çalışmalarda ailesinde kanser öyküsü olanların jinekolojik kanser farkındalığının da yüksek olduğu görülmüştür. Karabaş (2023)'ın yapmış olduğu çalışmada ailesinde kanser öyküsü olan kadınların jinekolojik kanser farkındalığın yüksek olduğu sonucuna ulaşılmıştır. Yapılan diğer çalışmalarda da benzer sonuçlar elde edilmiştir (Burucu ve Kıyak 2022; Duman ve ark 2015; İnan, 2018; Özdemir, 2006). Kanserlerin değiştirilemeyen risk faktörlerinden biri olan genetik geçiş bireyi sağlık kuruluşa yönlendirmeye iteceğinden bireyde jinekolojik kanser farkındalığını arttırır.

SONUÇ VE ÖNERİLER

Jinekolojik Kanser; erken tanı ve tedavi imkanlarının doğru zamanda kullanılması halinde ölüm riskini azaltılabilecek ve yaşam kalitesini artırılabilecek hastalık grubunda yer almaktadır. Bunun için de kadına farkındalık kazandırılmalıdır. Burada kadının en çok temas halinde olduğu sağlık çalışanlarına önemli roller düşmektedir. Bu sağlık çalışanları; eğitici , öğretici , danışmacı , uzlaşmacı gibi birçok rolünü kullanarak bu konuda gerekli farkındalık oluşumunu sağlayabilirler. Farkındalık kazandırılmaya çalışılırken birçok faktör ile karşılaşacaklardır. Benimsedikleri roller sayesinde bu faktörlere doğru bir şekilde yaklaşım göstererek bu faktörlerin farkındalık üzerinde olan olumsuz etkilerini bertaraf edebileceklerdir. Böylelikle hem kadının farkındalık düzeyi yükselmiş olacak yaşam kalitesi artacak hem de topluma getirilen maddi yükünde önüne geçilmiş olacaktır. Biz bu derlemede jinekolojik kanser farkındalığını etkileyen faktörleri literatür ışığında derledik fakat yapılan çalışmalar yetersiz olup bu konuda biraz daha çalışma yapılması önerilebilir.

KAYNAKÇA

1)Akkoyun, H. (2020). Kadınların jinekolojik yakınmaları, çözümleri ve jinekolojik kanserlerden korunma konusundaki bilgi ve uygulamaları arasındaki ilişki. Yüksek Lisans Tezi, Sivas Cumhuriyet Üniversitesi Sağlık Bilimleri Enstitüsü, Sivas.

2)Albuquerque, C. L. F. D., Costa, M. D. P., Nunes, F. M., Freitas, R. W. J. F. D., Azevedo, P. R. M. D., Fernandes, J. V., ... Barreto, H. M. (2014). Knowledge, attitudes and practices regarding the Pap test among women in northeastern Brazil. Sao Paulo Medical Journal, 132, 3-9. DOI: 10.1590/1516-3180.2014.1321551.

3)Alp Dal, N., Gümüşsoy, S., & Ertem, G. (2023). Sosyal medyayı kullanan kadınlarda jinekolojik kanser farkındalığının analizi. *Psikoloji, Sağlık ve Tıp* , *28* (9), 2720-2727.

4)Atlas, B. (2020). Çiğli Bölge Eğitim Hastanesine başvuran kadınların jinekolojik kanserlerle ilgili farkındalığı. Yüksek Lisans Tezi, Ege Üniversitesi Sağlık Bilimleri Enstitüsü, İzmir.

5)Atlas, B., Güneri, S. E.(2022). Kadınların jinekolojik kanserlerle ilgili farkındalığı ve farkındalığı etkileyen faktörler. İzmir Katip Çelebi Üniversitesi Sağlık Bilimleri Fakültesi Dergisi, 7(1), 77-85.

6)Balkan, E., & Oskay, Ü. (2023). Jinekolojik Kanser Hastası ve Ailesinin Psiko-Sosyal Bakımında Sağlık Profesyonelinin Rolü. *Bandırma Onyedi Eylül Üniversitesi Sağlık Bilimleri ve Araştırmaları Dergisi*, *5*(1), 74-83.

7)Başoğlu, M. (2020). Lezbiyen veya biseksüel kadınlarda kadın kanserlerine yönelik eğitimin jinekolojik kanser farkındalığına ve sağlıklı yaşam biçimi davranışlarına etkisi. Yüksek Lisans Tezi, Dokuz Eylül Üniversitesi Sağlık Bilimleri Enstitüsü, İzmir.

8)Bouvard, V, Wentzensen N, Mackien A, Berkhof J, Brotherton J, Giorgi-Rossi, P., ... & Lauby-Secretan B. The IARC perspective on cervical cancer screening. New England Journal of Medicine. 2021;385(20): 1908-1918.

9)Burucu, R., Kıyak, S. (2022). Üniversite öğrencilerinin jinekolojik kanser farkındalıkları ve ilişkili faktörler. Sürekli Tıp Eğitimi Dergisi, 31(3), 172-182. DOI: 10.17942/sted.883678.

10)Campo L, Zhang C, Breuer EK. EMT-Inducing molecular factors in gynecological cancers. Biomed Res Int 2015; 420891. doi:10.1155/2015/420891.

11)Centers for Disease Control and Prevention (CDC). What is gynecologic cancer? [Internet]. 2021.Available from: https://www.cdc.gov/cancer/gynecologic/ basic_info/what-is-gynecologic-cancer.htm erişim Tarihi: 5 Ağustos 2024.

12)Çelebi, N. (2021). Kadınların jinekolojik kanserlere yönelik farkındalıkları ve erken tanı yöntemlerine yönelik davranışlarının değerlendirilmesi. Yüksek Lisans Tezi, Atatürk Üniversitesi Sağlık Bilimleri Fakültesi, Erzurum.

13)Dal N. A., Akkuzu G., Şen Ç. Y. (2020). Ufuk üniversitesi kadın çalışanlarının jinekolojik kanser farkındalığının incelenmesi. Ebelik ve Sağlık Bilimleri Dergisi, 3(2), 91-99.

14)Dal NA, Ertem G. Jinekolojik kanserler farkındalık ölçeği geliştirme çalışması. İnsan ve Toplum Bilimleri Araştırmaları Dergisi 2017;6(5):2351-2367.

15)Dal, O. (2022). Kırklareli eğitim ve araştırma hastanesine başvuran kadınların jinekolojik kanserlere yönelik farkındalıklarının değerlendirilmesi, Yüksek Lisans Tezi, Kırklareli Üniversitesi Sağlık Bilimleri Enstitüsü, Kırklareli.

16)Duman, N. B., Koçak, D. Y., Albayrak, S. A., Topuz, Ş., Yılmazel, G. (2015). Kırk yaş üstü kadınların meme ve serviks kanseri taramalarına yönelik bilgi ve uygulamaları. GOP Taksim EAH Journal of Academic Research in Nursing, 1(1), 30-38. doi: 10.5222/jaren.2015.030.

17)GLOBOCAN. (2020). Cancer Today. Erişim tarihi: 05.08.2024, https://gco.iarc.fr/today/onlineanalysispie?v=2020&mode=cancer&mode_population=co ntinents&population=900&populations=900&key =total&sex=2&cancer= 39&type=2 &statistic=5&pr evalence=1&population_group=0&ages_group%5 B%5D=0&ages_group %5B%5D=17&nb_items=7 &group_cancer=1&include_nmsc=1&include_nm sc_other= 1& half_pie=0&donut=0

18)Gözüyeşil E., Düzgün A. A., Taş F. (2020). Bir aile sağlığı merkezine başvuran kadınların jinekolojik kanser farkındalıklarının değerlendirilmesi. Turkish Journal of Family Medicine and Primary Care (TJFMPC), 14(2), 177- 185. DOI: 10.21763/tjfmpc.730022. a/Factsheets/Populations/792-Turkey-Factsheets.Pdf. adresinden erişildi.

19)Gözüyeşil, E., Düzgün, A. A., Aslan, K. S. Ü. (2019). Kadınların serviks kanserinden korunma ve erken tanıya yönelik tutumlarının değerlendirilmesi. Sted/Sürekli Tıp Eğitimi Dergisi, 28(4), 229-238. DOI: 10.17942/sted.444170.

20)İnan, E., (2018). Diyarbakır ili Kayapınar İlçesi 9 nolu aile sağlık merkezi bölgesinde 30-69 yaş arası kadınların meme ve serviks kanseri konusunda bilgi, tutum ve davranışlarının 85 değerlendirilmesi. Tıpta Uzmanlık Tezi, Dicle Üniversitesi Tıp Fakültesi Halk Sağlığı Anabilim Dalı, Diyarbakır.

21)Karabaş, M. (2023).Kadınların *Jinekolojik Kanserlere Yönelik Farkındalıklarını Etkileyen Faktörler: Denizli İli Örneği* (Master's thesis, Aydın Adnan Menderes Üniversitesi Sağlık Bilimleri Enstitüsü).

22)Kaya Şenol, D., Polat, F., Doğan, M. (2021). Jinekolojik kanser farkındalığı: üreme çağı ve postmenopozal dönem kadınlar. Turkish Journal of Family Medicine and Primary Care, 15(1), 56-62. DOI: https://doi.org/10.21763/tjfmpc.805231.

23)Mwaka, A. D., Orach, C. G., Were, E. M., Lyratzopoulos, G., Wabinga, H., Roland, M. (2016). Awareness of cervical cancer risk factors and symptoms: cross-sectional community survey in post-conflict northern Uganda. Health Expectations, 19(4), 854- 867. DOI: 10.1111/hex.12382.

24)Okunowo, A. A., Adaramoye, V. O. (2018). Women's knowledge on ovarian cancer symptoms and risk factors in Nigeria: An institutional-based study. Journal of Epidemiology and Global Health, 8(1-2), 34. doi: 10.2991/j.jegh.2018.07.002.

25)Öz, S. (2021). 20 yaş ve üzeri kadınların jinekolojik kanserlere ılişkin bilgi ve farkındalıkları ile etkileyen faktörlerin incelenmesi. Yüksek Lisans Tezi, İstinye Üniversitesi Sağlık Bilimleri Enstitüsü, İstanbul.

26)Özdemir, S. (2006). Kanser hastalarının yaşadığı semptomlar ile tedavi kararını değerlendirme ve yaşam tutum profili arasındaki ilişki. Yüksek Lisans Tezi, Atatürk Üniversitesi Sağlık Bilimleri Enstitüsü, Erzurum,

27)Özen Çınar İ. Dünyada ve Türkiye'de jinekolojik kanserlerde durum ve epidemiyoloji. Jinekolojik Onkolojide Bakım. Editörler; Özkan S, Serçekuş P, Erkan Alataş E. https://books.akademisyen.net/index.php/akya/catalog/view/1135/1249/26842 Erişim Tarihi: 01.08.2024

28)Öztürk R., Bakir S., Kazankaya F., Paker S., Ertem G. (2021). Awareness about gynecologic cancers and related factors among healthy women: a cross-sectional study. Social Work İn Public Health, 36(7-8):847- 856. doi:10.1080/19371918.2021.1965936.

29)Sullivan, B. G., Qazi, A., Senthil, M. (2021). Cancer screening programs in low- and middleıncome countries: strategies for success. Annals of Surgical Oncology, 28(12), 6918- 6919. DOI: 10.1245/s10434-021-10509-w.

30)Sung, H., Ferlay, J., Siegel, R. L., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F. (2021). Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: a cancer journal for clinicians*, *71*(3), 209-249.

31)Şahin, D. (2009). Kırklareli devlet hastanesi'nde çalışan sağlık personelinin ve hastaneye başvuran kadınların jinekolojik kanserler hakkında bilgi, tutum ve davranışları. Yüksek Lisans Tezi, Trakya Üniversitesi Sağlık Bilimleri Enstitüsü, Edirne.

32)Şenol, D. K., Polat, F., & Doğan, M. (2021). Gynecological cancer awareness: reproductive age and postmenopausal women. *Turkish Journal of Family Medicine and Primary Care*, *15*(1), 56-62.

33)Teskereci, G., Arslan, Ü. Ö., Öncel, S. (2021). The awareness levels of women on gynecological cancer in Turkey: A cross-sectional study. International Journal of Gynecology & Obstetrics, 156(3), 539-545. DOI: 10.1002/ijgo.13745.

34)Tuncer, S. K., & Karakurt, P. (2023). Kadınların Jinekolojik Kanserler ile İlgili Farkındalık Düzeyinin Artmasında Sağlık Okuryazarlığının Etkisi Üzerine Bir Araştırma. *Mersin University School of Medicine Lokman Hekim Journal of History of Medicine & Folk Medicine*, *13*(1).

35)World Health Organization. Preventing Chronic Diseases: A Vital Investment 2015 https://www. who.int/chp/chronic_disease_report/contents/ part1.pdf?ua=12015. Erişim tarihi: 5 Ağustos 2024.

36)World Health Organisation (WHO). Incidence, mortality and prevalence by cancer site [homepage on the internet]. [Accessed: 5 Ağustos 2024]. Available from: https://gco.iarc.fr/today/data/factsheets/ populations/900-world-fact-sheets.pdf

PELVİK ORGAN PROLAPSUSUNUN YAŞAM KALİTESİNE ETKİSİ

Araştırma Görevlisi Hilal Başak ÇAKIR
İstanbul Medipol Üniversitesi, Sağlık Bilimleri Fakültesi, Ebelik Bölümü
ORCID: 0000-0002-4248-4694

Doç. Dr. Handan ÖZCAN
Sağlık Bilimleri Üniversitesi, Sağlık Bilimleri Fakültesi, Ebelik Bölümü
ORCID: 0000-0002-7131-1856

ÖZET
Pelvik organ prolapsusu (POP), ön ve arka vajinal duvarlardan bir veya daha fazlasının, uterusun (serviks) veya vajinanın apeksinin aşağı inmesi olarak tanımlanmaktadır. Vajinal prolapsustan kaynaklı vajinal kubbeleşme, pelvik basınç, sistosele bağlı üriner inkontinans, tekrarlayan idrar yolu enfeksiyonu, rektosele bağlı koku, acil dışkılama gibi problemlerden kaynaklı kadınların yaşam kalitesi etkilenmektedir.
POP'un semptomları kadınlarda vücut imajında olumsuz değişiklikler, rahatsızlık, hayal kırıklığı, sinirlilik, mutsuzluk, depresyon, kaygı ve üzüntüye neden olmaktadır. Yaygın bir sağlık sorunu olmasına rağmen, hastalar sorulmadıkça bu konuda konuşmaya gönüllü olmayabilir ve bu da tedavinin yetersiz kalmasına ve kadının yaşam kalitesinin daha da kötüleşmesine neden olabilir.
POP'ta tedavi yöntemleri olarak konservatif yöntemler ve cerrahi tedavi yer almaktadır. POP'ta uygulanan tedavinin asıl amacı bozulan kalitesini düzeltmek olmalıdır. Yapılan çalışmalarda POP yaşam kalitesini genellikle cerrahi müdahalelerin artırdığı tespit edilmiştir. Vajinal, abdominal, laparoskopik veya robotik cerrahi gibi birden fazla cerrahi prosedür geçiren kadınların, müdahale öncesi aşamaya kıyasla daha iyi bir yaşam kalitesine sahip olduğu çalışmalarda desteklenmiştir. Ayrıca, cerrahi müdahaleler yaşam kalitesinin zihinsel, sosyal ve fiziksel yönlerini iyileştirmede etkiliydi. Yaşam kalitesini iyileştirmesinin en büyük etkeni üriner inkontinans, pelvik ağrı, dispareuni ve fekal inkontinans gibi semptomların hızla iyileşmesi ve bunun özellikle yaşam kalitesinin fiziksel yönlerinin iyileşmesine neden olması olarak düşünülebilir. Egzersiz ve pelvik taban kas egzersizi gibi konservatif tedaviler hastaların yaşam kalitesini iyileştirmede etkili olmadığı tespit edilmiştir. Konservatif tedaviler genel olarak prolapsusun erken evrelerinde yararlı olmaktadır. Yaşam kalitesini bozan ileri evre prolapsuslarda cerrahi tedavinin etkin olduğu tespit edilmiştir.
Anahtar Kelimeler: pelvik organ prolapsusu, yaşam kalitesi, vücut imajı, konservatif yöntemler

THE IMPACT OF PELVIC ORGAN PROLAPSE ON QUALITY OF LIFE

ABSTRACT
Pelvic organ prolapse (POP) is defined as the descent of one or more of the anterior and posterior vaginal walls, the uterus (cervix) or the apex of the vagina. The quality of life of women is affected due to problems such as vaginal doming, pelvic pressure, urinary incontinence due to cystocele, recurrent urinary tract infection, odor due to rectocele, urgent defecation due to vaginal prolapse.

The symptoms of POP cause negative changes in body image, discomfort, frustration, irritability, unhappiness, depression, anxiety and sadness in women. Despite being a common health problem, patients may not be willing to talk about it unless asked, which can lead to inadequate treatment and worsen a woman's quality of life.

Treatment modalities for POP include conservative methods and surgical treatment. The main goal of treatment in POP should be to improve the deteriorated quality of life. Studies have shown that surgical interventions generally improve the quality of life in POP. Studies have supported that women who undergo multiple surgical procedures such as vaginal, abdominal, laparoscopic or robotic surgery have a better quality of life compared to the pre-intervention stage. Moreover, surgical interventions were effective in improving mental, social and physical aspects of quality of life. The major contributor to improved quality of life may be the rapid improvement of symptoms such as urinary incontinence, pelvic pain, dyspareunia and fecal incontinence, which may lead to improved physical aspects of quality of life in particular. Conservative treatments such as exercise and pelvic floor muscle training have not been found to be effective in improving patients' quality of life. Conservative treatments are generally beneficial in the early stages of prolapse. Surgical treatment was found to be effective in advanced prolapse that impairs quality of life.

Keywords: pelvic organ prolapse, quality of life, body image, conservative methods

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

POSTPARTUM DÖNEM PELVİK TABAN DİSFONKSİYONU ÖNLEME YÖNETİMİ

Araştırma Görevlisi Hilal Başak ÇAKIR
İstanbul Medipol Üniversitesi, Sağlık Bilimleri Fakültesi, Ebelik Bölümü
ORCID: 0000-0002-4248-4694

Doç. Dr. Handan ÖZCAN
Sağlık Bilimleri Üniversitesi, Sağlık Bilimleri Fakültesi, Ebelik Bölümü
ORCID: 0000-0002-7131-1856

ÖZET

Pelvik taban disfonksiyonu, mesane, vajen ve anal kanal çevresindeki pelvik taban kaslarının fizyolojik fonksiyonunda meydana gelen pelvik taban kaslarının kontrol ve koordine etme yeteneğini etkileyen bir bozukluktur. Pelvik taban disfonksiyonu kapsamında üriner inkontinans, fekal inkontinans, pelvik organ prolapsusu ve cinsel disfonksiyon yer almaktadır. Yaş, etnik köken, pelvik cerrahi öyküsü, kronik öksürük, obezite, omurilik bozuklukları, aile öyküsü ve genetik pelvik taban disfonksiyonu gelişimi için en yaygın tanımlanabilir risk faktörleri arasındadır.

Pelvik taban disfonksiyonunun olumsuz yönde etkileyen faktörlerden birisi obstetrik öyküdür. Gebelik ve doğum süreci pelvik taban disfonksiyonlarının en önemli risk faktörüdür. Parite, doğum, epizyotomi ve perine yırtılması, doğumun uzun süren ikinci aşaması, fetüsle ilgili faktörlerde pelvik taban disfonksiyonunu etkileyen faktörler arasındadır.

Gebelik ve obstetrik durumların pelvik taban disfonksiyonu için risk faktörü olduğu göz önüne alındığında pelvik taban disfonksiyonunun önlenebilmesi için gebelerin doğum öncesi bakım alması çok önemlidir. Pelvik taban disfonksiyonu olarak üriner inkontinans, fekal inkontinans, pelvik organ prolapsusu ve cinsel işlev bozukluğu önleme yönetimlerini ayrı ayrı değerlendirildiğinde; üriner inkontinansta üretraya baskı yapan başın travma yönetiminin çok iyi yapılması, ikinci evresini çok uzun tutulmaması doğumda yapılan postpartum üriner inkontinası önleme müdahalelerindendir. Yaşam tarzı müdahaleleri olarak sıvı alımı, kilo alımı ve sigara kullanımına dikkat edilmesi gerekmektedir. Fekal inkontinans önleme yönetiminde, özellikle doğum sürecinde epizyotomi, perineal travma, enstrümental doğum gibi obstetrik müdahaleler postpartum süreçte fekal inkontinans gelişmesine sebebiyet verebilir. Fekal inkontinansın yönetiminde epizyotominin kısıtlayıcı uygulaması, perinenin desteklenmesi, perineye masaj ve sıcak uygulama, doğum sonunda pelvik taban kas egzersizi, sigara kullanımı, kontipasyonun önlenmesi müdahaleleri önerilmektedir. Cinsel işlev bozukluğunu en çok etkileyen doğum sürecidir. Doğum yönetiminin doğru yapılması, doğum sonrası aile planlaması ve pelvik taban kas egzersizleri cinsel işlev bozukluğunu önleme yönetimleri arasındadır. Pelvik organ prolapsusu önleme yönetiminde ağır kaldırmaya dikkat edilmesi ve egzersizin az-orta yoğunlukta yapılması gerekmektedir. Doğum sonu POP geliştiyse iyileşme ve dokuların yeniden şekillenme sürecinden dolayı birkaç ay bekleme yönetimi önerilir. Yeterli doğum öncesi bakım, innatal süreçteki müdahaleler ve pospartum süreç yaşam tarzı değişiklikleri ile postpartum dönemdeki pelvik taban disfonksiyonu önlenebilmektedir.

Anahtar Kelimeler: pelvik taban disfonksiyonu, postpartum dönem, yaşam tarzı müdahaleleri, önleme yönetimi

PELVIC FLOOR DYSFUNCTION IN THE POSTPARTUM PERIOD PREVENTION MANAGEMENT

ABSTRACT

Pelvic floor dysfunction is a disorder in the physiologic function of the pelvic floor muscles around the bladder, vagina and anal canal that affects the ability of the pelvic floor muscles to control and coordinate. Pelvic floor dysfunction includes urinary incontinence, fecal incontinence, pelvic organ prolapse and sexual dysfunction. Age, ethnicity, history of pelvic surgery, chronic cough, obesity, spinal cord disorders, family history and genetics are among the most common identifiable risk factors for the development of pelvic floor dysfunction.

One of the factors negatively affecting pelvic floor dysfunction is obstetric history. Pregnancy and labor are the most important risk factors for pelvic floor dysfunction. Parity, labor, episiotomy and perineal tear, prolonged second stage of labor and fetus-related factors are among the factors affecting pelvic floor dysfunction.

Considering that pregnancy and obstetric conditions are risk factors for pelvic floor dysfunction, it is very important for pregnant women to receive prenatal care to prevent pelvic floor dysfunction. When the prevention management of urinary incontinence, fecal incontinence, pelvic organ prolapse and sexual dysfunction as pelvic floor dysfunction is evaluated separately; in urinary incontinence, the trauma management of the head pressing on the urethra should be done very well and the second stage should not be kept too long. As lifestyle interventions, attention should be paid to fluid intake, weight gain and smoking. In the management of fecal incontinence prevention, obstetric interventions such as episiotomy, perineal trauma, instrumental delivery, especially during the delivery process may cause the development of fecal incontinence in the postpartum period. In the management of fecal incontinence, restrictive application of episiotomy, support of the perineum, massage and warm application to the perineum, pelvic floor muscle exercise at the end of labor, smoking, and prevention of constipation are recommended. The birth process affects sexual dysfunction the most. Correct birth management, postpartum family planning and pelvic floor muscle exercises are among the interventions to prevent sexual dysfunction. In the management of prevention of pelvic organ prolapse, heavy lifting should be avoided and exercise should be performed at low to moderate intensity. If postpartum POP develops, a waiting period of several months is recommended due to the healing and tissue remodeling process. Pelvic floor dysfunction in the postpartum period can be prevented with adequate prenatal care, interventions in the intrapartum period and lifestyle changes in the postpartum period.

Keywords: pelvic floor dysfunction, postpartum period, lifestyle interventions, prevention management

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

GÜL PENCERENİN KİLİSELERDE ÖNEMİ VE İSTANBULDA GÜL PENCERELİ KİLİSE ENVANTERİNİN ÇIKARTILMASI

Alp ATABAY
Yıldız Teknik üni., Mimarlık, Mimari Tasarım
ORCID: 0009-0001-7302-6901

Prof. Dr. Nazlı Ferah AKINCI
Yıldız Teknik üni, Mimarlık, Mimari Tasarım
ORCID: 0000-0002-3628-3132

ÖZET
Ortaçağ avrupasında, haçlı seferlerin kazanılamamsının ardından, kilisenin otoritesinin sarsılması söz konusu olmuş, toplum üzerindeki bu otoritenin onarılması maksadıyla Gotik mimari, skolastik felsefe doğrultusunda, yardıma koşmuştur.
"Gotik mimari, Haçlı seferlerinin başarısızlıkla sonuçlanması ve diğer sebeplerden dolayı inancını kaybedip, kilisenin etkisinden çıkmaya başlayan halk üzerinde yeniden otorite sağlamak amacıyla dönemin din adamlarının etkisiyle ortaya çıkmıştır." (Decombo, 2019).
Bu incelmede Gül pencerenin kilise yapılarındaki önemi, fiziksel özelliklerini aşarak, insan üzerinde simgesel etkisi açısından ele alınmıştır. Bir ortaçağ dönemi ürünü olan gül pencerenin yirminci Yüzyıl başlarına kadar yaklaşık sekiz asır, kilise yapılarında benimsenerek kullanılması dikkat çekicidir. Gül Pencere kilisede aynı zamanda bir metafor olarak kullanılıp, tanrı ve aydınlatmayı temsil etmektedir. Bir mimari yapı elemanı olan gül pencere, kiliselerde verilmek istenen dini mesaj veya anlatılmak istenen dini hikayeyi güçlendirmek için önemli bi araç olarak kullanılmıştır.
Bu konuda dünyadan kısaca örnekler verildikten sonra, İstanbuldaki envanter ele alınıp, İstanbulda gül pencereye sahip kiliselerin envanteri ortaya konulmaya çalışılmıştır. Bu listede İstanbulda farklı mezhep ve tarzlara sahip kiliselerin ortak özelliği olan, Gül pencere, merkeze alınarak incelenmiştir.
Anahtar Kelimeler: gül pencere, İstanbul kiliseleri, götik mimari.

THE IMPORTANCE OF ROSE WINDOWS IN CHURCHES AND THE INVENTORY OF ROSE WINDOW CHURCHES IN ISTANBUL

ABSTRACT
In medieval Europe, after the failure of the Crusades, the authority of the church was shaken, and in order to restore this authority over society, classical architecture came to the rescue in line with scholastic philosophy.
"Gothic architecture emerged under the influence of the clergy of the period in order to regain authority over the people who lost their faith due to the failure of the Crusades and other reasons and began to move away from the influence of the church." (Decombo, 2019).
In this review, the importance of the rose window in church buildings is discussed in terms of its symbolic effect on people, beyond its physical features. It is noteworthy that the rose window, a product of the Middle Ages, was adopted and used in church buildings for approximately eight centuries until the beginning of the twentieth century. The Rose Window is also used as a metaphor in the church, representing God and illumination. The rose window, an architectural structural element, has been used as an important tool in churches to strengthen the religious message or the religious story to be told.

After briefly giving examples from around the world on this subject, the inventory in Istanbul is discussed and the inventory of churches with rose windows in Istanbul is tried to be revealed. In this list, the rose window, which is a common feature of churches of different sects and styles in Istanbul, has been examined based on the rose window.
Keywords: rose window, Istanbul churches, gothic architecture.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

DEPREMİN ARDINDAN ANTAKYA: MEKÂN VE HAFIZANIN YIKIMI

Arş. Gör. Canan NALÇA KISSABOYLU
İskenderun Teknik Üniversitesi, Mimarlık Fakültesi, Mimarlık Bölümü
ORCID: 0000-0002-3462-364X

Doç. Dr. Yasemen SAY ÖZER
Yıldız Teknik Üniversitesi, Mimarlık Fakültesi, Mimarlık Bölümü
ORCID: 0000-0001-9497-9368

ÖZET
Kentsel bellek, mekân ile birlikte var olur ve yapılı çevrede meydana gelen değişiklikler belleği doğrudan etkiler. Deprem gibi olaylar, kolektif hafızada travmatik etkiler yaratarak, kentsel mekânda neden oldukları yıkımlarla kentsel belleği geri dönülmez şekilde değiştirir ve dönüştürür. Antakya, kuruluşundan bu yana pek çok yıkıcı depremle sarsılan bir şehirdir. Buna rağmen tarihsel süreçte doğu batı arasındaki ticarette rol oynayan stratejik konumu ve dini açıdan kutsal olan bir merkez olma özelliği sayesinde terk edilmemiş, yapılan onarımlar ve yeniden inşalarla yaşam burada devam etmiştir. 6 Şubat 2023 tarihinde meydana gelen deprem, tarihi kent merkezinde yaşamın bir süreliğine durmasına sebep olan yıkıcı bir olaydır. Depremin etkisi hala sürmekte olup, yıkımlar sonucunda tarihi kent merkezi büyük ölçüde terk edilmiştir. Bu bölgede yeniden inşa süreci henüz tam anlamıyla başlamamıştır.
Bu çalışmanın amacı, 6 Şubat 2023 tarihli depremin ve depremin ardından yapıların kaldırılması sürecindeki uygulamaların, Antakya tarihi kentine ve kentsel belleğe olan etkilerini araştırmaktır. Çalışma, Antakya tarihi kent merkezini kapsamaktadır ve bu alanın ortasından kuzeydoğu-güneybatı doğrultusunda geçen Kurtuluş Caddesi ve çevresi odaklıdır. Çalışmanın yöntemi deprem öncesi ve sonrasında yapılı çevredeki verilerin karşılaştırılarak değişimlerin tespit edilmesi, yıkım sürecinin belgelenmesi ve tartışılmasına dayanmaktadır. Bu bağlamda, 2022 yılının Ağustos ayında, 2023 yılının Mart, Eylül, Aralık aylarında ve 2024 yılının Şubat ayında alan gezileri gerçekleştirilmiştir. Çalışma alanının deprem öncesi durumunu aktaran son harita olan 2009 tarihli Koruma Amaçlı Uygulama İmar Planı ve halihazır harita, deprem öncesi ve sonrası çekilen hava fotoğrafları ve drone video çekimlerinden yararlanılmış, elde edilen veriler Çevre, Şehircilik ve İklim Değişikliği Bakanlığı'nın hasar tespit sonuçlarıyla karşılaştırılmıştır.
Anahtar Kelimeler: Deprem, Yıkım, Antakya, Kurtuluş Caddesi, Kentsel Bellek

Not: Bu bildirinin birinci yazarının 2021 yılında başlamış olan ve Antakya tarihi kent merkezini kapsayan doktora tezi çalışması çerçevesinde elde edilen veriler, deprem öncesi şehrin durumunun tanımlanmasına olanak sağlamıştır.

ANTAKYA AFTER THE EARTHQUAKE: DESTRUCTION OF SPACE AND MEMORY

ABSTRACT
Urban memory coexists with space and changes in the built environment directly affect memory. Events such as earthquakes have traumatic effects on collective memory. Earthquakes irrevocably change and transform urban memory due to the destruction they cause in urban space. Antakya is a city that has been shaken by many destructive earthquakes since its foundation.

Nevertheless, thanks to its strategic location that played a role in the trade between east and west in the historical process and its status as a religiously sacred center, it was not abandoned and life continued here with repairs and reconstructions. The earthquake of February 6, 2023 was a devastating event that caused life in the historic city center to stop for a while. The impact of the earthquake is still ongoing and the historic city center has been largely abandoned as a result of the destruction. The reconstruction process has not yet started in this region.

The aim of this study is to investigate the effects of the earthquake of February 6, 2023 and the implementations during the removal of the buildings after the earthquake on the historical city of Antakya and urban memory. The study covers the Antakya historical city center and focuses on Kurtuluş Street and its surroundings, which runs through the center of this area in a northeast-southwest direction. The methodology of the study is based on comparing the data on the built environment before and after the earthquake, identifying the changes, documenting and discussing the demolition process. In this context, field trips were carried out in August 2022, March, September and December 2023 and February 2024. Conservation Development Plan dated 2009 and the base map, which is the last map of the study area before the earthquake, aerial photographs and drone video footage taken before and after the earthquake were utilized, and the obtained data were compared with the damage assessment results of the Ministry of Environment and Urbanization.

Keywords: Earthquake, Demolition, Antakya, Kurtuluş Street, Urban Memory

Note: The data obtained within the framework of the PhD thesis of the first author of this paper, which started in 2021 and covers the historical city center of Antakya, allowed the city's condition to be defined before the earthquake.

1. Giriş

Antakya Helenistik dönemden beri var olan, farklı kültürlerin mekansal ve toplumsal izlerini ve katmanlarını barındıran bir şehirdir. Hristiyanlık adı ilk defa burada kullanılmış ve şehir Hristiyanlar için kutsal sayılan bir hac yeri olmuştur (Downey,1961). Bunun yanısıra Asya, Mısır ve Roma'yı bağlayan ticaret yollarının kesişme noktasında bulunması şehrin ticaret merkezi olmasını sağlamıştır. Dini ve ticari önemi sayesinde Antakya, Helenistik, Roma ve Erken Bizans Dönemi'nin önde gelen şehirlerinden biridir (Demir, 2019). Fakat kuruluşundan itibaren sık sık gerçekleşen depremler şehrin gelişimi engellemiş ve ticari faaliyetler zamanla gerileme göstermiştir. 6. Yüzyılda yaşanan zincirleme felaketlerin ardından şehir küçülerek, eski önemini kaybetmiştir. Bu tarihten sonra ölçek olarak küçülse de yerleşim ve hayat burada devam etmiştir. Osmanlı Dönemine gelindiğinde yerleşim, antik dönem surlarının güneybatısında, nispeten küçük bir kasaba haline gelmiştir. 1919-1938 yılları arası Fransız Mandası döneminde tarihi yerleşim bölgesinde yeni bir cadde ve yapıların inşası gerçekleştirilmiştir. Cumhuriyet döneminde yerleşim dokusu büyük oranda korunmuştur.

6 Şubat 2023 depremleri öncesinde Antakya tarihi kent merkezinde geçmiş dönemlerin katmanları ve izleri, toprağın üzerindeki yapılar ve toprak altındaki kalıntılarda, sokak dokusunda, meydanlarda, yer adlarında, sosyal hayat, alışkanlıklar ve anma biçimlerinde yoğun bir şekilde izlenmektedir. Yaşanan deprem tarihi kent merkezinde sokak izleri dahil olmak üzere yapılı çevreyi oluşturan ögeleri yok eden bir afettir. Deprem anında tamamen yıkılan yapıların varlığının yanında, hasar aldığı için depremden sonra bilinçli bir şekilde yıkılarak kaldırılan pek çok yapı, kentin fiziksel çevresinde büyük çapta değişime yol açmıştır.

Kentin fiziksel çevresindeki değişim, kolektif hafızaya etki eder. Toplumsal olaylar, olayların yaşandığı yerler ve toplumsal gruplar karşılıklı olarak birbirlerinden izler taşırlar. Halbwachs'a göre istisnai olaylar toplumun mekan ile ilişkilerinde değişime sebep olmaktadır. Olayların gerçekleşmesinin ardından ne kolektif bellek ne de fiziki çevre artık aynı değildir (Halbwachs, 2015). Antakya'da gerçekleşen deprem fiziksel çevre ile ilişkili olarak kolektif hafızanın zarar görmesine sebep olan istisnai bir olaydır. Kentsel mekanın yıkımı, kolektif hafıza ve kentsel deneyimlerin değişimi ile ilişkili olarak kentsel bellek zarar görmüştür.

Bu çalışmanın amacı 6 şubat depreminin ve deprem sonrasındaki sürecin Antakya tarihi yerleşim bölgesinde fiziksel çevreye ve kentsel belleğe olan etkilerini araştırmaktır. Bu araştırma tarihi yerleşim bölgesinin ortasından kuzeydoğu-güneybatı doğrultusunda geçen Kurtuluş Caddesi ve çevresine odaklanmaktadır.

Çalışmanın metodolojisi hava fotoğrafları, deprem öncesi durumu aktaran son harita olan 2009 tarihli Koruma Amaçlı İmar Planı ve halihazır harita, drone video çekimleri, alanda yapılan yerinde gözlemler ve çekilen fotoğraflardan yararlanılarak yapılı çevredeki değişimlerin tespit edilmesi, yıkım sürecinin belgelenmesi ve tartışılmasına dayanmaktadır. Deprem öncesi, depremin ilk zamanları ve deprem sonrasındaki durum karşılaştırılmıştır. 2022 yılının Ağustos ayında, 2023 yılının Mart, Eylül, Aralık aylarında ve 2024 yılının Şubat ayında alan gezileri gerçekleştirilmiştir. Alan gezilerinde yapılan yerinde gözlemlerle elde edilen veriler Çevre, Şehircilik ve İklim Değişikliği Bakanlığı'nın hasar tespit sonuçlarıyla karşılaştırılmıştır. Kurtuluş Caddesi ve çevresindeki değişimler haritalar üzerinden aktarılmıştır.

2. Tarihte Antakya Depremleri

Antakya, güney-kuzey doğrultusundaki Ölü Deniz Fayı, güneybatıdan gelen ve İskenderun Körfezinden geçen Kıbrıs Yayı ve Bitlis Bindirme kuşağının birleştiği yörededir. Bu nedenle sık sık sismik aktiviteler meydana gelmektedir (Özdemir ve diğerleri, 2000). Sismik özellikleri nedeniyle Antakya tarih boyunca çok büyük depremlerle karşı karşıya kalmıştır. M.Ö. 320 yılı ile 1299 yılı arasında Antakya'yı etkileyen 62 adet deprem meydana gelmiştir (Bakır, 2022). 1299 ve 1894 yılları arasında bazıları minimal olmak üzere 17 adet deprem gerçekleşmiştir (Giorgi ve Eger, 2021; Sbenaiti ve diğerleri, 2005). 20. Yüzyılda 1951 ve 1997 yıllarında gerçekleşen orta büyüklükteki depremler şehri etkilemiştir ("Boğaziçi Üniversitesi", 2024).

Tarihte yaşanan depremler arasında kentte büyük yıkımlara sebep olduğu kaydedilen ve bu yıkımlar hakkında bilgi sahibi olduğumuz depremler yer almaktadır. 115 yılında yaşanan deprem bunlardan biridir. Cassius Dio'nun tasvirine göre şiddetli fırtına, kükreme ve çok büyük bir sarsıntı gerçekleşmiş, bu depremin ardından Antakya'nın sayısız vatandaşı evlerini ve mallarını kaybetmiştir. Halkın bir kısmı harabe alanına dönen şehri terk etmiştir. Fakat felaketin ardından şehirde pek çok imar faaliyeti gerçekleştirilerek yaşam yeniden canlandırılmıştır. Şehrin kolonadlı ana caddesinin öncekinin iki katına çıkan boyutlarda yeniden inşası bu faaliyetlerden biridir (Giorgi ve Eger, 2021).

Şehirde felaketle sonuçlanan bir diğer deprem 526 yılında yaşanan depremdir. Malalas'a göre bu depremin ardından Antakya kullanılamaz hale gelmiştir ve dağa yakın birkaç ev dışında hiçbir şey kalmamıştır. Bu deprem 250000 kişinin ölümüyle sonuçlanmıştır. 528 yılında tekrar deprem olmuş ve onarılan yapılar da zarar görerek 5000 kişi hayatını kaybetmiştir (Sbeinati vd., 2005). Yaşanan bu felaketler ve ardından 540 yılında gerçekleşen Pers istilaları şehrin gerilemesine ve küçülmesine sebep olmuştur (Demir, 1996).

Şehrin ana caddesi daha küçük ölçekte yeniden inşa edilmiş ve daha küçük bir alanı kaplayan yeni bir kent duvarı hattı inşa edilmiştir. Arkeolojik bulgular, şehir yaşamının yaşanan felaketlerin ardından eski canlılığına dönemediğini göstermektedir (Kennedy, 1985).
19. yüzyılda 1822 ve 1872 yıllarında şehri etkileyen iki büyük deprem gerçekleşmiştir. 1822 depreminin ardından Antakya ve çevresindeki köyler harap hale gelmiş, pek çok kişi enkaz altında kalarak hayatını kaybetmiş, şehrin kuleleri, surları, hanları ve evleri çökmüştür. Sieberg'e göre 1872 yılında gerçekleşen deprem Antakya'nın 3'te 2'sinin yıkımına ve 1800 kişinin ölümüne sebep olmuştur. Bu depremin ardından yapılar şehrin sur taşları kullanılarak yeniden inşa edilmiştir (Sbenaiti ve diğerleri, 2005)
2023 yılında 6 şubatta gerçekleşen 7,7 ve 7,6 büyüklüğündeki iki deprem kent tarihindeki çok yıkıcı olaylar olarak kayıtlara geçmiştir. Bu depremler Türkiye'nin güneybatı ve güneyde bulunan illerini etkilenmiştir. Resmi açıklamalara göre 50 bin 783 kişinin hayatını kaybetmiş, 107.204 kişinin ise yaralanmıştır. Yaşanan ölümler ve yıkım sayısı açısından en çok etkilenen il Hatay olmuştur ("TMMOB", 2024).

3. Antakya Tarihi Kenti Yerleşim Özellikleri ve 6 Şubat Depremleri Öncesi Durum

Antakya M.Ö 300 yılında Asi Nehri ile Kel Dağı'nın uzantıları olan Habib Neccar (Silpius) ve Kuseyr (Staurin) dağları arasında kurulmuştur. Kent, Asi Nehri çevresinde dolanarak Habib Neccar ve Kuseyr Dağlarına doğru yükselen ve dağların sırtlarında birleşen surlarla çevrelenmiştir.Helenistik dönemde Hippodamus yani ızgara dokulu yerleşim mevcuttur. Surların çevrelediği alanı kaplayan ve 58X112 metre boyutlarındaki adalardan oluşan bir yerleşim dokusu vardır (Hoepfner,1999). Roma döneminde ızgara yerleşim dokusu sürdürülmüştür (Downey, 1961). 6 yüzyılda gerçekleşen depremler ve ardından yaşanan Arap seferleri ile birlikte şehrin yerleşim dokusu değişmeye başlamıştır. 19. yüzyıla gelindiğinde kentte az sayıdaki dik açılı ızgara sokaklarla bütünleşmiş organik sokak dokusunun baskın olduğu görülmektedir. Yerleşim, surların güneybatısında küçük bir alanı kaplar (Baedeker, 1898). 20. Yüzyıl başında Fransız Mandası Dönemi'nde organik yerleşim dokusu büyük oranda korunmuş, bu doku içerisinde kuzeydoğu güneybatı doğrultusunda Kışla-Dörtayak caddesi adıyla yeni bir cadde açılmıştır (Weulersse, 1934). Bu cadde Hatay'ın Türkiye Cumhuriyeti'ne katılması ile birlikte Kurtuluş Caddesi adını almıştır. Cumhuriyet döneminde de yerleşim dokusunun büyük ölçüde korunduğu, dokudaki en belirgin değişikliğin Balcılar Sokağı adındaki dar sokağın genişletilerek Asi Nehri'ne kadar uzatılması ve Kemalpaşa Caddesi adının verilmesi olduğu söylenebilir (Nakib, 2012)
Kurtuluş (Kışla-Dörtayak) Caddesi'nin açılması ve genişletilmesi esnasında 1934 yılında cadde üzerinde yapılan kazılar caddenin Helenistik dönemden itibaren var olduğunu ve Roma Dönemi'nde sütun dizileri inşa edilerek kentin ana caddesi haline geldiğini ortaya çıkarmıştır (Campbell ve diğerleri, 1934). Bu cadde yer altında antik dönem kalıntıları, yer üzerinde ise Memlük, Osmanlı, Fransız Mandası ve Cumhuriyet dönemi yapıları olmak üzere kent belleğine ait birçok mekansal öğeyi içerir. 2023 depremi öncesinde Kurtuluş Caddesi üzerinde 71 adet tescilli ve geleneksel yapı bulunmaktadır. Bunlar arasında Memlük dönemine ait Beyseri Hamamı ve Habib Neccar Cami, Osmanlı Dönemine ait Sarımiye Cami, Şeyh Muhammed Cami, Musevi Havrası, Aselcioğlu, Ökten, Şeyhoğlu Sabunhaneleri, Çıkmaz ve Kamile Kadın Çeşmeleri ve konak yapıları yer almaktadır. Fransız Mandası döneminde cadde üzerinde Caferiye Mescidi, kıraathaneler, oteller, zemin katları ticari, üst katları konut olarak kullanılan yapılar ve konaklar inşa edilmiştir. Bu dönemde zemin katlarda var olan dükkanların eczane, berber salonu, tuhafiye ve manifatura mağazaları, bakkal, kahvehane ve fırın işlevleriyle kullanıldığı bilinmektedir (Nakib, 2012).

Bu çok işlevli ve renkli ana cadde, caddeden ulaşılan daha sakin, dar ve organik dokunun bir parçası olan sokaklara bağlanır. Bu doku içerisinde pek çok çıkmaz sokak bulur (Şekil1). Yaşam ana cadde ve gerisindeki dar organik doku arasında var olan mekan düzeni ve deneyimlerin zıtlığından beslenir. Kurtuluş Caddesi üzerinde bulunan dini, sosyal, ticari, endüstriyel işlevli yapılar çevresindeki doku ile birlikte var olan kentsel hafızanın parçalarıdır.



Şekil 1. Antakya Kurtuluş Caddesi (Yazarlar tarafından 2009 tarihli Koruma Amaçlı İmar Planı Üzerinden Hazırlanmıştır.)

4. Araştırma ve Bulgular

Bu çalışma kapsamında araştırma ve bulgular, 6 Şubat 2023 Depremlerinin Ardından Antakya'da yapılan yerinde gözlemler ile elde edilen haritalar ve fotoğrafların aktarıldığı ve alınan resmi kararlarla birlikte hasar tespit sonuçlarının sunulduğu ve değerlendirildiği iki ayrı bölüm halinde sunulmuştur.

4.1. 6 Şubat 2023 Depremlerinin Ardından Antakya

6 Şubat depremleri Antakya tarihi kent merkezi ciddi yıkımlarla sonuçlanmıştır. Tarihi kent dokusu içerisindeki dar sokaklar ve daha geniş olan Kurtuluş caddesi depremin ardından yıkımlar sebebiyle bir süre ulaşıma kapanmıştır. Tarihi kent merkezi kadar, yeni yerleşim bölgelerinde de ulaşım kanalları zarar görmüştür. Cadde üzerinde özellikle Habib Neccar Cami çevresi, Şeyh Muhammed Cami çevresi ve kuzeydoğu bölümündeki yapılar deprem anında yıkılarak, caddeye doğru düşen enkaz yığınları yolu kapatmıştır. Mart 2023 tarihinde yapılan alan gezisinde, Kurtuluş Caddesi'ni kapatan yıkık yapıların kaldırıldığı ve caddenin ulaşıma açıldığı, ancak ara sokakların hala enkaz yığınları nedeniyle kapalı olduğu görülmüştür. Cadde üzerinde Aselcioğlu Sabunhanesi, Şeyh Muhammed Cami, Habib Neccar Cami kubbesi ve minaresi, Sarımiye Cami minaresi, Affan Kahvesi üst katı ve çok sayıda ticaret ve konut işlevli yapı yıkılmıştır(Şekil 2).

1.İnci Kıraathanesi (Affan Kahvesi)	2.Havra
	
3. Sarımiye Cami	4. Caferiye Mesciti
	
6. Habib Neccar Cami	8.Şeyh Muhammed Cami
	
9. Aselcioğlu Sabunhanesi	11. Şeyhoğlu Sabunhanesi
	

Şekil 2. 2023 yılı Mart Ayında Kurtuluş Caddesi'nden görünümler (Not: görsel numaraları şekil 1'deki harita ile ilişkilendirilmiştir) (Kaynak: Nalça Kıssaboylu,C. arşivi)

Haziran 2023 tarihinde enkaz kaldırma çalışmalarının devam ettiği, Kurtuluş Caddesi üzerine saçılan enkazların tamamen temizlediği ve yol genişliğinin eski haline geldiği gözlenmiştir. Cadde üzerinde hala açık herhangi bir işletme olmadığı ancak Kurtuluş caddesinden girilen Uzun Çarşı'da bazı dükkanların hizmet vermeye başladığı görülmüştür. Kurtuluş Caddesi'nin kuzeydoğu bölgesindeki enkazların kaldırılmasıyla boşlukların oluşmaya başladığı görülmektedir. Sokak aralarında hala açılmayı bekleyen kapalı dar sokaklar vardır.
2023 yılı Eylül ayında yapılan alan gezisinde ara sokaklardaki enkazların kaldırıldığı ve sokakların tamamen açıldığı görülmüştür. Özellikle depremin ilk anında yıkılan Habib Neccar Cami çevresi, Şeyh Muhammed Cami çevresi ve caddenin kuzeydoğu bölümündeki yapıların enkazlarının kaldırılması ile ortaya çıkan boş alanlar dikkat çekmektedir (Şekil 3).



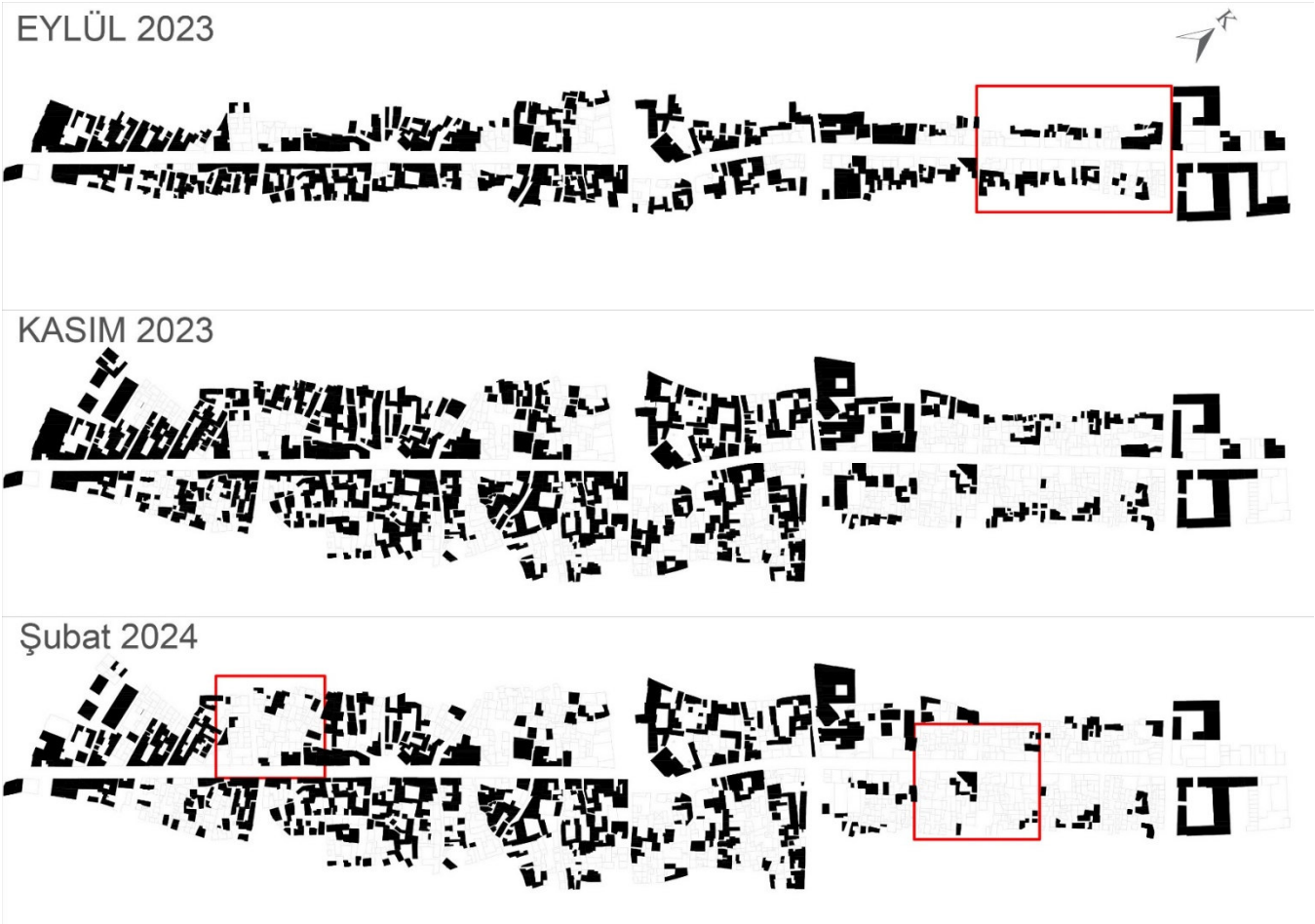
Şekil 3. Kurtuluş Caddesinin kuzeydoğu bölümünde yapıların kaldırılması ile oluşan boşluklar (Kaynak: Nalça Kıssaboylu,C. arşivi)

2023 yılının Eylül ve Kasım ayları, 2024 yılının Şubat ayında yapılan yerinde gözlemler sonucunda cadde üzerinde ve hemen arkasındaki bina dizisi içerisinde yıkılan yapılar tespit edilerek dolu boş haritaları hazırlanmıştır (Şekil 4). Kasım ayında yapılan yerinde gözlemler sonucunda daha çok yapının kaldırılması ile boşlukların arttığı ve artık bazı bölgelerde caddenin gerisindeki ara sokak izlerinin yıkılan yapılar sebebiyle yok olduğu gözlenmiştir. Kasım 2023 ve Şubat 2024 tarihleri arasında özellikle ara sokak üzerindeki yapıların kaldırılmaya devam edildiği görülmektedir. Kurtuluş Caddesi'nden ara sokaklara doğru ilerledikçe özellikle Habib Neccar Cami, Beyseri Hamamı, Şeyh Muhammed Cami, yerleşimin kuzeydoğusunda bulunan sabunhanelerin çevresinde ve İnci Kıraathanesinin karşı sokağı olan Saydam Caddesi boyunca ilerledikçe sokak izlerinin tamamen kaybolduğu tespit edilmiştir (Şekil5). Deprem öncesi, depremin hemen ardından çekilen ve 2024 yılının Mart ayında çekilen hava görüntüleri süreç içerisinde gerçekleşen değişimi ve artan boş alanları göstermektedir (Şekil 6).

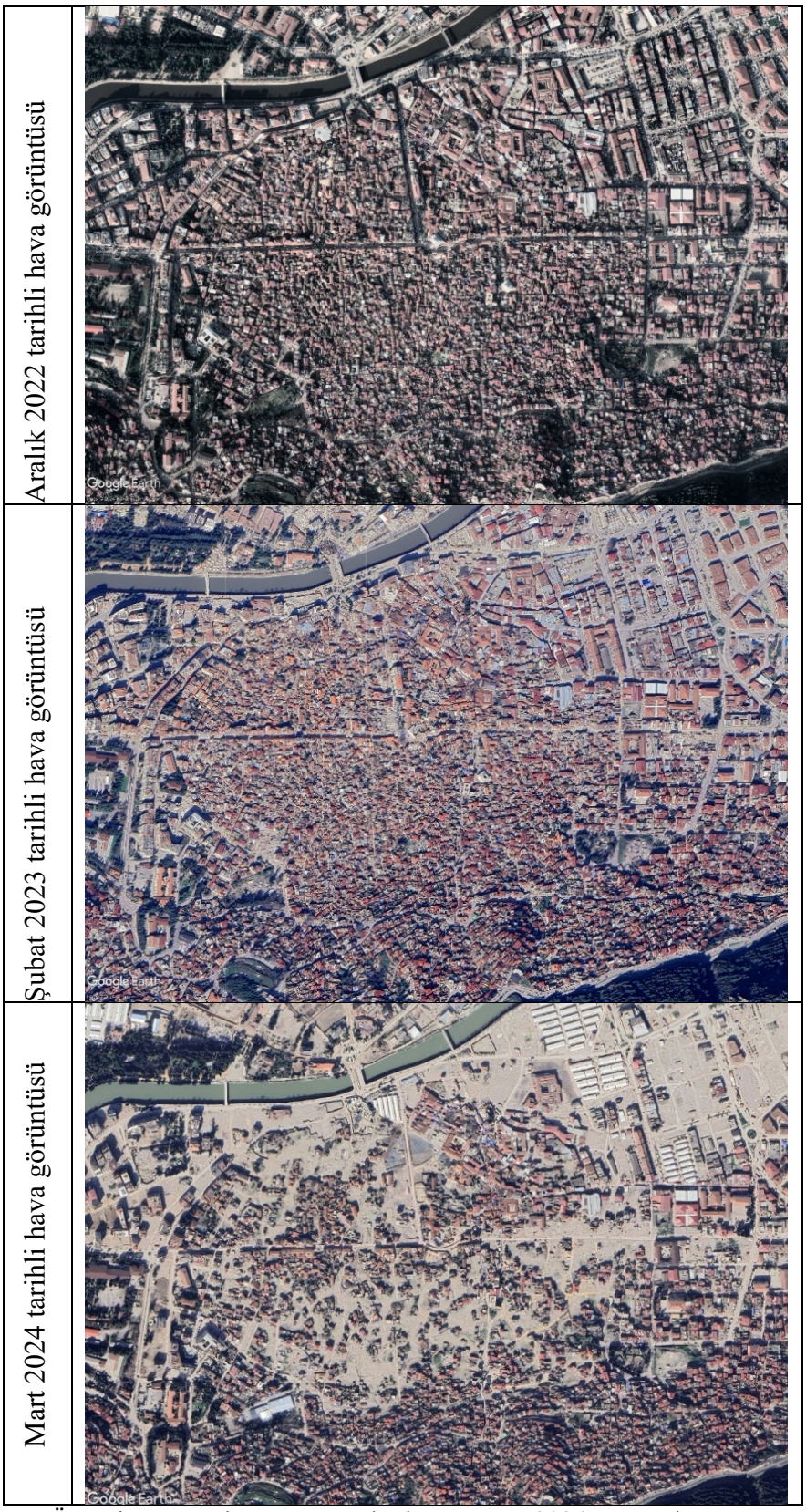


Şekil 4. Şubat 2024 tarihinde Kurtuluş Caddesi ve çevresinde yer alan boşluklar

2024 yılının Şubat ayında cadde üzerinde sayısı çok az olsa bazı işletmelerin hizmete açıldığı görülmüştür. Bunlar arasında eczane, işitme cihazı satış bürosu, bakkal, fırın, teknik servis ve iletişim ofisi, kafe yapısı yer almaktadır. Kurtuluş caddesinden girilen Uzun Çarşı, yerleşimin diğer bölgelerine göre görece daha az zarar görmüştür. 2023 yılının Haziran ayından sonra uzun çarşı bölgesinde daha çok işletmenin açıldığı ve bu bölgenin canlandığı söylenebilir.



Şekil 5. Depremin ardından yıkılan ve kalan yapılara göre hazırlanan dolu boş haritaları (Yazarlar tarafından hazırlanmıştır)



Şekil 6. Deprem Öncesi, Depremin Hemen Ardından ve Mart 2024'te Antakya'nın Hava Görüntüsü (Kaynak: googleearth)

4.2. Tarihi Kent Merkezinde Deprem Sonrası Kararlar ve Uygulamalar

Depremin hemen ardından gerçekleştirilen ilk uygulama alandaki yapıların hasar durumlarının tespit edilmesi olmuştur. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı'nın yürüttüğü hasar tespit çalışmalarına göre yapılar yıkık, acil yıktırılacak, ağır hasarlı, orta hasarlı, az hasarlı, hasarsız ve değerlendirme dışı olmak üzere kategorilere ayrılmıştır. Çalışma alanındaki yapıların hasar durumlarının analizi için İçişleri Bakanlığına ait adres sorgu sayfasında (https://adres.nvi.gov.tr/Home) alandaki yapıların adreslerinin, e-devlet sayfasında hasar tespit durumlarının sorgulanarak haritaya işlenmesiyle hasar durumları haritası oluşturulmuştur. Vakıflara ait yapıların büyük kısmının değerlendirme dışı veya tespit edilemedi şeklindeki açıklamalarla tespit çalışmaları dışında bırakıldığı anlaşılmaktadır. Her kategori için belirlenen farklı renklere göre harita oluşturulmuştur (Şekil 7).



Şekil 7. Hasar Tespit Durumları (Yazarlar tararafından yapı adreslerine göre e-devlet hasar tespit durumlarının sorgulanması ile hazırlanmıştır)

Deprem sonrasında alınan resmi kararla birlikte Eski Antakya bölgesi olarak bilinen bölgede Çevre, Şehircilik ve İklim Değişikliği Bakanlığı'nın hasar tespit çalışmalarının ardından yıkık, acil yıkılacak ve ağır hasarlı olduğu belirlenen tescilli sivil mimarlık örnekleri ve geleneksel yapıların kitabe, litürjik malzeme, ikona vb. nitelikli malzemelerinin yerinde ayrıştırılarak kurtarılması, ayrıştırma işlemi tamamlanan tescilli kültür varlıklarına ait enkazın "Kültür Enkazı ve Ayrıştırma Merkezi"olarak belirlenen alana taşınmasına karar verilmiştir ("Hatay Valiliği", 2013). Bu karara istinaden alandaki yıkık, acil yıkılacak ve ağır hasarlı tescilli ve geleneksel sivil mimarlık örnekleri kaldırılmıştır. Vakıflar Genel Müdürlüğü'ne ait anıt yapıların ve sosyal, ticari işlevli bazı yapıların ise yerinde iskele alınarak restorasyon çalışmalarının başlatıldığı görülmüştür.

Hasar tespit sonuçlarına göre alandaki ağır hasarlı yapıların sayısı diğer kategorilere göre daha fazladır. 2023 yılının Mart ayında yapılan alan gezisinde, Bakanlık tarafından ağır hasarlı olarak tespit edilen bazı tescilli ve geleneksel sivil mimarlık örneklerinin ayakta olduğu ve yıkık kategorisindeki yapılar arasında kalan bölümleri ayakta ve dik duran yapıların varlığı gözlenmiştir. Bu yapıların kaldırılarak enkaz ayrıştırma alanlarına taşınması yerine, gerekli önlemler alınarak yerinde güçlendirilebileceği ve restore edilebileceği değerlendirilmiştir. Ancak yapıların çoğu alınan resmi karara paralel olarak ilerleyen aylarda alandan kaldırılmıştır. Yapılan yerinde gözlemlerde, tescilli ve geleneksel sivil mimarlık örneklerinin yanı sıra alanda daha önce kayıt altına alınmamış fakat geleneksel yapı malzemeleri ve yapım teknikleri ile üretilmiş nitelikli fakat çoğunlukla bakımsız ağır hasarlı yapıların da olduğu gözlenmiştir. Bu yapılar tescilsiz olduğu için enkaz ayrıştırma alanına taşınmamış ve geri dönülemez şekilde tamamen yok olmuştur (Şekil 8).

Deprem sonrasında tarihi kent merkezindeki bazı yapıların hasar durumları ODTÜ Tarihsel Çevre Değerlerini Araştırma ve Uygulama Merkezi (TAÇDAM) ekibi tarafından değerlendirilmiş ve 2023 yılının Mayıs ayında sunulmuştur (ODTÜ TAÇDAM, 2013). Bu raporda hasar durumları verilen yapılarla, Çevre, Şehircilik ve İklim Değişikliği Bakanlığı'nın (ÇŞİDB) değerlendirme sonuçları kıyaslandığında epey farklı sonuçlar olduğu görülmüştür. Bakanlığın ağır hasarlı olarak belirlediği pek çok yapı ODTÜ ekibi tarafından az veya orta hasarlı olarak değerlendirilmiş ve rapor edilmiştir.



Şekil 8. Kurtuluş Caddesinde Mart 2023 tarihinde ayakta olan ve sonraki aylarda kaldırılan tescilli ve tescilsiz yapı örnekleri (Nalça Kıssaboylu arşivi)

5. Sonuç

Antakya sismik özellikleri nedeniyle kuruluşundan itibaren pek çok kere büyük depremlere maruz kalmıştır. Buna rağmen şehir yeniden inşa edilmiş ve yerleşim kesintisiz olarak devam etmiştir. Yerleşim katmanlarını oluşturan mekansal öğeler, deneyim ve alışkanlıklar kentsel belleğin bileşenlerini oluşturmaktadır. Bu bileşenler zamanla dönüşmüş fakat tamamen silinmemiş ve izleri okunmaya devam etmiştir. 6 Şubat 2023 tarihinde yaşanan depremler ve devamındaki süreç ise kentte yerleşim dokusunun ve sokak izlerinin kaybolmasına sebep olmuştur. Mekansal öğeler yeniden inşa edilmediği ve mekansal deneyimler ve alışkanların sürdürülmesine ilişkin önlemler alınmadığı takdirde kent belleğinin tamamen silinmesi söz konusudur.

Antakya'da deprem sonrasında yapıların şahıs veya vakıflara ait olmasına ve işlevlerine göre yeniden ayağa kaldırma çalışmaları kapsamındaki kararlar ve uygulamalar farklılaşmaktadır. Vakıflara ait anıt yapılar, sosyal ve ticari işlevli yapılar yerinde güçlendirilmekte ve restore edilmektedir. Fakat tarihi kent merkezi genelinde şahıslara ait pek çok sivil mimarlık örneği kaldırılarak enkaz ayrıştırma alanlarına taşınmıştır. Depremin yıkıcı etkisinin yanında, Vakıf eserlerine uygulanan yaklaşımının diğer yapılar için de uygulanmaması tarihi kentte oluşan boş alanlar ve sokak izlerindeki kaybın sebepleri arasındadır. Kurtuluş Caddesi üzerinde yerinde restore edilen Vakıflara ait anıt, sosyal ve ticaret işlevli yapı yoğunluğu ara sokaklardaki yapılara göre gözle görülür derecede daha fazladır. Ara sokaklardan girilen bölgelerde daha büyük boşluklar yer almaktadır. Bunun nedenlerinden biri ara sokaklarda şahıslara ait sivil mimarlık örneği sayısının daha çok olmasıdır.

Yapılan yerinde gözlemler sonucunda ilk aşamadan itibaren tarihi yapıların hasar tespitinde daha detaylı veriler elde edilmesi gerektiği düşünülmektedir. Nitekim farklı kurum ve kuruluşların (ÇŞİDB, 2023; ODTÜ TAÇDAM,2023) alandaki kimi yapılar için farklı değerlendirmeler yapmaları bu görüşü desteklemektedir. Alanda bir bölümü veya katı yıkılmış olan bazı yapıların bile geriye kalan yığma taş bölümlerinin ayakta ve sağlam kaldığı örneklere rastlanmıştır. Dolayısıyla yapıların ağır hasarlı veya yıkık olarak tespit edilmesi, enkaz ayrıştırma alanlarına taşınarak yerinden tamamen kaldırılmasını gerektirmemektedir. Alandaki çok sayıda yığma kargir yapının hasar durumlarının tespitinin koruma ve geleneksel yapım sistemleri konusunda uzman kişiler tarafından yapılması gerektiği ve betonarme yapılarla aynı ölçütlere göre tespit edilmemesi gerektiği düşünülmektedir. Tarihi yapılarla ilgili hasarın niteliğine ilişkin detaylı bilgiler verilseydi ve yapıya müdahale yöntemiyle ilişkili değerlendirme hasar tespit aşamasında yapılmış olsaydı bazı yapıların alanda kurtarılabileceği değerlendirilmiştir.

Alandan kaldırılan yapıların rekonstrüksiyonları henüz başlamamıştır. Yapıların kaldırılması esnasında nitelikli mimari elemanların zarar görüp görmediği ve yapıların kaldırılmadan önce yeniden inşa edilebilecek yeterli ölçü, yapım sistemi ve detay bilgisinin elde edilip edilmediği tartışma ve endişe konusudur. Yeniden yapım süreci ilerledikçe bu tartışmalar yanıt bulacak, halihazırda kaybolan sokak izlerinin ne düzeyde ve özgünlükte yeniden var edilebileceği açığa çıkacaktır.

Kaynaklar

Bakır, M. (2022). *The Effects of Earthquakes in Antioch and Its Vicinity: Evidence Of Repair, Rebuilding and Urban Reorganization Between The Fourth And Thirteenth Centuries* (Doktora tezi). İstanbul Teknik Üniversitesi, İstanbul.

Baedeker, K. (1898). *Paelstine and Syria : Handbook for travellers.* London: Dulau and Co.

Boğaziçi Üniversitesi. Büyük Depremler. (2024, 1 Ağustos) Erişim Adresi: http://www.koeri.boun.edu.tr/sismo/2/deprem-bilgileri/buyuk-depremler/ .

Campbell, W. A., Waage, F., Lassus, J. ve Wilber, D.N. (1934) General Report On The Excavatıons At Antıoch-On-The-Orontfs For Tee Season Of 1934.

Demir, A. (1996). *Çağlar İçinde Antakya.* Akbank Kültür ve Sanat Yayınları

Demir, A. (2004). *The urban pattern of Antakya: streets and houses.* Antioche de Syrie. Histoires, images et traces de la ville antique içinde.

Downey, G. (1961). *A History of Antioch in Syria*. Princeton University Press.

Giorgi, A. U. D. ve Eger, A. A. (2021). *Cities of Ancient World, Antioch a History.* Routledge, London and Newyork.

Halbwachs, M. (2015). *Kolektif Bellek.* Pinhan Yayıncılık.

Hatay Valiliği. Basın Açıklaması (2024, 1 Ağustos) Erişim Adresi: http://www.hatay.gov.tr/basin-aciklamasi160423.

Hoepfner, W. (1999). *Hellenismus.* Geschichte des Wohnens içinde, S. 441-524; DOI: https://doi.org/10.11588/propylaeumdok.00005624

Kennedy, H. (1985). From Polis to Madina: Urban Change in Late Antique and Early Islamic Syria. *Past & Present*, *106*, 3–27. http://www.jstor.org/stable/650637

Mimarlar Odası. Deprem Değerlendirme Raporu. (2024, 1 Ağustos) Erişim Adresi: https://www.tmmob.org.tr/icerik/tmmob-6-subat-depremleri-8-ay-degerlendirme-raporu-yayimlandi

Nakib, B. (2012). *Eski Antakya'dan Görünümler-Tarihsel Yapılar ve Eski Ünlü Yerler.* Antakya: Antakya Belediyesi Kültür Yayınları.

ODTÜ TAÇDAM (2023). *Antakya'nın Çok Katmanlı Kültürel Mirasının Deprem Sonrası Belgelenmesi, Hasar Tespiti ve Değerlendirmesi*, yayınlanmamış rapor (60 syf), Ankara: ODTÜ, çevrimiçi erişim: https://tacdam.metu.edu.tr

Öztemir, F., Necioğlu, A. ve Bağcı, G. (2000). Antakya ve Çevresinin Depremselliği ve Odak Mekanizması Çözümleri. *Jeofizik 14, 87-102.*

Sbeinati, M.R., Darawcheh, R. Ve Mouty, M. (2005). The historical earthquakes of Syria: an analysis of large and moderate earthquakes from 1365 B.C. to 1900 A.D. *Annals Of Geophysıcs, Sayı. 48, N. 3*

Weulersse, J. (1934), "Antioche Essai De Géographie Urbaine", Bulletin d'études orientales, T. 4, pp. 27-79

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

ERGANİ KONUT ÜRETİM BİÇİMLERİ VE KONUT SORUNLARI

İlknur GÜÇLÜ
Dicle Üniversitesi, Mimarlık Fakültesi, Mimarlık Bölümü
ORCID: 0009-0009-2639-1920

Prof. Dr. Havva ÖZYILMAZ
Dicle Üniversitesi, Mimarlık Fakültesi, Mimarlık Bölümü
ORCID: 0000-0002- 1252-0359

ÖZET
Konut, bireyler ve toplumlar için temel bir ihtiyaç olup, birçok açıdan büyük öneme sahiptir. Konut yalnızca bir barınma yeri değil, aynı zamanda bireylerin fiziksel, ruhsal, sosyal ve ekonomik refahını doğrudan etkileyen kritik bir unsurdur. İnsanların ihtiyaçlarına uygun konutlar oluşturabilmek için farklı konut üretim biçimleri ortaya çıkmıştır. Çeşitli konut tasarımları beraberinde konut sorunlarını da getirmektedir. Konut sorunları, çeşitli ekonomik, sosyal, politik ve çevresel faktörlerin birleşimi sonucu ortaya çıkar. Diyarbakır ili, Türkiye'nin Güneydoğu Anadolu Bölgesi'nde yer alan bir ildir. Ergani ilçesi ise bu ilin önemli ilçelerinden biridir. Ergani, tarih boyunca farklı medeniyetlere ev sahipliği yapmış ve zengin bir kültürel mirasa sahiptir. Daha önce yapılmış olan çalışmalar incelendiğinde literatürde Ergani konut üretim biçimleri ve konut sorunları hakkında çalışma yapılmamış olması ve literatürde taramalarında eksik olması sebebiyle bu çalışma yapılmıştır. Ergani'de yapılan incelemeler sonucunda konut tasarımlarının arasındaki farklar mahalle farklılıklarında net bir şekilde görülmektedir. Yapılacak olan bu çalışmada konutların hangi amaçlarla çeşitlilik gösterdiği, konut ihtiyaçlarının üretim şekline zaman içinde nasıl yansıdığı ve tasarlanan konutların sorunları üzerinde yapılan incelemeler aktarılacaktır.
Anahtar Kelimeler: Konut Sorunları, Üretim Biçimi, Ergani

ERGANI HOUSING PRODUCTION TYPES AND HOUSING PROBLEMS

ABSTRACT
Housing is a basic need for individuals and societies and is of great importance in many aspects. Housing is not only a place of shelter, but also a critical element that directly affects the physical, spiritual, social and economic well-being of individuals. Different types of housing production have emerged in order to create houses that suit people's needs. Various housing designs bring with them housing problems. Housing problems arise as a result of a combination of various economic, social, political and environmental factors. Diyarbakır province is a province located in the Southeastern Anatolia Region of Turkey. Ergani district is one of the important districts of this province. Ergani has hosted different civilizations throughout history and has a rich cultural heritage. When the previous studies are examined, this study was conducted because there were no studies on Ergani housing production styles and housing problems in the literature and there were incomplete scans in the literature. As a result of the investigations carried out in Ergani, the differences between housing designs are clearly seen in the neighborhood differences. In this study, the purposes for which houses vary, how housing needs are reflected in the production method over time, and the investigations on the problems of designed houses will be explained.
Keywords: Housing Problems, Mode of Production, Ergani

GİRİŞ

Konut, insanların sürekli olarak veya belirli bir süre için yaşamak üzere kullandıkları, genellikle bağımsız bir yapı veya yapının bir parçası olan mekandır. Konutlar, ailelerin veya bireylerin barınma ihtiyaçlarını karşılamak amacıyla inşa edilir ve içinde yaşamaya uygun çeşitli odalar, mutfak, banyo gibi alanlar bulunur. İnsanların en temel ihtiyaçlarından biri olan konut, yalnızca bir barınak değil, aynı zamanda dayanıklı tüketim malı, toplumda kişiler ve aileler için bir güvence kaynağı, bir yatırım aracı, emeğin yeniden üretildiği yer ve yaşam çevresinin oluşumunda yapı taşıdır. (Öztürk,1997:9; Tekeli, 1999:103).

Tarihsel açıdan konut, "iletişim, etkileşim, mekân, zaman ve anlamın örgütlü bir örüntüsüdür. Bir yandan ait olduğu etnik grubun karakteristiklerini, yaşam biçimini, davranış kurallarını, çevresel tercihlerini, imgelerini, zaman-mekân taksonomilerini yansıtırken öte yandan kullanıcısının özüyle ilgili imgelerini, kendini kanıtlama ve anlatma eğilimini, böylece tasarım, donatım ve biçemi ile bireyin kişilik ve ayrıcalığını yansıtır." İnsan yaşamıyla özdeşleşmiş bir olgu olan konut, doğan, yetişen, evlenen, çocuk büyüten, çalışan, yaşlanan ve zamanı geldiğinde ölen insan için sosyal, siyasal, ekonomik dizgelerinde ayrıca bir parçasıdır (Gür,2000:11-12).

Konut, insanların yaşamlarını sürdürdükleri, barınma ihtiyaçlarını karşıladıkları yapıları ifade eder. Konutlar, çeşitli türlerde ve formlarda olabilir; apartman daireleri, müstakil evler, villalar, gecekondu ve daha birçok farklı yapı tipinde karşımıza çıkabilir. Konut, sadece fiziksel bir yapı olmanın ötesinde, bireylerin ve ailelerin yaşam kalitesi, güvenliği, mahremiyeti gibi çeşitli konularda büyük öneme sahiptir. Konut, bireylerin ve ailelerin yaşamında temel bir yer tutar, insanların barınma ihtiyaçlarını karşılayarak insanın en temel ihtiyaçlarından biri olan güvenli bir barınma alanı, yaşamın sürdürülebilmesi için vazgeçilmezdir. Konutlar, bireylere ve ailelere güvenli ve özel bir alan sağlar. Bu, kişilerin kendilerini rahat ve güvende hissetmeleri açısından kritik öneme sahiptir.

Konut, dış etkenlerden korunmayı ve kişisel mahremiyetin sağlanmasını mümkün kılar. İyi bir konut, fiziksel ve mental sağlığı olumlu yönde etkiler. Yeterli ısıtma, temiz su, hijyenik koşullar ve uygun yaşam alanları, bireylerin sağlıklarını korumalarına yardımcı olur. Konutlar, bireyler ve aileler için önemli bir ekonomik yatırımdır. Konut sahipliği, ekonomik güvenlik sağlar ve bireylerin ekonomik durumunu iyileştirebilir. Ayrıca, konutlar gayrimenkul piyasasında önemli bir yere sahiptir ve ekonomik faaliyetlerin merkezinde yer alır ayrıca aile bireylerinin bir araya gelerek sosyal ve duygusal bağlarını güçlendirdiği mekanlardır. Konutlar, çocukların eğitim ve gelişimi için stabil ve destekleyici bir ortam sağlar. Çocuklar, güvenli ve sağlıklı bir ev ortamında daha iyi öğrenir ve gelişirler. İyi bir konut ortamı, çocukların akademik başarılarını ve sosyal becerilerini olumlu yönde etkiler. İyi konut koşulları, toplumsal katılımı ve komşuluk ilişkilerini güçlendirir. Güvenli ve destekleyici bir konut ortamı, insanların toplumsal etkinliklere ve komşuluk ilişkilerine daha fazla katılmalarını sağlar, bu da sosyal dayanışmayı artırır. Konut, bireylerin ve ailelerin kültürel değerlerini ve kimliklerini yansıttıkları bir alan olarak önem taşır. Ev dekorasyonu, yaşam tarzı ve günlük ritüeller, konut aracılığıyla ifade edilir ve korunur. İyi planlanmış konut bölgeleri, altyapı ve hizmetlere (okul, sağlık merkezi, toplu taşıma, parklar vb.) kolay erişim sağlar. Bu, bireylerin yaşam kalitesini artırır ve günlük yaşamlarını kolaylaştırır.

Konut, sadece fiziksel bir yapı olmanın ötesinde, bireylerin ve toplumların genel refahı, güvenliği ve yaşam kalitesi üzerinde derin etkileri olan kritik bir unsurdur. Bu nedenle, konut politikaları ve planlamaları, sosyal ve ekonomik gelişimin anahtar unsurlarından biri olarak kabul edilir.

Konut, birçok yönüyle insan yaşamında oldukça önemli bir yere sahiptir. Çünkü konut bireylerin en fazla yatırım yaptıkları finansal bir mülkiyet aracı ve finansal bir yetkinliktir.

Konut, fiyatı nedeniyle nadir olarak alınabilen fakat hemen peşin paraya satılamayan bir mülk olduğundan ayrıca önemlidir (Sowell,2010:5).

Yaşayan bir organizma olarak ele alınabilecek konut ve kent anlayışı zaman zaman değişimlere uğramıştır. Bu değişimlerden ülkemiz de kendi adına etkilenmiştir. Özellikle 20. yüzyılın ikinci çeyreğinden başlamak üzere sanayileşmeye paralel olarak köy kent demografik yapısı tamamen değişmiş ve kentlerde de artan nüfus konut yoksunluğu problemini doğurmuştur. Ülkemizde yıllardan beri devam eden bir problem alanı olan konut sorunu aynı zamanda tüm ülkeler için geçerlidir. Köylerden kentlere olan göçler başta olmak üzere kentleşme süreci birçok nedenle hız kazanmıştır. Ancak bu hızlı gelişme beraberinde yeni nüfusun kalacağı konut ihtiyacı sorununu doğurmuştur. Konut sorununu ortaya çıkartan kentleşmeye ek olarak nüfus artışı, işsizlik, konutların eskimesi yani kentsel yenileme, arsa ve yapı malzemesindeki fiyatlar, gecekondu alanlarının ıslahı ve tasfiyesi, yetersiz gelir dağılımı gibi başka faktörler de vardır. Kent ve konut aktörleri belediye, sanayi ve ticaret odaları, genç işadamları ve kadın girişimcilik dernekleri, sivil toplum örgütleri, üniversite ve yerel medya gibi ekonomik, sivil, eğitsel ve idari yönleri olan aktörler olarak değerlendirilebilir (Keyman ve diğerleri,2010:30-31)

Konut problemi, Türkiye'de özellikle kentleşmenin başladığı 1950'li yıllardan başlamak suretiyle ekonomik, sosyal ve mekânsal bir sorun olarak ortaya çıkmış ve beraberinde gecekondulaşma ve çarpık kentleşmeyi getirmiştir. Nüfus ve kentleşmenin artmasına paralel olarak büyük kentlerde yığılmalar ve büyük nüfus kitleleri meydana gelmiş, bu duruma paralel olarak konut talebinde de artışlar oluşmuştur. Fakat mevcut konut arzının yetersiz olması, konut yapımında yetersiz sayıda arsa üretilmesi ve kişilerin artan konut gereksinimi plansız kentlerin oluşumunu beraberinde getirmiştir. (Demir ve Palabıyık, 2005: 4)

Konut sorunları, çeşitli ekonomik, sosyal, politik ve çevresel faktörlerin birleşimi sonucu ortaya çıkar.

- Nüfusun hızla artması, konut talebini artırırken, arzın bu talebi karşılayamamasına yol açar.
- Kırsal alanlardan büyük şehirlere olan yoğun göç, şehirlerde konut ihtiyacını artırır ve mevcut konut sayısının yetersiz kalmasına neden olur.
- Düşük gelirli bireylerin ve ailelerin konut satın alacak veya kiralayacak maddi güce sahip olmamaları, konut sorunların artırır.
- İnşaat malzemelerinin ve işçilik maliyetlerinin yüksek olması, konut fiyatlarını artırır ve bu da düşük ve orta gelirli ailelerin konut edinmesini zorlaştırır.
- Ekonomik krizler, enflasyon, konut piyasasını olumsuz etkileyerek fiyatlarda dalgalanmalara neden olur.
- Yetersiz ve plansız kentleşme, uygun altyapı ve hizmetlerin sunulmadığı, düzensiz konut bölgelerinin oluşmasına yol açar.
- Hükümetlerin ve yerel yönetimlerin, artan konut talebine uygun yanıt vermemesi ve yeterli sayıda konut inşa edilmemesi ve gerekli denetimlerin yapılmaması.
- Kentsel dönüşüm projelerinin yanlış planlanması ve uygulanması, mevcut sakinlerin yerlerinden edilmesine ve sosyal dokunun ve kent dokusunu bozulmasına neden olur.
- Doğal afetler nedeniyle başka ülkelere veya bölgelere göç eden insanların konut ihtiyacı, mevcut konut piyasasını zorlayabilir.
- Deprem, sel, yangın gibi doğal afetler, mevcut konutların yıkılmasına veya hasar görmesine neden olarak konut sorunlarını artırır.
- İklim değişikliği ve çevresel bozulmalar, bazı bölgelerde yaşanamaz koşullar yaratabilir, bu da yeni konut ihtiyacını doğurur.

- Su, elektrik, kanalizasyon, yol gibi temel altyapı hizmetlerinin eksik veya yetersiz olduğu bölgelerde konut geliştirmek zordur.
- Yeterli toplu taşıma olanaklarının olmaması, bazı bölgelerde ulaşım sorunlarını ortaya çıkarır konutların tercih edilmemesine ve yoğun talep olan bölgelerde aşırı yığılmalara neden olabilir.

Bu faktörler, birbirleriyle etkileşime girerek konut sorunlarının daha karmaşık ve çözülmesi zor hale gelmesine yol açar ve şehirlerdeki konut sorunlarının artmasına neden olur.

Konut sorunları, çeşitli faktörlerden kaynaklanarak bireylerin ve toplumların yaşam kalitesini olumsuz yönde etkileyen problemlerdir. En yaygın konut sorunlarından biri olan konut yetersizliği nüfus artışı, göç ve yetersiz konut üretimi sebebiyle oluşmaktadır. Özellikle büyük şehirlerde hızlı nüfus artışı ve kırsaldan kente göç, konut talebini artırırken, mevcut konut arzının yetersiz kalmasına yol açar. Yeni konut inşa edilme hızının, talebi karşılayamaması durumunda konut yetersizliği yaşanır. Ayrıca konut fiyatlarının gelir seviyelerine göre yüksek olması, özellikle düşük ve orta gelirli aileler için konut sahibi olmayı zorlaştırır.

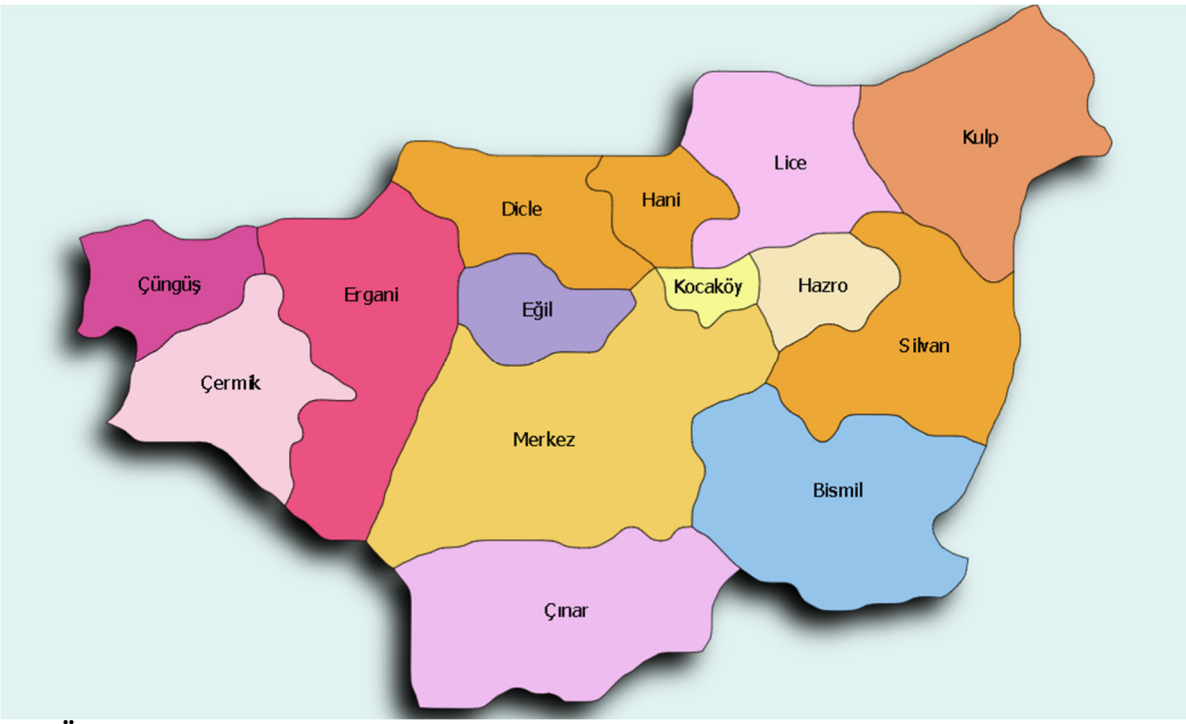
Kiraların yüksek olması, kiracıların barınma masraflarını karşılamalarını zorlaştırır ve maddi yük oluşturur. Yetersiz yapı denetimi, düşük kaliteli malzeme kullanımı ve kötü inşaat uygulamaları, konutların dayanıklılığını ve güvenliğini olumsuz etkiler. Yenilenmemiş, bakımsız ve eski yapılar, yaşam koşullarını olumsuz yönde etkiler. Yeterli konut arzının olmadığı durumlarda, insanlar izinsiz ve plansız yapılar inşa eder. Bu tür yapılar genellikle altyapı hizmetlerinden yoksundur ve güvenli değildir. Kaçak yapıların bulunduğu bölgelerde, genellikle su, elektrik, kanalizasyon gibi temel altyapı hizmetleri eksik veya yetersizdir.

Kentsel dönüşüm projeleri, mevcut sakinlerin yerlerinden edilmesine ve sosyal dokunun bozulmasına yol açabilir. Kentsel dönüşüm projelerinin yetersiz planlanması ve uygulanması, yeni sorunlara yol açabilir. Sosyal konut projelerinin yetersizliği, düşük gelirli ailelerin barınma sorunları yaşamasına neden olur. Kiracıların uzun vadeli barınma güvencesinin olmaması ve sık sık yer değiştirme zorunluluğu, barınma güvencesizliği yaratır. Kira artışlarının kontrolsüz olması, kiracıların mali yükünü artırır. Deprem, sel, toprak kayması gibi doğal afetlere karşı dayanıksız konutlar, büyük risk taşır. İklim değişikliği ve çevresel kirlilik, konutların yaşam koşullarını olumsuz etkileyebilir.

Farklı gelir gruplarının ayrışması ve düşük gelirli bölgelerin gettolaşması, sosyal ve ekonomik eşitsizlikleri derinleştirir. Sosyal konut bölgelerinin veya düşük gelirli mahallelerin diğer toplumsal kesimlerden izole olması, sosyal uyumu zorlaştırır. Su, elektrik, doğalgaz, yol, toplu taşıma gibi temel altyapı hizmetlerinin yetersiz olduğu bölgelerde yaşayanlar, ciddi sıkıntılarla karşılaşır. Konutların eğitim ve sağlık hizmetlerine uzak olması, yaşam kalitesini düşürür.

Güneydoğu Anadolu Bölgesi'nde, Diyarbakır iline bağlı ilçe olan Ergani, Dicle'nin sağ kıyısına 10 km uzaklıkta ve 1526 metre yüksekliğindeki Zülküf Dağı'nın güney eteğine kurulmuş. Diyarbakır ilinin en büyük ilçesi olan Ergani, Mezopotamya'nın en eski yerleşim birimlerinden biridir. Ergani birçok medeniyete öncülük etmiş, farklı kültürlerin taşıyıcısı olmuştur.

Neolitik devrin izlerini taşıyan Çayönü Höyüğü, Ergani ilçesinin 7 km kadar güneybatısında bulunur. Göçebelikten yerleşik yaşama geçilip tarıma ilk başlanılan yerler arasında bulunan Çayönü Höyüğü, Sesverenpınar köyü sınırları içerisinde yer alan ve 1. derece arkeolojik ve doğal sit alanı olarak tescillen Hilar Mağaraları'nın yaklaşık 500 metre güneyindedir. (URL 1)



GÖRSEL 1: Ergani Haritası (https://ambigutravel.my.id/blog-tr/diyarbak%C4%B1r-ergani-yol-haritas%C4%B1.html)

Çayönü yerleşmesinin özellikleri incelendiğinde basit yapıların dışında iyi tasarıma sahip ve kullanım biçimi olarak yaşam alanlarının iyice belirgin olduğu bir yapıya sahiptir. Her bir evre kendi döneminin özelliklerini temsil eder. Çeşitli biçimlerde kendi ihtiyaçları çerçevesinde düzenlenmiştir. İçinde çok çeşitli yapılar ve sosyal alanlar, köylerin meydanları, ateş ve çöp çukurları, mezar alanları ile tam bir komplekstir. Çayönü yerleşik hayata geçilmesiyle birlikte zaman içinde iyi bir köyleşme evresini tamamlamış daha sonra kentleşmeye doğru adımlar atılmıştır. (Özdemir, 2017)

'Ergani'de çevresel etkilerle oluşmuş farklı yerleşme biçimleri vardır. Farklı fiziksel özelliklere sahip, yapı ve dokudaki köylere, mezralara, komlara, bağ evlerine ve diğer kırsal yerleşmelere sahanın her bölümünde rastlamak mümkündür. Çevresel etkilere bağlı olarak ve kırsal alanlarda ekonomik faaliyetlere göre fonksiyonelleşmiş yerleşim birimleri ve meskenler yerleşme coğrafyası açısından oldukça güzel örnekler oluşturur.' (Durmuş, 2009)

Diyarbakır ilinin en büyük ilçesi olan Ergani, Mezopotamya'nın en eski yerleşim birimlerinden biridir. Ergani çeşitli medeniyetlere öncülük etmiş, farklı kültürlerin taşıyıcısı olmuştur.

İlçenin ekonomisi tarım, hayvancılık ve ticarete dayanmaktadır. Ayrıca, bölgedeki tarihi ve kültürel turizm potansiyeliyle de dikkat çekmektedir. Ergani'nin tarihi geçmişi oldukça eskiye dayanmaktadır. İlçe, tarihte birçok medeniyetin izlerini taşımaktadır. Bu nedenle, tarihi yapılar ve eserler açısından zengindir. Ayrıca, doğal güzellikleriyle de dikkat çeken bir bölgedir.

Ergani'nin mimari yapısı, bölgenin tarihî ve kültürel geçmişiyle şekillenmiştir. Bu bölge, tarih boyunca çeşitli medeniyetlere ev sahipliği yapmış ve bu medeniyetlerin izleri mimari yapılarında görülebilmektedir. Ergani'de şu an etkisine rastladığımız geleneksel mimari örnekler bulunmaktadır. Bu mimari tarzda, taş ve kerpiç gibi yerel malzemeler kullanılarak yapılar inşa edilmiştir. Evler genellikle tek katlı, beyaz kesme taşlardan yapılmış ve çoğunlukla avlu veya bahçe içinde yer alır.

Geleneksel konutların dışında ilçe genelinde son zamanlarda yapılan yeni konutlar ve ticarî binalar da bulunmaktadır. Ancak, bu yapılar genellikle geleneksel dokunun özelliklerini taşımamaktadır.

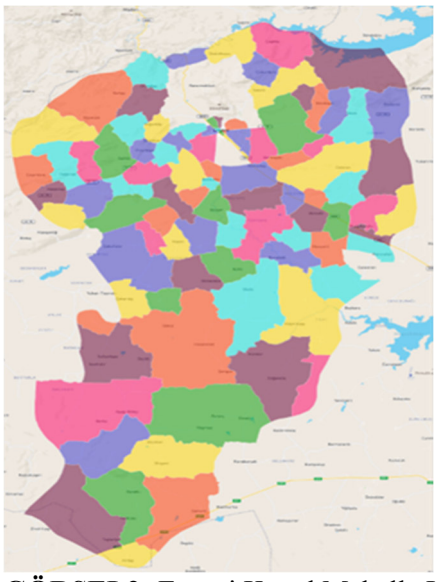
ARAŞTIRMA VE BULGULAR

Ergani, Diyarbakır ilinin önemli ilçelerinden biri olarak, kentleşme sürecinde çeşitli aşamalar kaydetmiştir. İlçede kentleşme, özellikle 2000'li yıllardan sonra hız kazanmıştır. Kentleşme süreci, ilçenin demografik yapısında ve sosyal yaşamında önemli değişikliklere yol açmıştır.

Son yıllarda yapılan yatırımlarla Ergani'de altyapı hizmetleri iyileştirilmiştir. Yol, su, kanalizasyon ve elektrik gibi temel altyapı hizmetlerinin yanı sıra, doğalgaz altyapısı da önemli ölçüde geliştirilmiştir. Ergani'de, özellikle eski ve depreme dayanıksız yapıların yıkılarak yerlerine modern konutların inşa edilmesi amacıyla kentsel dönüşüm projeleri uygulanmaktadır. Bu projeler, ilçenin çehresini değiştirmekte ve daha yaşanabilir bir ortam sunmaktadır. İlçede sağlık, eğitim ve sosyal hizmetlerin yaygınlaştırılması amacıyla yeni kamu binaları ve tesisler inşa edilmiştir. Bu gelişmeler, Ergani'deki yaşam kalitesini artırmakta ve göçü teşvik etmektedir.

Ergani'de pek çok mahalle bulunmaktadır ve her bir mahallenin kendine özgü özellikleri vardır. Ergani ilçe genelinde toplam 104 mahalleden oluşmaktadır. 90'ı kırsal 14 tanesi merkez olan bu mahallelerde farklı konut tasarımları ve kullanımları görülmektedir. Kırsal mahallelerde genel olarak geleneksel yapıların tek katlı, kerpiç ve yığma malzemeden yapılmış olan konutlar karşımıza çıkmakta fakat merkezde olan 14 mahallede ise son dönemlerde farklı sebeplerle üretilmiş çeşitli konut tasarımları görülmektedir.

Bazı mahallelerde genellikle düşük katlı apartman daireleri ve müstakil evler bulunmaktadır. Eski ve yeni yapıların bir arada olduğu bir mahalleler gözlemlenirken bazı mahallelerde ise orta ve yüksek katlı apartmanlar, yeni konut projeleri dikkat çekmektedir.





GÖRSEL2: Ergani Kırsal Mahalle Haritası **GÖRSEL 3:** Ergani Merkez Mahalleleri Haritası
https://atlasbig.com.tr/images/diyarbakir-erganinin-mahalleleri-harita.png

Ergani'de konut sektörü de kentleşme süreci ile birlikte önemli bir gelişme göstermiştir. Yeni konut projeleri ve modern yaşam alanları, ilçenin konut sayısı artırmıştır. İlçede birçok yeni konut projesi hayata geçirilmiştir. Bu projeler genellikle modern mimari ve yaşam standartlarına uygun şekilde tasarlanmaktadır.



GÖRSEL4: Ergan Kemertaş Mahallesi ve Makam Dağı
(http://www.diyarbakir.gov.tr/ergani)

Yeni konutlar, Ergani'deki konut ihtiyacını karşılamakta ve aynı zamanda ilçenin estetik görünümünü iyileştirmektedir. Konut fiyatları, yerel ekonomiye, altyapı olanaklarına ve konutların özelliklerine bağlı olarak değişiklik göstermektedir. Ergani'de konut fiyatları, Diyarbakır merkezine kıyasla daha uygun olmakla birlikte, kentleşme süreci depremin etkisiyle birlikte fiyatlarda da artış gözlemlenmektedir.



GÖRSEL5: Ergani (https://www.diyarbakir.bel.tr/index.php)

Ergani'de yapılan incelemeler sonucunda konut tasarımlarının arasındaki farklar mahalle farklılıklarında net bir şekilde görülmektedir. Ergani'de eski ve yeni konutlar beraber görülmektedir. Ergani merkez konumda bulanan, ticari mekanların yoğun olduğu ve birkaç mahallenin ortak noktası olan bir çarşıya sahiptir. Bu mahallelerde ve çarşının etrafında genellikle çok katlı olmayan müstakil yapılar yer alırken merkezden uzaklaştıkça ve mahalleler farklılaştıkça toplu konut alanları oluşturulmuştur bu kullanıcı yoğunluğu bu mahallelerde artmıştır. İlçe genelinde genellikle düşük katlı apartman daireleri ve müstakil evler bulunmaktadır. Eski ve yeni yapıların bir arada olduğu bir mahalleler gözlemlenirken bazı mahallelerde ise orta ve yüksek katlı apartmanlar, yeni konut projeleri dikkat çekmektedir. Bu tür farklılaşmalar beraberinde birçok sorunu (ulaşım, alt yapı, ticari mekanların kullanımı gibi) getirmiştir. Bu konut türlerinin farklılaşması konutların farklı plan tiplerine sahip olmasına neden olmuştur.



GÖRSEL6: Ergani (https://tr.foursquare.com/v/ergani-%C3%A7ar%C5%9F%C4%B1/522eec3411d2c1d9980b5f57/photos)

Zaman içinde gelişme ve iyileşme gösteren Ergani ilçesinde farklı konut üretim biçimlerinin yan sıra çeşitli nedenlerle oluşan konut sorunları da görülmektedir. Ergani ilçesinde konut sorunları, birçok Türkiye şehrinde olduğu gibi çeşitli faktörlerden kaynaklanmaktadır. Bu sorunlar, kentleşme süreci ve demografik değişimler ile daha belirgin hale gelmektedir.

Ergani, tarihi bir yerleşim yeri olduğu için ilçede eski ve depreme dayanıksız birçok yapı bulunmaktadır. Bu yapılar, deprem riski taşıyan bölgelerde ciddi güvenlik sorunlarına yol açmaktadır. Kentsel dönüşüm projeleri bu sorunu çözmeyi amaçlasa da, ilçede kentsel dönüşüm anlamında çalışma faaliyetleri görülmemektedir. Taşıyıcı, malzeme, zemin etütü gibi konularda depreme karşı dyanaksız olan yapılar ilçede görülmektedir.

Ergani'deki nüfus artışı ve göç hareketleri, konut talebinin artmasına neden olmuştur. Bu talep, mevcut konut sayısının yetersiz kalmasına yol açmaktadır. Yeni konut projelerinin inşası devam etse de, arz ve talep arasında zaman zaman dengesizlikler yaşanabilmektedir.

Ergani'de bulunan bazı konutlarda yönetmelik anlamında eksiklikler görülmektedir. Toplu konutlarda otoparklar yetersizdir, yönetmeliğe uygun bir şekilde konut sayısına ve nüfusa uygun otopark düzenlemeleri yapılmamıştır.

Müstakil konut bölgelerinde ise çarpık kentleşme ve dağınık yerleşme nedeniyle araçların dar sokaklara park edilmesi ulaşımı zorlaştırmaktadır bu durum ilçede yaşayan insanların yaşam kalitesini olumsuz etkilemektedir. Konutlarda yangın yönetmeliğine uygun yangın merdiveni tasarımı, kaçış mesafelerin ayarlanması gibi konularda özen gösterilerek tasarlanan konut sayısı çok azdır. Toplu konutların bodrumları yetersizdir, sığınak tasarımları yönetmeliğe uygun bir şekilde konut ve kişi sayısına uygun olarak tasarlanmamıştır.
Bazı bölgelerde altyapı hizmetlerinin yetersizliği, konut sorunlarının başında gelmektedir. Su, kanalizasyon, elektrik ve doğalgaz gibi temel hizmetlerin eksikliği, konutların yaşanabilirliğini olumsuz etkilemektedir. Yeni konut projelerinde bu altyapı sorunları dikkate alınsa da, eski yapılarda bu problemler devam etmektedir. Eski yapıların yoğun bulunduğu mahallelerde doğalgaz hizmetinin bulunmadığı konutlar mevcuttur bu mahallelerde su, elektrik kesintisi gibi alt yapı sorunları da yaşanmakta ve orada yaşayan insanların yaşamını olumsuz etkilemektedir.



GÖRSEL6: Ergani yeni konut bölgesi (https://ergani.meb.gov.tr/www/goruntulerle-ilcemiz/galeri/25)

Kentleşme süreci ve artan talep, konut fiyatlarının yükselmesine neden olmuştur. Yüksek konut fiyatları, özellikle dar gelirli aileler için konut sahibi olmayı zorlaştırmaktadır. Bu durum, sosyal konut projelerine olan ihtiyacı artırmaktadır fakat Ergani ilçesinde sosyal konut projesi yok denecek kadar azdır. Dar gelirli ailelerin ev sahibi olma düşüncesi zorlaşmıştır.
6 şubat 2023 tarihli yaşanan depremlerin ardından çevre illerden birçok zorunlu göç alan Ergani ilçesinde kira fiyatları artmıştır. Konut ihtiyacına karşı olarak fiyatlardaki artış insanların yaşamını ve kiralık olarak kullanabilecek uygun fiyatlı ev bulabilmesini zorlaştırmıştır.



GÖRSEL7: Ergani yeni konut bölgesi (https://ergani.meb.gov.tr/www/goruntulerle-ilcemiz/galeri/25)

Ergani'de hızlı nüfus artışı ve yetersiz konut arzı, bazı bölgelerde gecekondulaşmaya yol açmıştır. Plansız ve denetimsiz yapılaşma, hem altyapı hem de çevre sorunlarına neden olmaktadır. Bu durum, kentin yaşam kalitesini düşürmektedir.



GÖRSEL 8: Ergani eski konut bölgesi
(https://www.erganihaber.net/mobil/haber/8265/erganinin-yeni-nufusu.html)



GÖRSEL 9: Ergani (https://www.erganistan.com/ergani-eski-yeni/)

Bazı konutlarda yapı kalitesi düşük olabilmektedir. Özellikle eski yapılar, modern standartlara uygun olmadığından dolayı yaşam koşullarını olumsuz etkileyebilir. Bu durum, sağlık ve güvenlik sorunlarını da beraberinde getirebilmektedir. Ayrıca iklim şartlarına uygun tasarlanmayan konutlarda yaz aylarında ve kış aylarında sorunlar görülmektedir.
İklime uygun olmayan yapılarda yaz aylarında aşırı sıcaklıklar sebebiyle konutlarda yaşam zorlaşmakta, kış aylarında ise artan soğuklar nedeniyle yaşam kalitesi düşmektedir. İklime uygun çatı tasarımları ve ısı yalıtımı yapılmayan evlerde insanlar iklimin etkisiyle zorluklar yaşamaktadır.

SONUÇ

İnsan yaşamında önemli bir yere sahip olan konut barınma amacı dışında insanların sosyal, ekonomik, ruhsal refahını etkileyen önemli bir unsurdur. Geçmişten günümüze değişen ihtiyaçlar nedeniyle konut tasarımlarında farklılar gözlemlenmektedir ve konut üretim biçimleri sürekli olarak değişim göstermektedir. Konut üretim biçimlerinin değişimi, toplumun ihtiyaçları ve beklentilerine paralel olarak sürekli değişim göstermektedir. Bu süreçte teknolojik ilerlemeler, çevresel nedenler ve sosyo-ekonomik değişimler önemli rol oynamaktadır. Çeşitli konut tasarımları beraberinde konut sorunlarını da getirmektedir. Konut sorunları, çeşitli ekonomik, sosyal, politik ve çevresel faktörlerin birleşimi sonucu ortaya çıkar. Konut sorunları, çeşitli faktörlerden kaynaklanarak bireylerin ve toplumların yaşam kalitesini olumsuz yönde etkileyen problemlerdir. En yaygın konut sorunlarından biri olan konut yetersizliği nüfus artışı, göç ve yetersiz konut üretimi sebebiyle oluşmaktadır.

Ergani, Diyarbakır ilinin önemli ilçelerinden biridir. Ergani, tarih boyunca farklı medeniyetlere ev sahipliği yapmış ve zengin bir kültürel mirasa sahiptir. Ergani'de pek çok mahalle bulunmaktadır. Her mahallenin farklı özellikleri vardır. Ergani ilçe genelinde toplam 104 mahalleden oluşmaktadır. 90'ı kırsal 14 tanesi merkez olan bu mahallelerde farklı konut tasarımları ve kullanımları görülmektedir. Kırsal mahallelerde genel olarak geleneksel yapıların tek katlı, kerpiç ve yığma malzemeden yapılmış olan konutlar karşımıza çıkmakta fakat merkezde olan 14 mahallede ise son dönemlerde farklı sebeplerle üretilmiş çeşitli konut tasarımları görülmektedir. Eski ve yeni yapıların bir arada olduğu bir mahalleler gözlemlenirken bazı mahallelerde ise orta ve yüksek katlı apartmanlar, yeni konut projelerinin çalışmaları gözlemlenmektedir. Ergani'de konut yetersizliği, yüksek konut maliyetleri**,** gecekondu ve kaçak yapılar**,** altyapı sorunları, kentsel dönüşüm projelerinin yetersizliği, çevresel**,** sosyal planlama ve yönetim eksiklikleri gibi farklı konut sorunları gözlemlenmektedir. Yapılan bu çalışmada Ergani'de bulunan konutların üretim biçimleri hakkında bilgi verilerek gözlemler sonucunda ilçenin konut sorunları tespit edilmiş ve aktarılmıştır.

KAYNAKÇA

Durmuş, E. (2009) Ergani İlçesi'nin Coğrafyası, Doktora Tezi, Fırat Üniversitesi, Elazığ.

Erdoğan Bayraktar. ''Bir İnsanlık Hakkı Konut Toki'nin Planlı Kentleşme ve Konut Üretim Seferberliği'', Boyut Yayın Grubu,2007, Birinci Baskı, s. 11.

Gür, Şengül Öymen. ''Doğu Karadeniz Örneğinde Konut Kültürü'', Yapı Endüstri Merkezi Yayınları, 2000,Birinci Baskı, İstanbul.

Hülya Demir ve Vildan Kurt Palabıyık, "Konut Ediminde Uzun Vadeli İpotek Kredisi Sistemi", HKM Jeodezi, Jeoinformasyon ve Arazi Yönetimi Dergisi, 92, 2005, s. 4

Keyman, E.Fuat ve Lorasdağı Berrin Koyuncu. ''Kentler, Anadolu'nun Dönüşümü, Türkiye'nin Geleceği'', Doğan Egmont Yayıncılık,2010, 1. Baskı, İstanbul.

Özdemir Muammer, (2017) Neolitik Dönem Anadolu Mimarisinden Bir Kesit: Çayönü, Muş Alparslan Üniversitesi.

Öztürk Nazım (1997), Türkiye'de Konut Sektörü, Cumhuriyet Üniversitesi Sosyal Bilimler Enstitüsü İktisat Anabilim Dalı Yüksek Lisans Tezi, Sivas

Sowell, Thomas. ''The Housing Boom and Bust Revised Edition'', Basic Books Publishing,2010, USA.

Tekeli, İlhan. ''Türkiye'de Cumhuriyet Döneminde Kentsel Gelişme ve Kent Planlaması'', 75 Yılda Değişen Kent ve Mimarlık, İstanbul, Tarih Vakfı Yayınları,1998, 1-24.

URL 1- http://www.ergani.gov.tr/ilcemiz-ergani

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

MEKAN TASARIMLARINDA YAPAY ZEKANIN ROLÜ

İlknur GÜÇLÜ
Dicle Üniversitesi, Mimarlık Fakültesi, Mimarlık Bölümü
ORCID: 0009-0009-2639-1920

Prof. Dr. İclal ALUÇLU
Dicle Üniversitesi, Mimarlık Fakültesi, Mimarlık Bölümü
ORCID: 0000-0002-8151-2811

ÖZET
Zaman içinde teknolojide yaşanan hızlı gelişmeler yapay zeka kavramını hayatımızın her alanında karşımıza çıkarmaya başlamıştır. İnsanların iş yapış biçimlerini taklit etme amacı taşıyan çalışmaların tümü olarak ifade edilebilen yapay zekâ, hayatımızın bir parçası haline gelmiştir. Toplumsal hayatın kaçınılmaz bir parçası olan yapay zeka programları günümüzde her alanda ve disiplinde kullanılabilmektedir. Tüm meslek gruplarında kolaylık sağlayabilen yapay zeka mimarlık disiplini içinde de hızla gelişmektedir. Mimari mekânın içinde, kullanıcılara işlevsel, yapısal ve estetik ölçütlere göre en uygun tasarımı sunmak için çözümler üreten iç mimarlık, yapay zeka gelişiminden faydalanarak hızlı çözüm üretebilme seçenekleri ile tasarım süreçlerini kolaylaştırmış, daha az hata payı ile daha hızlı sonuçlar alınmaya başlanmıştır. Yapılan bu çalışmada mekan tasarımlarında etkisi görülen yapay zeka programları üzerinde incelemeler yapılmıştır.
Anahtar Kelimeler: Yapay zeka, mekan, tasarım, roller

THE ROLE OF ARTIFICIAL INTELLIGENCE IN SPACE DESIGNS

ABSTRACT
Rapid developments in technology over time have begun to introduce the concept of artificial intelligence in every aspect of our lives. Artificial intelligence, which can be defined as all studies aimed at imitating people's ways of doing business, has become a part of our lives. Artificial intelligence programs, which are an inevitable part of social life, can be used in every field and discipline today. Artificial intelligence, which can provide convenience in all professional groups, is also developing rapidly within the discipline of architecture. Interior architecture, which produces solutions to offer users the most appropriate design according to functional, structural and aesthetic criteria within the architectural space, has facilitated the design processes with quick solution generation options by taking advantage of the development of artificial intelligence, and faster results have begun to be obtained with less margin of error. In this study, studies were conducted on the artificial intelligence programs that are most effective in interior design.
Keywords: Artificial intelligence, interior, design, roles

GİRİŞ
"Teknoloji, ilk insandan bu yana gelişerek bugüne gelmiştir ve her uygulama/detaylandırma/çözüm biçimi bir teknolojidir, her biri bir diğerini geliştirerek bugün kullanılan teknolojilere erişilmiştir" (Demirarslan 2021, 826). Teknolojik gelişmelerin ve dijitalleşmenin etkisi iç mimarlık disiplininde oldukça etkili bir biçimde hissedilmektedir. Bu durumun bir sonucu olarak "iç mimarlık bugün dijital teknolojiden ayrılamaz bir mevcudiyet haline gelmiştir" (Demirarslan D. ve Demirarslan O. 2020, 563).

Dijitalleşmenin ve dijital teknolojilerin iç mimariye yansıyan ürünlerinden biri de yapay zekâdır. Yapay zekâ sistemlerinin günümüzde iç mimari alanda kullanımları incelendiğinde, bu sistemlerin hızla disiplinin süreçlerine entegre edildikleri görülmektedir. Gelişen yapay zekânın mevcut mesleki bilgi altyapısı ile bütünleştirilmesi ve yapay zekâ ile mekân tasarlamak günümüz tasarımcılarının hedeflerindendir. Bu süreçte "Yapay zekâ ve robot teknolojileri ucuz iş gücünün değerini azaltırken, nitelikli ve yapay zekâ ile çalışabilecek iş gücünün önemini artırmaktadır" (Demir 2019, 46). Yapay zekâ ile çalışabilecek nitelikteki bu bireyler, iç mimari alandaki çalışmalarıyla daha işlevsel ve kullanıcı ihtiyaçlarına göre optimize edilmiş, kullanıcıyı tanıyan, anlayan ve sınıflandıran sistemler oluşturmaya çalışmaktadır. Yapay zekâdaki günümüz gelişmelerinin iç mimarlığa getirdiği yeniliklerin tasarımcı, uygulayıcı ve kullanıcı deneyimi çerçevesinde değerlendirilmesinin amaçlandığı bu çalışmada nitel araştırma yöntemi olan betimsel analiz metodundan faydalanılacaktır. "Betimleme analizinde amaç, elde edilen bulguların düzenlenmesi ve yorumlanması yoluyla araştırma sonuçlarını anlaşılır bir şekilde okuyuculara sunmaktır" (Gürbüz ve Şahin 2018, 413).

YAPAY ZEKA

"Yapay zekâ kabaca; bir bilgisayarın ya da bilgisayar denetimli bir makinenin, genellikle insana özgü nitelikler olduğu varsayılan akıl yürütme, anlam çıkartma, genelleme ve geçmiş deneyimlerden öğrenme gibi yüksek zihinsel süreçlere ilişkin görevleri yerine getirme yeteneği olarak tanımlanmaktadır" (Nabiyev 2016, 25) Yapay zekânın ilişkili olduğu birçok teknoloji mevcuttur. Bu teknolojiler yapay zekâ etkisinde şekillenmekte ve bunun yanında gösterdikleri gelişimle birbirlerini de etkilemekte ve değiştirmektedirler.

Yapay zekâya dair yaygın üç temel görüş bulunmaktadır. Bunlardan birincisinde; insanın bir öze sahip olduğu savunulmaktadır. Bu görüşe göre; bilgisayarlar ne yaparlarsa yapsın, akıllı sayılamamakta, sadece mekanik davranışlar sergileyebilmektedirler. İkinci görüşte ise; insan dahil tüm oluşumların mekanik sistemlere indiregenebileceği savunulmaktadır. Bu görüşü savunan Minsky5'e göre; insan doğanın bir parçasıdır. Etten kemikten oluşmuştur. Ama en nihayetinde insan, atomlardan oluşmuş bir bilgi işlem sistemidir. İnsan eli ile üretilmiş bilgisayarlardan temelde farkı yoktur. Üçüncü görüş ise; birinci görüşü kabul etmeyen, fakat ikinci görüşte ifade edilen insan davranışlarının algoritmalara indiregenebileceğini kabul etmeyen bakış açısıdır. Bu bakış açısında insana denk yapay sistemler üretilebileceği, fakat bugünkü bilgilerle bunun henüz mümkün olmadığı savunulmaktadır

MİMARLIK VE YAPAY ZEKA

Yapay zekânın iç mimarlık disiplinine sunabileceği birçok potansiyel mevcuttur. İç mimarlık hizmeti süresince iç mimar; kullanıcı/işveren, tedarikçi, üretici ve uygulayıcı ile sürekli iletişim halindedir. Paydaşlar arasındaki bu zincir benzeri ilişkide birçok etmenle beraber iç mimari hizmet süresince sürekli bir karşılıklı bilgi akışı gerçekleşir. Mimarlık temel disiplininin paydaşlar arası bağdaştırıcılığı evrensel ve zamanın ötesindedir. "Rönesans'tan beri mimari disiplin kendisini tasarımcı, fakat ayrıca işveren ve projelerin gerçekleştirilmesinden sorumlu zanaatkar gibi farklı paydaşlar arasındaki bir iletişim olarak tanımlamıştır" (Picon, 2020, s. 15).

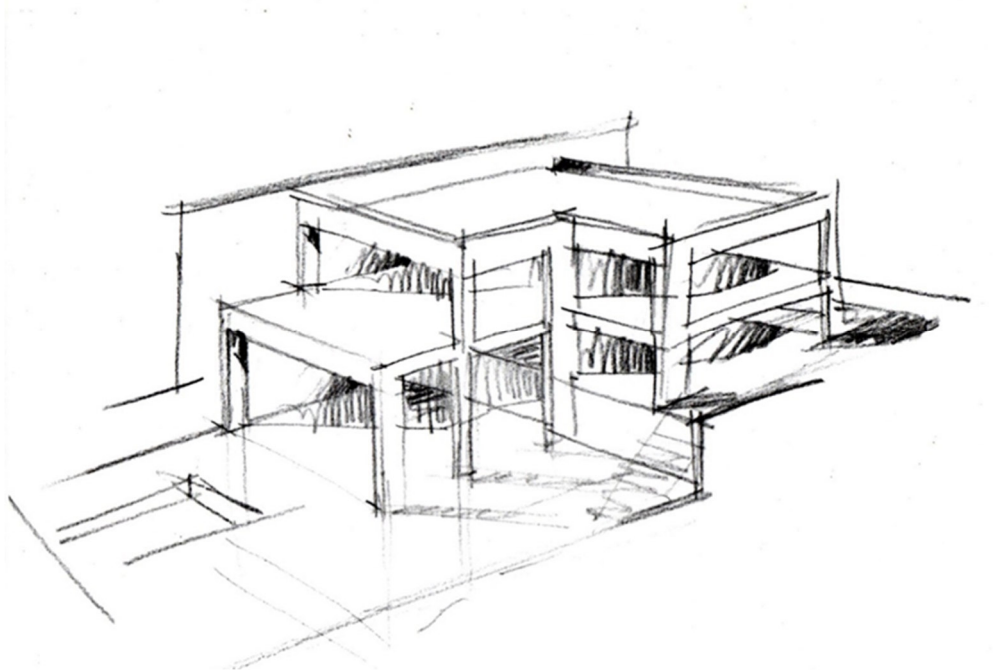
Bugün ise bu iletişim akışına dijital yazılım arayüzleri aracılığı ile yapay zekâ da dahil olmaktadır. Yapay zekânın rasyonel işlemlerdeki becerisi bu bilgi akışında;

- Ön görüşme bilgilerinin sistematik düzende toplanması ve değerlendirilmesi
- Tasarım önerileri oluşturma
- Tasarımda yapılabilecek değişikliklerin belirlenmesi ve teknik dille ifadesi

• İş kalemlerinin, malzemelerin, işçiliğin, nakliyenin, montajın planlanması
• Süreç boyunca güncellenebilen ve değişebilen malzeme stok, fiyat ve termin bilgisi,
• Üretim ve uygulama için taahhüt edilen süre ve proses kontrolü
• Problem varlığında taraflarca üretilen çözümler ve bu çözümlerden muhatapların bilgilendirilme durumu
• İletişimin dijital platformda bilgi aktarımı ile sağlanabilmesi gibi konularda taraflar arası bilgi alışverişini zamanı çok verimli şekilde kullanarak yürütebilme potansiyeli taşımaktadır.
Günümüz teknolojilerindeki olanakları temel alarak tasarım ofislerinde yapay zekâ kullanımının tasvir edildiği bir gelecek öngörüsüne değinmek bu potansiyeller hakkında fikir sahibi olabilmek adına faydalı olacaktır.Son yıllarda mimarların ve tasarımcıların çalışma şeklini önemli ölçüde değiştirebilecek birçok yapay zeka aracı ortaya çıkıyor.

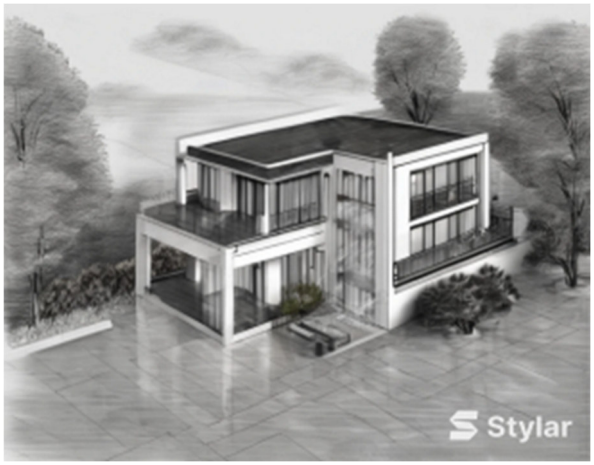
1. Stylar.ai

En kontrol edilebilen yapay zeka olarak adlandırılan Stylar, kullanıcıları için kendi oluşturduğu farklı stillerde dönüşümlere olanak tanıyan, fotoğrafları, çizimleri ve ya metinleri farklı stillere dönüştürülebilen bir yapay zeka sitesidir. Kullanıcıların yükledikleri ayrıntıları tarife eden otomatik bir 'istem' oluşturucu sunarak, bu ayrıntıları çeşitli stillerle dönüştürmelerini sağlar. Kullanıcılar siteye Google hesapları ile giriş yapabilir ve daha önce oluşturulan projeleri görüntüleyebilirler, gelişmiş bir depolama alanı sunar. Kullanıcılar için başlangıçta aylık 200 ücretsiz kullanım hakkı (kredi) tanımlanır. 2 boyutta tasarlanan mekanların 3 boyutlu halini hızlı bir şekilde sunan bu program mimarlar için tasarım aşamasında olan projelerin hızlı bir şekilde gerçekçi görüntülerini elde etmek için kullanılabilir. Stylar, görsellerin dört farklı çeşidiyle stilize etme yeteneği sunar, bu da çeşitli seçenekler arasından seçim yapma imkanı verir. Bu görsellerden istediğinizi indirebilme imkanı sunar.'Rimo nesne' özelliği ile belirli bir alanı seçebilir, bölgedeki nesneleri kaldırabilirsiniz, bu da Photoshop benzeri bir işlevsellik sunar.



Resim 1: Kullanılan örnek eskiz görseli

Yukarıda görmüş olduğunuz eskiz çizimlerinin stylar progamı ile dönüşümü ve oluşturulan render görselleri aşağıda sunulan şekildedir.



Resim 2: Oluşturulan görsel



Resim 3: Oluşturulan görsel



Resim 4 : Oluşturulan görsel



Resim 5 : Oluşturulan görsel

Herhangi bir komut girmeden görselden görsele seçeneği ile bu şekilde görseller oluşturan Stylar programına farklı komutlar eklediğimizde bizim için yeni 4 adet görsel oluşturur. Aşağıdaki görsellerde ormanlık alan içinde, kot farkı olan bir arazide tasarlanmış, 2 katlı, modern cephe tasarımı olan geniş pencereli bir villa komutu girilerek elde edilen görseller görülmektedir.



Resim 6 : Komutla oluşturulan görsel



Resim 7 : Komutla oluşturulan görsel



Resim 8 : Komutla oluşturulan görsel



Resim 9 : Komutla oluşturulan görsel

Görüntüden görüntü oluştururken komut ekleyebildiğimiz Stylar, stil seçerek de görüntü elde edebileceğimiz bir programdır. Gerçekçi, modern , iç tasarım anlayışı, pastel 3d, minimalist, emperyonist, pırıltı parıltı, bohem, iskandinav, sanayi, çağdaş tek renkli gibi birçok stil seçeneğine sahip olan Stylar programında seçtiğimiz stil üzerinden görüntüler oluşturabiliriz. Kullanılan detaysız eskiz çizimi üzerinde modern ve gerçekçi bir görünmüş oluşturmak için modern göz alıcı stilini seçereke yeniden 4 görsel oluşturarak aşağıdaki görsellere ulaşmaktayız**.**



Resim 10 : Göz alıcı stille oluşturulan görsel



Resim 11 : Göz alıcı stille oluşturulan görsel



Resim 12 : Göz alıcı stille oluşturulan görsel



Resim 13 : Göz alıcı stille oluşturulan görsel

Eskiz çizimleri dışında 3 boyutu yapılan binaların da gerçekçi görüntülerine ulaşabilmek için Stylar programını kullanabiliz. Aşağıda SketchUp programında olan bir villanın görselinin Stylar programıyla nasıl render görüntüsü oluştuğunu görmekteyiz.



Resim 14 : Kullanılan 3d görüntü



Resim 15 : Oluşturulan görsel



Resim 16: Oluşturulan görsel

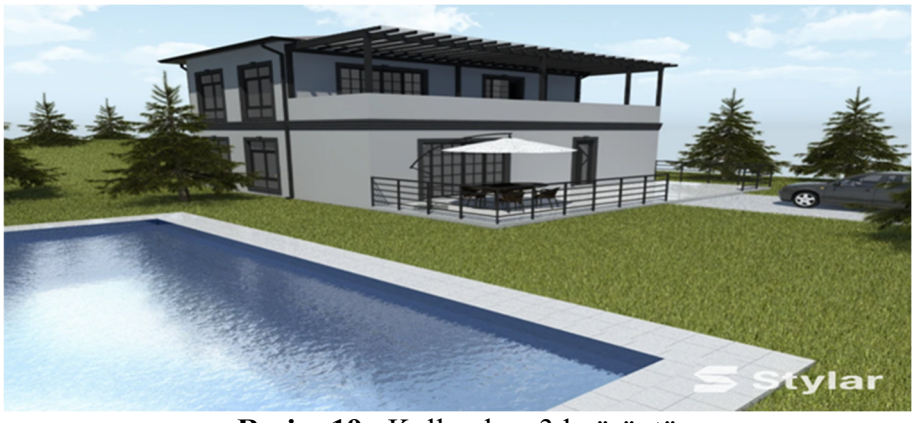


Resim 17 : Oluşturulan görsel



Resim 18: Oluşturulan görsel

Stylar programı aldığımız basit render fotoğraflarının da daha gerçekçi bir şekilde görünmesi konusunda bize yardımcı olur.



Resim 19 : Kullanılan 3d görüntü



Resim 20 : Oluşturulan görsel



Resim 21: Oluşturulan görsel



Resim 22 : Oluşturulan görsel



Resim 23: Oluşturulan görsel

İç mekan tasarımları yaparken iç mekan görselleri oluştumak ve gerçekçi görüntüler elde etmek mimarlar için büyük önem arz etmektedir. Tasarımı yapılan mekanların render görüntüleri için de Stylar programı kullanılabilmektedir.



Resim 24: Kullanılan iç mekan görüntüsü



Resim 25 : Oluşturulan iç mekan görseli



Resim 26: Oluşturulan iç mekan görseli



Resim 27 : Oluşturulan iç mekan görseli



Resim 28: Oluşturulan iç mekan görseli



Resim 29: Kullanılan iç mekan görüntüsü



Resim 30 : Oluşturulan iç mekan görseli



Resim 31: Oluşturulan iç mekan görseli



Resim 32 : Oluşturulan iç mekan görseli



Resim 33: Oluşturulan iç mekan görseli

2. Maket.ai

Maket programı mimarları hızlandıran bir tasarıma sahiptir. Kat planı oluşturup, mimari konseptleri geliştirebilen, mevcut planlar üzerinde değişiklikler yapabileceğimiz bir program olan Maket tasarım süreçlerini hızlanırarak taslakları renderlere dönütürebilmektedir. Google hesabıyla ve ya mail adresi ve telefon numarası kullanarak giriş yapabildiğimiz bu program başlangıçta 3 proje üzerinde 5 tasarım kredisi hakkı verilerek kullanım imkanı sağlamaktadır. Programın kullanım ücreti ise aylık aylık 30 dolardır. İstenilen komutları cevaplandırarak tek katlı bir yapının kat planını oluşturabiliriz.





Resim 34 :Oluşturulan kat planı

Resim 35: Oluşturulan kat planı

Basit komutlar girerek kat planı oluşturmak istediğimizde yukarıda görüldüğü gibi iki farklı kat planını istediğmiz ölçü birimiyle oluşturabilmektedir.
Maket ile render oluşturmak istediğimiz zaman ise bizden malzeme, ortam, kaplama, zaman (gece, gündüz gün batımı) , çözünürlük seviyesini seçmemizi isteyerek görseller oluşturur.



Resim 36 : Oluşturulan görsel

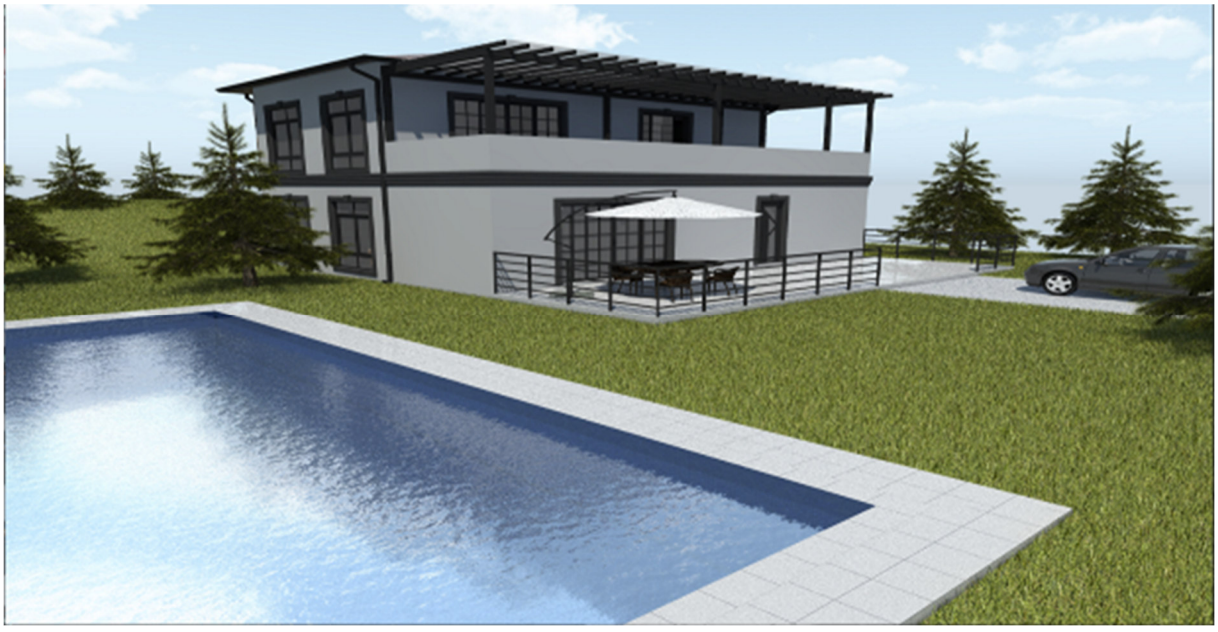


Resim 37: Oluşturulan görsel



Resim 38 : Oluşturulan görsel

Maket programını kullanarak 3 boyutlu bir tasarım yapmak istediğimiz zaman ise bize 4 seçenek sunmaktadır (3d dış mekan, 3d iç mekan , 2 boyutlu yükseklik ve renkli kat planı).
3 boyutlu dış mekan oluşturabilmek için kendi oluşturduğumuz detaysız bir dosyayı programa yükleyip, malzeme, kaplama, ortam gibi komutları ekliyoruz.



Resim 39 : Kullanılan 3d görüntü



Resim 40: Oluşturulan görüntü

Oldukça hızlı bir şekilde, yaklaşık dakika içinde görsel oluşturabilen bu program rahat kullanabilmek için bizlere ücretsiz eğitim videoları sunmaktadır. Oluşturduğu kat planlarını istenilen malzeme detaylarıyla kaplayabilmektedir.



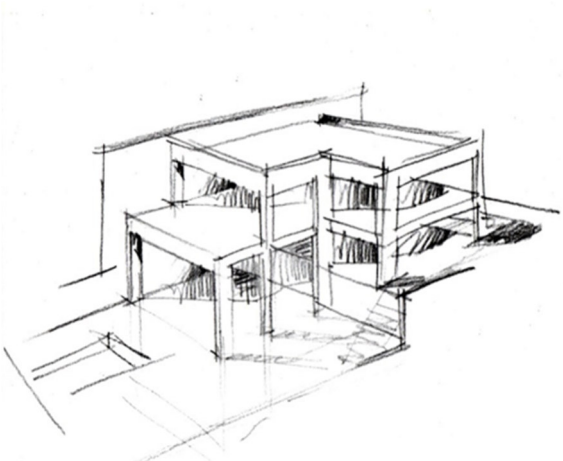
Resim 41: Kullanılan kat planı



Resim 42: Oluşturulan kat planı

3. Mnml.ai

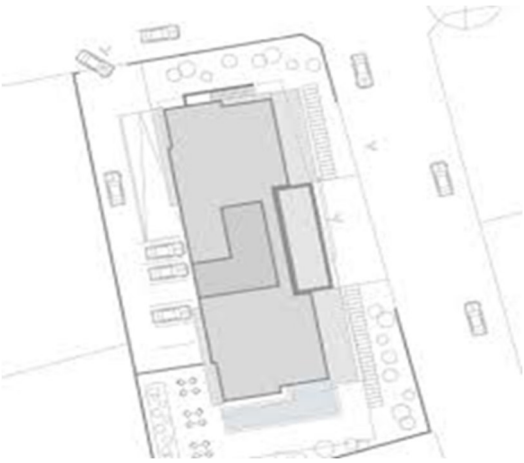
Mimari ve iç mimari projeler için geliştirilmiş bir **yapay zeka tabanlı asisatan olan Mnml,** tek bir sketch'den bile çeşitli tasarım varyasyonları oluşturabilir. Zaman tasarrufu sağlar, Skecthup, Blender, 3d max gibi programı destekler, farklı dış mekan ve iç mekan tasarım stillerini sunduğu gibi, aynı zamanda peyzaj düzenleme fikirleri ve mimari konsept ifadeleri üretme özelliklerine de sahiptir. Yapay zeka programları arasından en kolay arayüz ekranına sahip olarak tanıtılır. E posta adresi ile şifre oluşturularak kayıt yapılan bu program bazı özellikleri kısıtlayarak 30 ücretsiz kredi sunarken, (yaklaşık 4 kullanım hakkı) gelişmiş özellikleriyle kullanabilmek için yıllık 300 dolar talep etmektedir.



Resim 43: Kullanılan eskiz görseli



Resim 44: Oluşturulan görsel



Resim 43: Kullanılan vaziyet planı



Resim 44: Oluşturulan görsel

Mnml gerçekçi görseller oluşturmanın yanı sıra tasarımlarınız için konsept oluşturma konusunda da size yardımcı olur. Tasarımınız hakkında ipucu kelimeler yazarak sizin tasarımınıza uygun bir metin yazısı oluşturarak konsept oluşturabilir.

Komut: Villa, ferah, modern, yaratıcı, dikkat çeken

Metin yazısı: Modern villanın konsepti, açık ve ferah bir atmosferi ön planda tutan, yaratıcı ve dikkat çekici bir yaşam alanı yaratma fikri etrafında şekilleniyor. Tasarım felsefesi, zamansız ve zarif bir estetik elde etmek için temiz, geometrik çizgilerin ve yenilikçi malzemelerin kullanımını vurguluyor.

Büyük pencerelerin ve tavan pencerelerinin entegrasyonu, bol miktarda doğal ışık sağlayarak iç ve dış mekan yaşamı arasındaki sınırları bulanıklaştırıyor. Sürdürülebilir ve enerji tasarruflu teknolojilerin kullanımı tasarımı tamamlayarak uyumlu ve çevreye duyarlı bir konut yaratıyor. Düzen, işlevsellik ve konforu en üst düzeye çıkarırken aynı zamanda kişiselleştirilmiş alanlar için esneklik sağlayacak şekilde dikkatlice planlanmıştır. Genel tasarım yaklaşımı, sakinlerin kendilerini modern yaşam tarzına tamamen kaptırabilecekleri davetkar ve ilham verici bir ortam yaratmayı amaçlıyor. Oluşturduğu metin yazısını, metinden hayal gücüne stilini kullanarak görsele dönüştürebilme özelliğ bulunan Mnml, yukarıdaki metin için aşağıda bulunan mekan göselini oluşturmuştur.



Resim 45: Oluşturulan görsel

Herhangi bir render stilini kendi tasarımlarınıza uygulayabilmeniz için kolaylık sağlayan Mnml sizden tasarımınızın ve referansınızın talep ederek, uygun görsel hazrılar.



Resim 46: Kullanılan vaziyet planı



Resim 47: kullanılan referans görseli



Resim 48: Oluşturulan görsel

3 boyutlu tasarımını yaptığınız dosyaların seçtiğiniz stilde gerçekçi görüntüsünü alabildiğiniz bu programdan farkli stillerde alınmış görseller aşağıdaki gibidir.



Resim 49: Kullanılan iç mekan görseli

Zen:



Resim 50: Oluşturulan görsel

Barok:



Resim 51: Oluşturulan görsel

Minimalist:



Resim 52: Oluşturulan görsel

Lüks:



Resim 53: Oluşturulan görsel

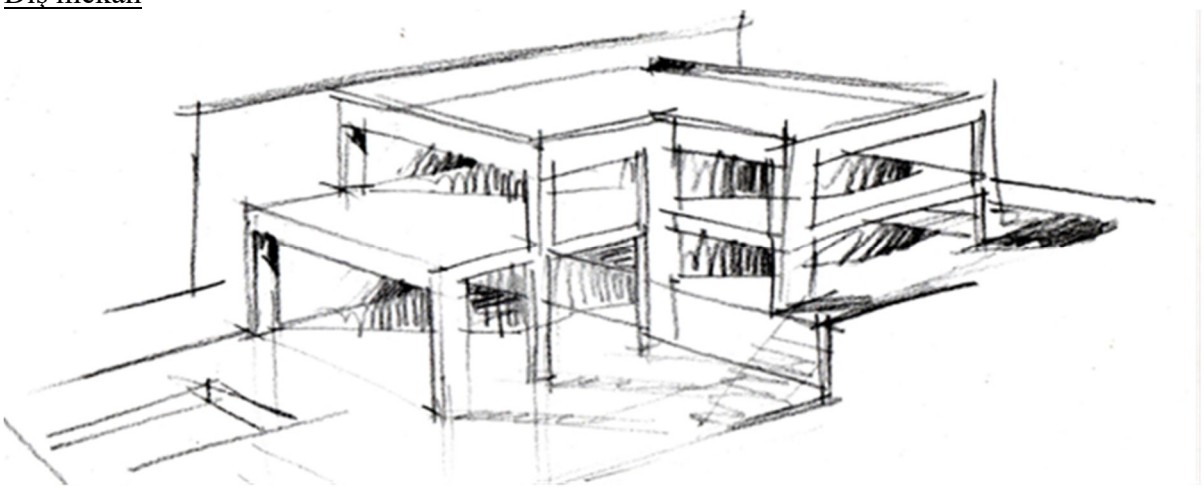
Her görsel için 1 dakikalık bekletme süresi veren Mnml oluşturduğu her bir görsel için 10 kredi istemektedir. Projenize uygun stilde tasarımları yapabilmek için oldukça kullanışlı ve hızlıdır.

4. Archi-Vinci

ArchiVinci'nin yapay zeka destekli dış modülüyle mimari çizimler farklı dış görünümlere dönüştürebilir. Çeşitli mimari stilleri, malzemeleri ve peyzaj unsurlarını kullanarak tasarımları dönüştürebilir. Farklı cepheleri, aydınlatma koşullarını ve ortamları kısa sürede oluşturur.

Çeşitli mobilya stillerini, aydınlatma şemalarını ve malzeme paletlerini gösteren ayrıntılı iç mekan görselleri oluşturabilir, çeşitli tasarım olanaklarını sunar, konsept tasarımların gelişmesine yardımcı olur.

Dış mekan



Resim 54: Kullanılan eskiz görseli



Resim 53: Oluşturulan görsel

İç mekan

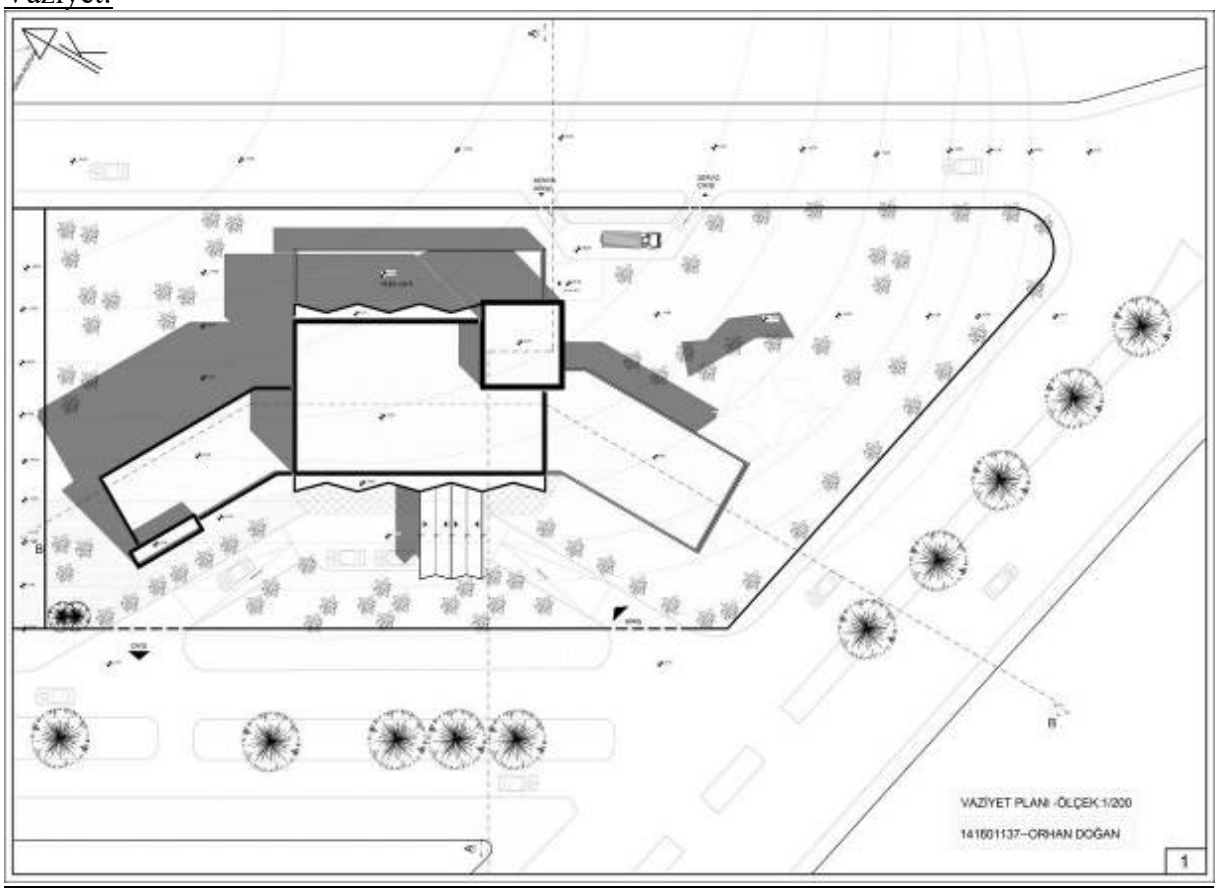


Resim 54: Kullanılan iç mekan görseli



Resim 55: Oluşturulan görsel

Vaziyet:



Resim 56: Kullanılan vaziyet planı



Resim 57: Oluşturulan görsel

Kısmi değişim



Resim 58: Kullnılan görsel



Resim 59: Duvar tablosu kısmi değişimi



Resim 60: Orta sehpa kısmi değişimi

Boş mekana malzeme ekleme



Resim 61: Kullanılan boş mekan görseli



Resim 62: Oluşturulan mekan görseli



Resim 62: Kullanılan boş mekan görseli



Resim 63: Oluşturulan mekan görseli

5. Rerender-ai

Tasarımlarımızın gerçek görüntüsüne ulaşmak için kullanabileceğimiz re render programı bizlere 3 benzerlik düzeyi sunarak benzerlik düzeyini seçebilmemizi sağlar. Benzer, dengeli ve yaratıcı seçenekleri ile bize tasarımın benzerlik oranlarının sınırlarını oluşturur. Bu program tasarımın hangi bina tipine ait (ofis, okul, gökdelen, tapınak, avm, otel, hastane vb) bilgileri alarak cepheleri tasarlar ve bize renk teması seçebilmeyi sunar.



Resim 64: Oluşturulan görsel



Resim 65: Oluşturulan görsel

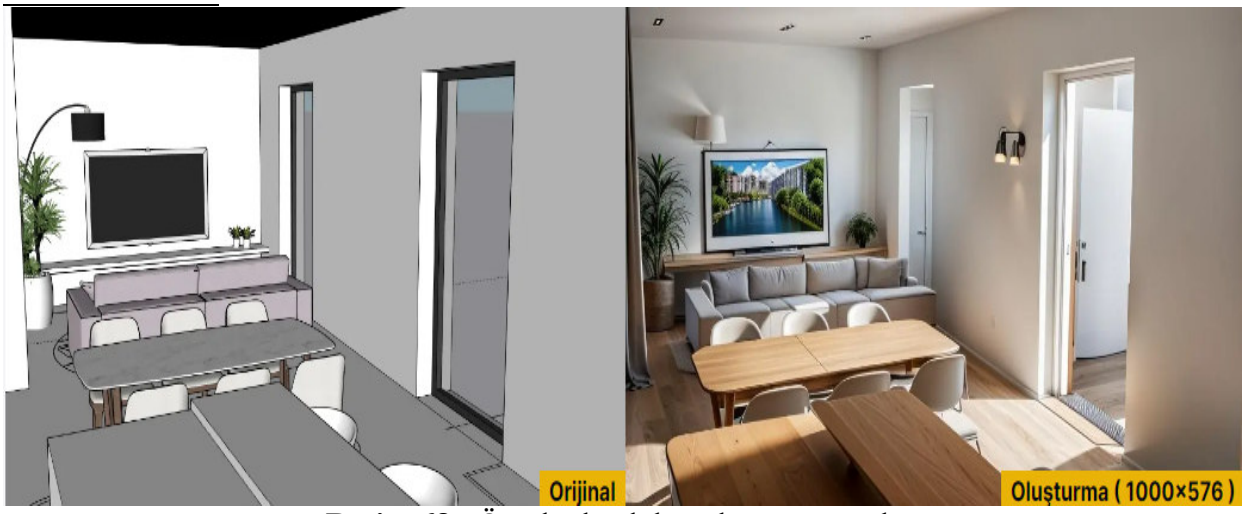


Resim 66: Oluşturulan görsel



Resim 67: Oluşturulan görsel

Örnek tasarımlar



Resim 68: Örnek olarak hazırlanmış görsel



Resim 69: Örnek olarak hazırlanmış görsel



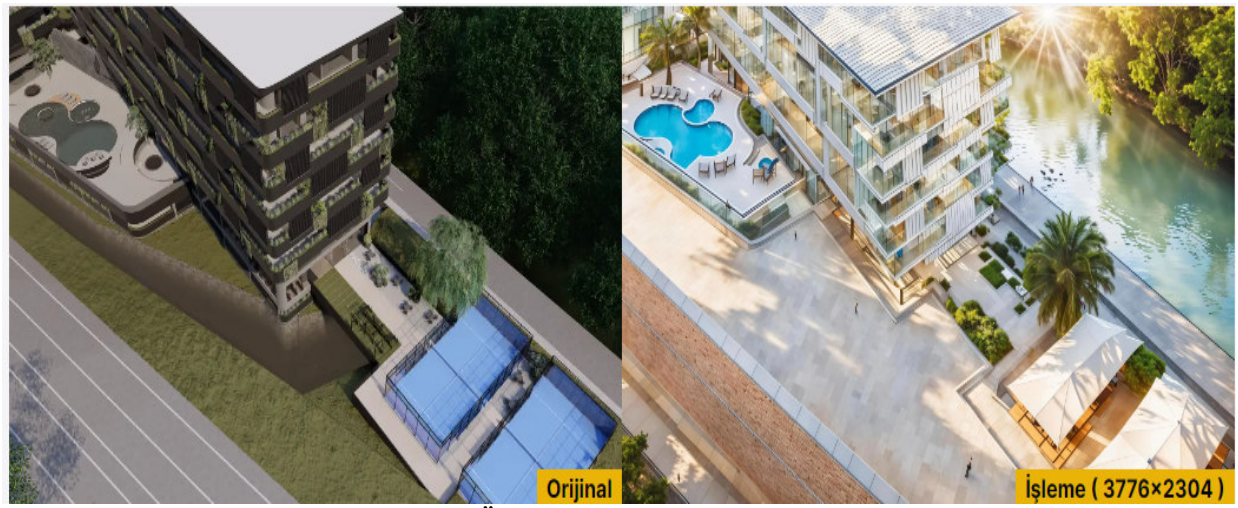
Resim 70: Örnek olarak hazırlanmış görsel



Resim 71: Örnek olarak hazırlanmış görsel



Resim 72: Örnek olarak hazırlanmış görsel



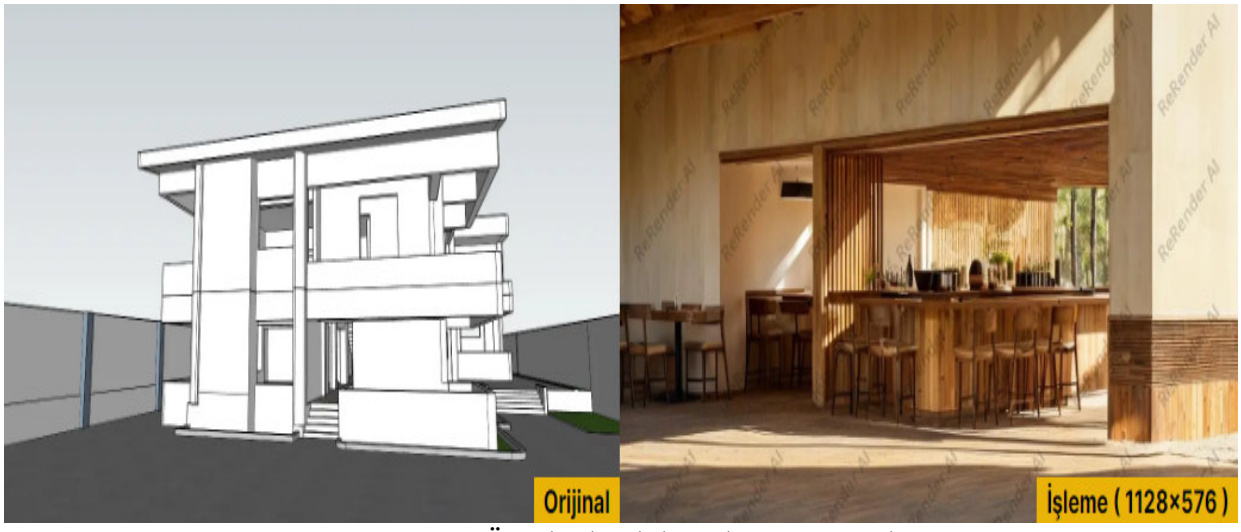
Resim 73: Örnek olarak hazırlanmış görsel



Resim 74: Örnek olarak hazırlanmış görsel



Resim 75: Örnek olarak hazırlanmış görsel



Resim 76: Örnek olarak hazırlanmış görsel

DEĞERLENDİRME VE SONUÇ

	STYLAR	MAKET	MNML	ARCHİ-VİNCİ	RE RENDER
Komutlarla çalışabilme	X	X	X	X	X
Çoklu görsel oluşturma	X	X			
Konsept geliştirme			X	X	
Eskizden render alabilme	X	X	X	X	X
Farklı stil seçebilme	X	X	X	X	X
Kolay kullanım videosu		X			
Gerçekçi İç mekan	X	X	X	X	X
Boş mekanlara malzeme ekleyebilme					X
Kat planı oluşturma		X			
Kat planı renklendirme		X			
Örnek tasarım görseli sunma					X
Metinden görsel oluşturma	X		X		
Ücretsiz kullanım hakkı	X	X	X	X	X
Referanslı render oluşturma			X		
3D' den render alabilme	X	X	X	X	X

Tablo 1: Program özelliklerinin karşılaştırılması

Yukarıda verilen tabloda bu çalışma için kullanılan 5 farklı yapay zeka programının ücretsiz kullanım hakkıyla kullanılarak programların sahip olduğu özellikler karşılaştırmalı olarak verilmiştir.

Hayatımızın her alanında kolaylıklar sağlayan yapay zeka, mimarlık alanında da hızlı sonuçlar üreterek mimarların yükünü hafifletmektedir. Bu çalışma 5 farklı yapay zeka programının mimarlık alanında nasıl kolaylıklar sağladığı ve mimarların saatlerce uğraşarak ulaşacağı sonuçlara nasıl dakikalar içinde ulaşabildiği incelenmiştir. Mimarlıkta kullanılan yapay zeka programları, tasarım, modelleme, analiz, proje yönetimi, konsept geliştirme ve gerçekçi görsel oluşturma gibi farklı alanlarda önemli rol oynamaktadır. Yapay zeka programlarının görsel olarak ne kadar geliştiği ve kullanıcıların isteklerini ne kadar karşılayabildiğine dair örnekler üzerinde incelemeler yapılmıştır. Hızlı ve başarılı sonuçlar alabildiğimiz bu çalışma sayesinde mimarların iş yükünün yapay zeka sayesinde azalabileceğini ve zaman tasarrufu sağlayabileceğimiz programlar olduğu ayrıca çeşitli stillerde hızlı tasarımlar yaparak yaratıcılığın yüksek olduğu çalışmalar sunabileceğimiz tespit edilmiştir.

KAYNAKÇA

Demir, Ozan. 2019. "Sürdürülebilir Kalkınma için Yapay Zekâ". Yapay Zekâ ve Gelecek, editör Gonca Telli, 1. Baskı, 44-64. İstanbul: Doğu Kitabevi.

Demirarslan, D. ve Demirarslan, O. (2021). Proportion and Order in Architectural Design. H. B. Henden Şolt (Ed.), Research&Reviews in Architecture, Planning and Design in (1. Edition, pp. 3-26). Ankara: Gece Kitaplığı.

Demirarslan, S. (2018). Kavramsal Sanat ve Mimarlığa Yansımaları. Türk & İslam Dünyası Sosyal Araştırmalar Dergisi, 19(19), 244-254.

Gürbüz, Sait ve Faruk Şahin. 2018. Sosyal Bilimlerde Araştırma Yöntemleri: Felsefe-Yöntem-Analiz. 5. Baskı. Ankara: Seçkin Yayıncılık.

Nabiyev, V. V. (2016). Yapay Zekâ: Stratejili Oyunlar-Örüntü Tanıma-Doğal Dil İşleme (5. Baskı). Ankara: Seçkin Yayıncılık.

Picon, A. (2020). What About Humans? Artificial Intelligence in Architecture. P. F. Yuan, M. Xie, N. Leach, J. Yao ve X. Wang (Ed.), Architectural Intelligence: Selected Papers from the 1st International Conference on Computational Design and Robotic Fabrication (CDRF 2019) in (pp. 15- 29). Singapore: Springer Singapore.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

YORGUNLUK TESPİTİ İÇİN YBM VE İHA TEKNOLOJİLERİ ENTEGRASYONUNUN ÖNÜNDEKİ ENGELLERİ VE İTİCİ GÜÇLERİN ORTAYA ÇIKARILMASI

Sefer MEŞE
Yıldız Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Yapı İşletmesi Bölümü
ORCID: 0009-0005-6868-6605

Dr. Öğretim Üyesi Gökhan DEMİRDÖĞEN
Yıldız Teknik Üniversitesi, İnşaat Mühendisliği Fakültesi, İnşaat Mühendisliği Bölümü, Yapı İşletmesi
ORCID: 0000-0002-2929-2399

ÖZET
Yorgunluk, performansı ve güvenliği önemli ölçüde bozabilen fiziksel ve zihinsel bir bitkinlik halidir. Fiziksel ve zihinsel yorgunluk, işçilerin uzun süreli yoğun fiziksel aktivite, stres ve mental çaba sonucunda kas ağrıları, enerji eksikliği, konsantrasyon güçlüğü ve karar verme yeteneklerinde azalma gibi belirtilerle ortaya çıkan ve iş performanslarını olumsuz etkileyen bir durumdur. İnşaat sektöründe yorgunluk, kazalara, yaralanmalara ve ölümlere katkıda bulunan kritik bir faktördür. Bu makale, işçi yorgunluğunu kapsamlı bir şekilde belirlemek, izlemek ve azaltmak için dijital teknolojilerin, özellikle de Yapı Bilgi Modellemesi (YBM) ve İnsansız Hava Aracı (İHA) sistemlerinin entegrasyonunu araştırmaktadır. Çalışma, inşaat işçileri arasındaki yorgunluğun derinlemesine bir analizini ve bu teknolojilerin bu sorunu etkili bir şekilde ele almak için nasıl kullanılabileceğini sağlamayı amaçlamaktadır. Makale öncelikle yorgunluğu tanımlamakta ve inşaatla ilgili kazalardaki önemli rolünü tartışmaktadır. İnşaat işçilerinin yaşadığı yorgunluğun nedenleri ve türlerine ilişkin mevcut literatür gözden geçirilmektedir. Daha sonra makale, sektördeki yorgunluk sorununu tanımlamayı ve ele almayı amaçlayan çeşitli çalışmaları incelemektedir. Yorgunluğu ölçmek ve değerlendirmek için literatürde kullanılan metodolojileri vurgulamakta ve önceki araştırmalarda uygulanan araç ve tekniklere ayrıntılı bir genel bakış sağlamaktadır. Bu araştırmanın özü, inşaat işçilerinin sağlık ve güvenliğini artırmak için YBM ve İHA sistemlerinin entegrasyonuna yönelik engellerin ve itici güçlerin belirlenmesidir. Çalışma, bu dijital teknolojilerden yararlanarak, yorgunluk tespitinde bu teknolojilerin potansiyel uygulama alanlarını önermektedir.
Anahtar Kelimeler: Yorgunluk; İnşaat; YBM; İHA; Sağlık ve Güvenlik;

UNLOCKING BARRIERS AND DRIVERS: INTEGRATING BIM AND UAV TECHNOLOGIES FOR FATIGUE DETECTION

ABSTRACT
Fatigue is a state of physical and mental exhaustion that can significantly impair performance and safety. Physical and mental fatigue is a condition characterized by muscle pain, lack of energy, difficulty concentrating, and reduced decision-making ability resulting from prolonged intense physical activity, stress, and mental effort, negatively impacting workers' job performance. In the construction industry, fatigue is a critical factor contributing to accidents, injuries, and fatalities. This article explores the integration of digital technologies, specifically Building Information Modeling (BIM) and Unmanned Aerial Vehicle (UAV) systems, to identify, monitor, and mitigate worker fatigue comprehensively.

The study aims to provide an in-depth analysis of fatigue among construction workers and how these technologies can be employed to address this issue effectively. The paper first defines fatigue and discusses its significant role in construction-related incidents. It reviews the existing literature on the causes and types of fatigue experienced by construction workers. Subsequently, the article examines various studies aimed at identifying and addressing the problem of fatigue within the industry. It highlights the methodologies used in the literature to measure and evaluate fatigue, providing a detailed overview of the tools and techniques applied in previous research. The core of this research is the identification of barriers and drivers for the integration of BIM and UAV systems to enhance the health and safety of construction workers. By leveraging these digital technologies, the study suggests potential application areas of these technologies in the fatigue detection.
Keywords: Fatigue; Construction; BIM; UAV; Health and Safety

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

AKILLI ŞEHİRLER VE SANAT ALANLARINDAKİ AKADEMİK ÇALIŞMALARIN BİBLİYOMETRİK ANALİZİ

Seçkin TEKİN
Munzur Üniversitesi, Lisansüstü Eğitim Enstitüsü, Kültür ve Sanat Yönetimi
ORCID: 0009-0001-0285-2405

Dr. Öğr. Üyesi Emine Banu BURKUT
Konya Teknik Üniversitesi, Mimarlık ve Tasarım Fakültesi, İç Mimarlık Bölümü
ORCID: 0000-0003-0252-4054

Prof. Dr. Murat DAL
Munzur Üniversitesi/Güzel Sanatlar, Tasarim ve Mimarlik Fakültesi/İç Mimarlik Tasarimi Bölümü
ORCID: 0000-0001-5330-1868

ÖZET
Akıllı şehir kavramı, bilgi ve iletişim teknolojilerinin şehir yönetiminde entegrasyonunu sağlar ve bu bağlamda sanat, kültürel ifade biçiminin yanı sıra sosyal katılımı da teşvik eden bir araç olarak karşımıza çıkar. Akıllı şehirlerin çağdaş uygulamaları, sanatın toplumsal hayata etkisini artırırken, aynı zamanda bireylerin çevreleri ile olan ilişkilerini derinleştirmektedir. Bu çalışmada, akıllı şehirler ve sanat kavramları hakkında yazılmış olan literatür çalışmalarını kavramsal ve kuramsal olarak analiz etmeyi amaçlamaktadır. Araştırma metodolojisi bibliyometrik analiz ve bilimsel haritalamadır. Akıllı Şehirler ve Sanat konularında çok sayıda bibliyometrik analiz çalışması olmasına rağmen, bu araştırma 2020-2024 yılları arasındaki güncel makalelere odaklanmaktadır. Araştırma için veriler Web of Science veri tabanından toplanmıştır. Araştırma verileri Vosviewer ve CiteSpace yazılım programları kullanılarak analiz edilmiştir. Mevcut araştırmalara genel bir bakış yapılmış ve yazılım programlarının analizlerinin sonuçları ağ ve tematik haritalar halinde sunulmuştur. Bu araştırmanın bulgularına göre 1210 yayın bulunmaktadır. Bu eserler 894 makale, 222 bildiri, 94 inceleme makalesi, 37 erken erişim, 3 kitap bölümü ve 1 sanat sergisi incelemesinden oluşmaktadır. Web of Science Kategorileri: ‘Engineering Electrical Electronic’ (476), ‘Computer Science Information Systems’ (388), ‘Computer Science Artificial Intelligence’ (285), ‘Telecommunications’ (241) ve ‘Computer Science Teory Methods’ (189). Ülkeler ve Bölgeler: Çin (670), Hindistan (139), Amerika Birleşik Devletleri (124), Güney Kore (94) ve İngiltere (82). Çalışmanın bulguları arasında karşılaştırmalı bibliyometrik analizler ve bilimsel haritaların yanı sıra gelecekteki araştırmalar için öneriler de yer almaktadır. Çalışmanın amacı sürdürülebilir turizm araştırmalarına katkıda bulunmaktır.
Anahtar Kelimeler: Akıllı Şehirler, Sanat, Bibliyometrik Analiz.

BIBLIOMETRIC ANALYSIS OF ACADEMIC STUDIES ON SMART CITIES AND ART

ABSTRACT
The concept of the smart city enables the integration of information and communication technologies in city management, and in this context, art emerges as a form of cultural expression as well as a tool that encourages social participation.

Contemporary applications of smart cities increase the impact of art on social life, while at the same time deepening the relationship of individuals with their environment. This study aims to conceptually and theoretically analyze the literature on the concepts of smart cities and art. The research methodology is bibliometric analysis and scientific mapping. Although there are numerous bibliometric analysis studies on Smart Cities and Art, this research focuses on recent articles between 2020-2024. Data for the research was collected from the Web of Science database. The research data was analyzed using Vosviewer and CiteSpace software programs. An overview of the existing research was made and the results of the analysis of the software programs were presented in the form of networks and thematic maps. According to the findings of this research, there are 1210 publications. These works consist of 894 articles, 222 papers, 94 review articles, 37 early access, 3 book chapters and 1 art exhibition review. Web of Science Categories: 'Engineering Electrical Electronic' (476), 'Computer Science Information Systems' (388), 'Computer Science Artificial Intelligence' (285), 'Telecommunications' (241) and 'Computer Science Theory Methods' (189). Countries and Regions: China (670), India (139), United States (124), South Korea (94) and United Kingdom (82). The findings of the study include comparative bibliometric analyses and scientific maps as well as recommendations for future research. The aim of the study is to contribute to sustainable tourism research.
Keywords: Smart Cities, Art, Bibliometric Analysis.

GİRİŞ

Son yıllarda, akıllı şehirler ve sanat alanlarındaki akademik çalışmalar, teknolojinin ve kültürel üretimin kesişim noktasında önemli bir gelişim göstermiştir (Örselli & Akbay, 2019). Akıllı şehirler, şehirlerin verimliliğini ve yaşam kalitesini artırmak amacıyla bilgi ve iletişim teknolojilerini entegre eden dinamik yapılar olarak öne çıkmaktadır (URL-1). Bu bağlamda, şehirlerin altyapı sistemlerinden sosyal hizmetlerine kadar pek çok alanda yenilikçi çözümler sunulmaktadır. Öte yandan, sanat alanındaki akademik çalışmalar da, toplumsal ve teknolojik değişimlerin etkisiyle evrim geçirerek yeni ifade biçimleri ve yaratıcı süreçler geliştirmektedir. Bu iki alanın kesişim noktası, şehirlerin sanatsal ve kültürel dinamikleri ile akıllı teknolojilerin entegrasyonunu içeren zengin bir araştırma potansiyeli sunmaktadır. Bu çalışma, akıllı şehirler ve sanat alanlarındaki akademik çalışmaların bibliyometrik analizini yaparak, bu iki disiplinin nasıl birbiriyle etkileşimde bulunduğunu, hangi temaların öne çıktığını ve gelecekteki araştırma yönelimlerini ortaya koymayı amaçlamaktadır.

Akıllı Şehirler

Bilgi ve iletişim teknolojilerini kullanarak şehirlerin yönetimini ve yaşam kalitesini iyileştirmeyi amaçlayan şehirlerdir. Bu şehirler, nesnelerin interneti (IoT), büyük veri, yapay zeka ve bulut bilişim gibi yenilikçi teknolojilerden yararlanarak (Köseoğlu & Demirci, 2018) enerji verimliliği, su yönetimi, ulaşım, sağlık hizmetleri ve kamu güvenliği gibi alanlarda daha etkili çözümler sunar (Topsakal & Sağlık, 2024). Akıllı şehirler, vatandaşların günlük yaşamlarını kolaylaştırmak ve şehir kaynaklarını daha sürdürülebilir bir şekilde kullanmak için tasarlanmıştır (URL-2).

Türkiye'de de *Ulusal Akıllı Şehirler Stratejisi ve Eylem Planı* gibi politikalarla akıllı şehir projeleri desteklenmektedir. Özellikle büyük şehirlerde, ulaşım, toplu taşıma, enerji verimliliği ve su yönetimi gibi alanlarda akıllı şehir uygulamaları hayata geçirilmektedir. Bu projeler, şehirlerin daha yaşanabilir, sürdürülebilir ve verimli olmasını hedeflemektedir (URL-1).



Şekil 1. Akıllı Şehir Dönüşümü Yol Haritası (URL-1)

Sanat

İnsanın duygu, düşünce ve hayal gücünü estetik bir biçimde ifade etme çabasıdır. Bu ifade, resim, heykel, müzik, edebiyat, dans gibi çeşitli formlarda olabilir (URL-3). Sanat, bireyin iç dünyasını ve toplumsal gerçeklikleri yansıtarak, izleyiciye farklı bakış açıları sunar ve duygusal bir bağ kurar. Ayrıca, sanatın tarih boyunca kültürel ve sosyal değişimlerde önemli bir rol oynadığı görülmektedir (Ötgün, 2008).

YÖNTEM

Bu çalışmanın araştırma metodolojisi bibliyometrik analiz ve bilimsel haritalamadır (Tekin, Burkut & Dal, 2024).

Araştırma bulguları incelenirken ve kavramlar arası ilişkiler ortaya koyulurken Vosviewer ve CiteSpace bibliometrik haritalama ve analiz programı kullanılacaktır. Vosviewer, Ludo Waltman ve Nees Jan van Eck tarafından geliştirilen bilimsel araştırmaların ülke, dergi, yazar, özet, atıf, anahtar kelimeler, gibi verileri kullanarak, mevcut ya da araştırmacılar tarafından çalıştırılan veriler üzerinden haritalar oluşturan bir bibliyometrik haritalama programıdır (Van Eck ve Waltman, 2010:536). Citespace programı ortak atıf ağlarını görselleştirmeyi ve analiz etmeyi sağlayan bir java uygulamasıdır (Chen, 2006: 393).

- Sistematik literatür taraması 29 Temmuz 2024 ile 05 Ağustos 2024 tarihleri arasında Web of Science veri tabanı kullanılarak elde edilmiştir (Tekin, Burkut & Dal, 2024).
- Akıllı Şehirler ve Sanat konularında çok sayıda bibliyometrik analiz çalışması olmasına rağmen, bu araştırma 2020-2024 yılları arasındaki güncel makalelere odaklanmaktadır (Burkut, & Dal, 2023).
- Veri tabanında "smart cities" (All Fields) ve "art" (All Fields) anahtar kelimeleri kullanılarak **1269** adet veri elde edilmiştir.
- Elde edilen veriler 894 makale, 222 bildiri, 94 inceleme makalesi, 37 erken erişim, 3 kitap bölümü ve 1 sanat sergisi yayınlarından oluşmaktadır.

Akıllı Şehirler ve Sanat konuları ile ilgili yapılmış olan çalışmalarda aşağıdaki sorulara cevap aranacaktır;

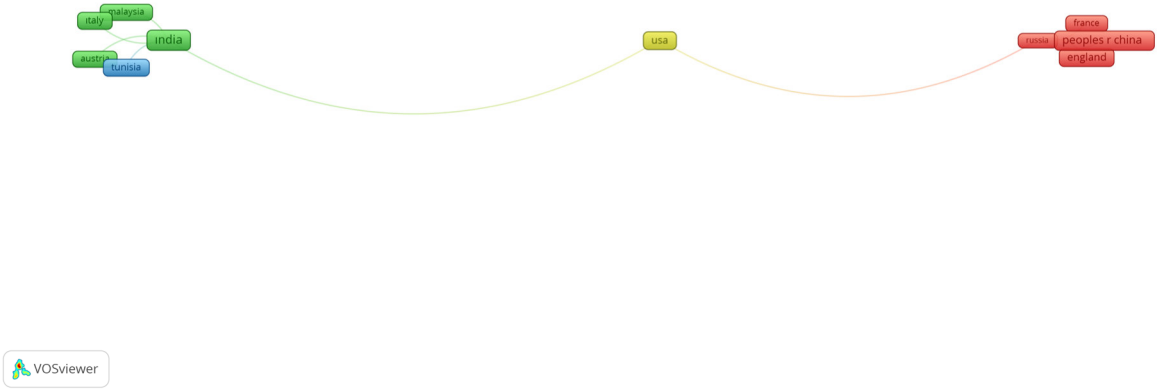
- En çok atıf alan ülkeler hangileridir?
- En çok tekrar eden anahtar kelimeler hangileridir?
- En çok atıf alan yazarlar kimlerdir?

BULGULAR

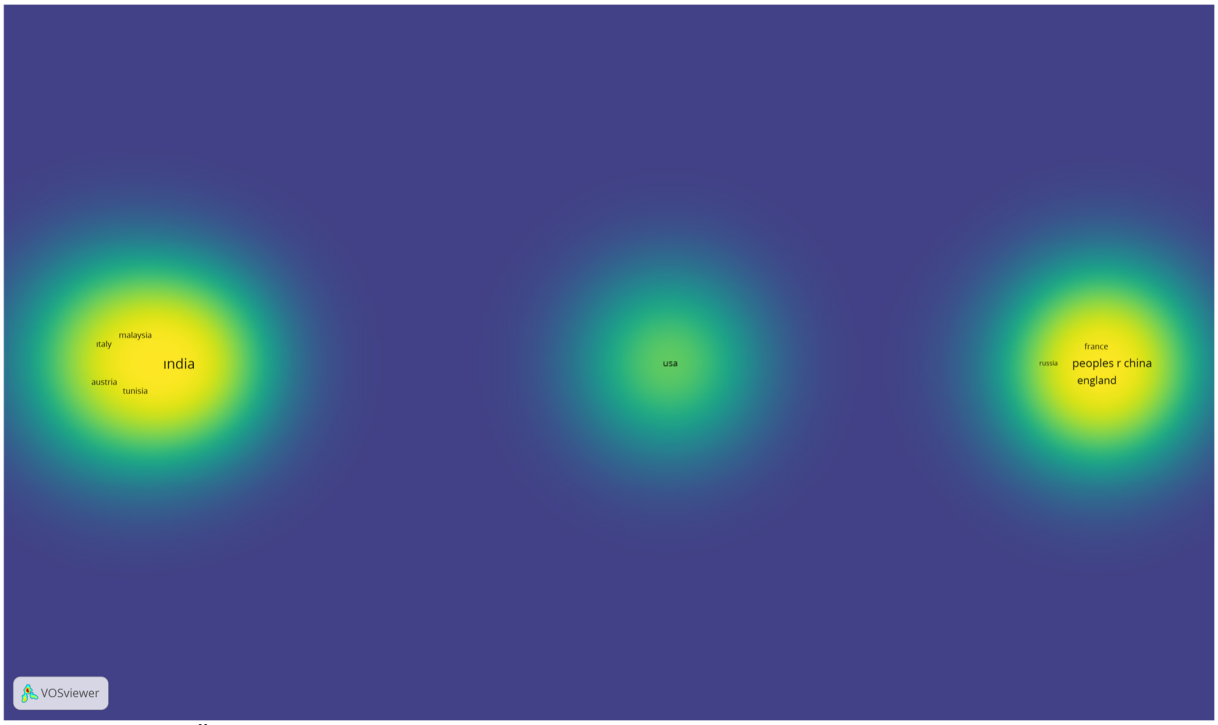
Bu başlık altında 29 Temmuz 2024 ile 05 Ağustos 2024 tarihleri arasında toplanan verilerden elde edilen bulgulara yer verilmiştir (Burkut, & Dal, 2023).

Ülkelerin Atıf Analizi (Citation Of Countries)

"Yayınların ülkelere göre aldıkları atıflara dair ağ haritası oluşturulmak üzere bir ülke tarafından en az 1 eser yayınlanması ve 1 atıf alınması kriteri kapsamında aralarında ilişki bulunan 22 gözlem birimi üzerinden analiz yapılmıştır" (Armutçu, 2023). 4 küme de 9 bağlantı tespit edilmiştir. En fazla atıf alan ülkeler Hindistan (236 atıf), Çin Halk Cumhuriyeti (156 atıf) ve İngiltere (122 atıf) olmuştur. Eser sayısı olarak sıralandığında Çin Halk Cumhuriyeti (22 yayın), Hindistan (12 yayın) ve İngiltere (4 yayın) şeklinde sıralanmaktadır.



Şekil 2. Ülkelerin Atıf Bağları (Network Visualization) (Ağ Görselleştirme)



Şekil 3. Ülkelerin Atıf Bağları (Density Visualization) (Yoğunluk Görselleştirme)

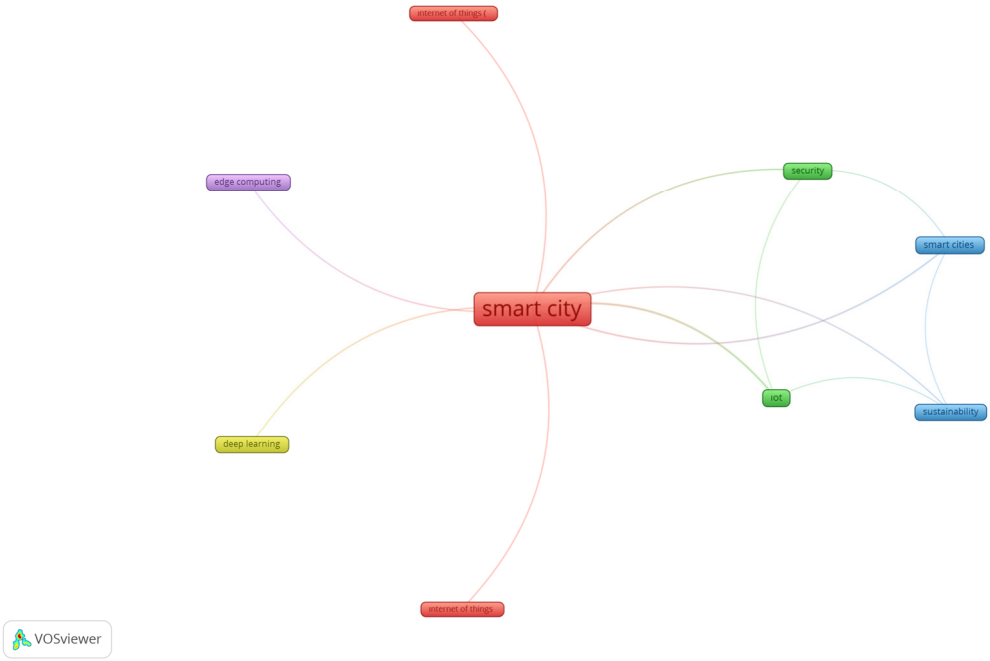


Şekil 4. Ülkelerin Atıf Bağları (Network Visualization) (Ağ Görselleştirme)

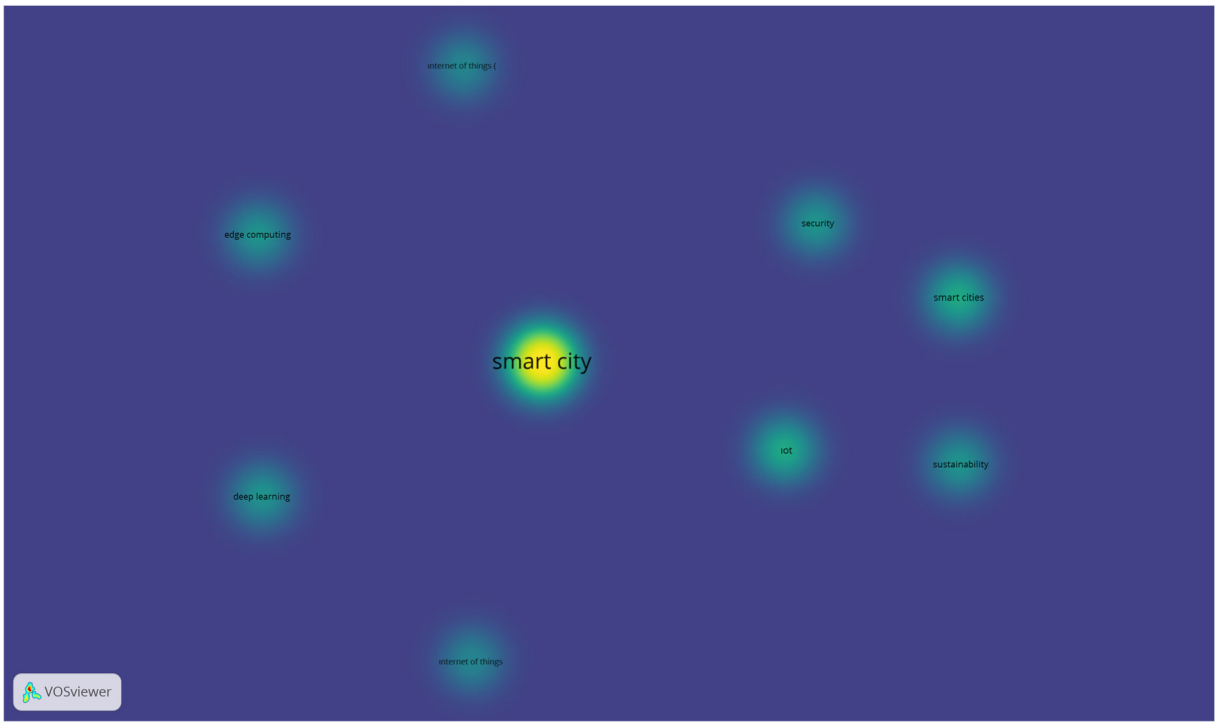
Anahtar Kelime Analizi (Co-occurence of All Keywords)

Akıllı Şehirler ve Sanat ile ilgili yayınlarda en sık kullanılan minimum 2 kriteri ile anahtar kelimelere bakıldığında 39 tekrar ile Smart City (Akıllı Şehir), 5 tekrar ile IOT (Internet of Things), 5 tekrar ile Smart Cities (Akıllı Şehirler), 3 tekrar ile Security (Güvenlik) ve 3 tekrar ile Sustainability (Sürdürülebilirlik) sözcükleri ilk sıralarda yer almaktadır. Toplam bağlantı gücü açısından en güçlü ifadeler Smart City (21), IOT (7), Security (5) sözcükleri olmuştur.

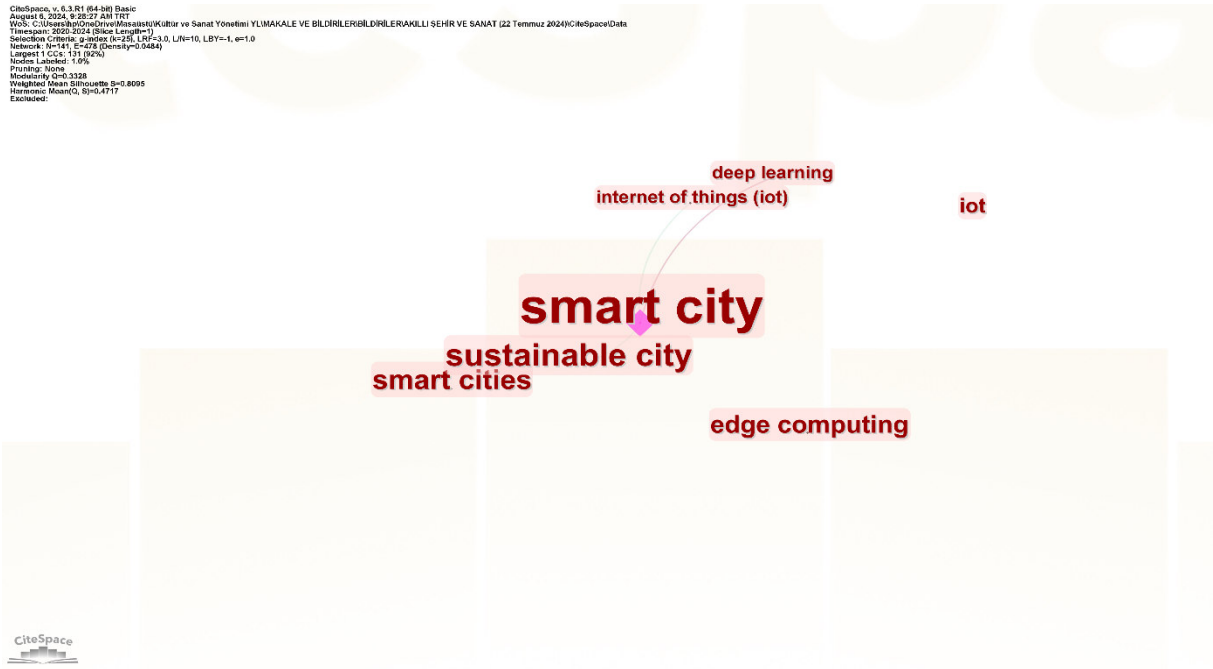
En az 2 defa görülen ve aralarında ilişki bulunan 9 gözlem birimi ile yapılan analiz neticesinde toplam 5 küme, 12 bağlantı ve 25 toplam bağlantı gücü tespit edilmiştir.



Şekil 5. Anahtar Sözcük Bağları (Network Visualization)



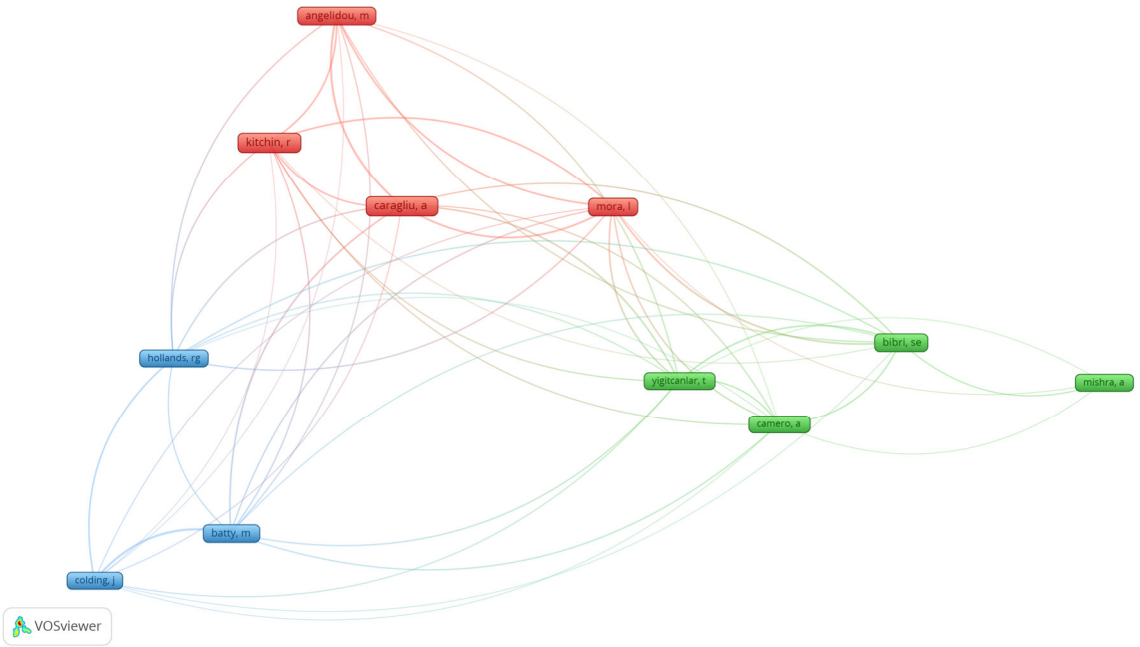
Şekil 6. Anahtar Sözcük Bağları (Density Visualization)



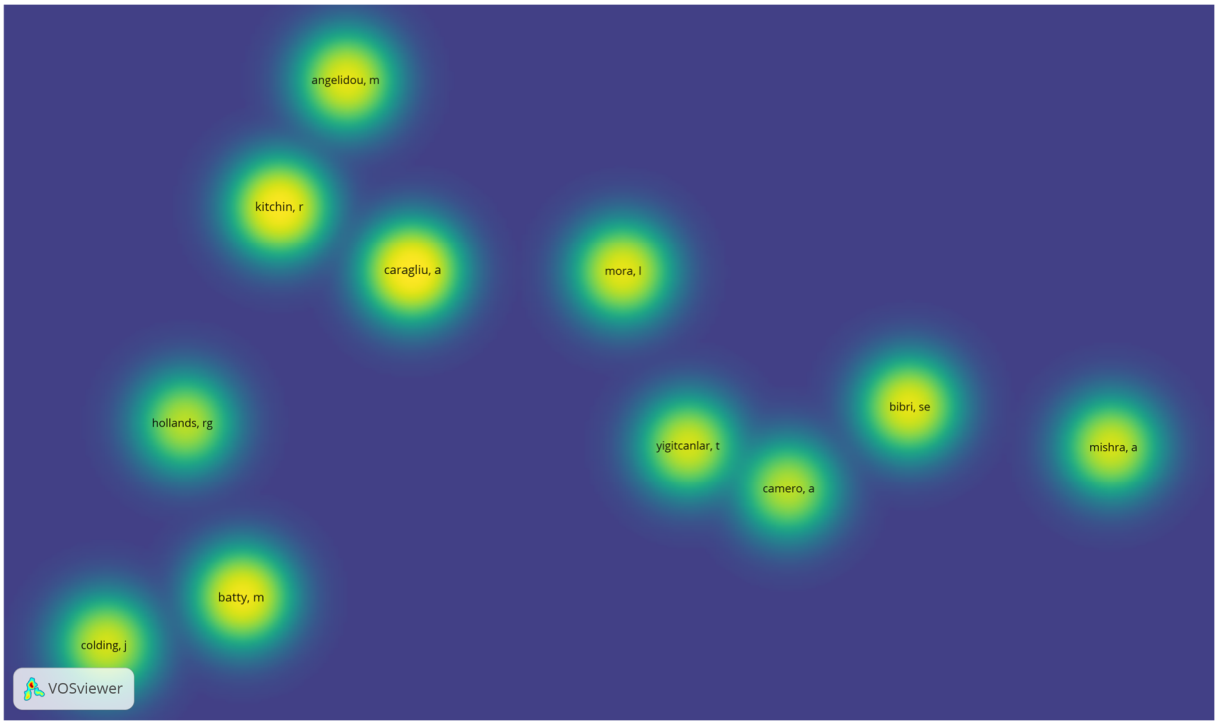
Şekil 7. Anahtar Sözcük Bağları (Network Visualization)

Yazarların Ortak Atıf Analizi (Co-citation of Cited-authors)

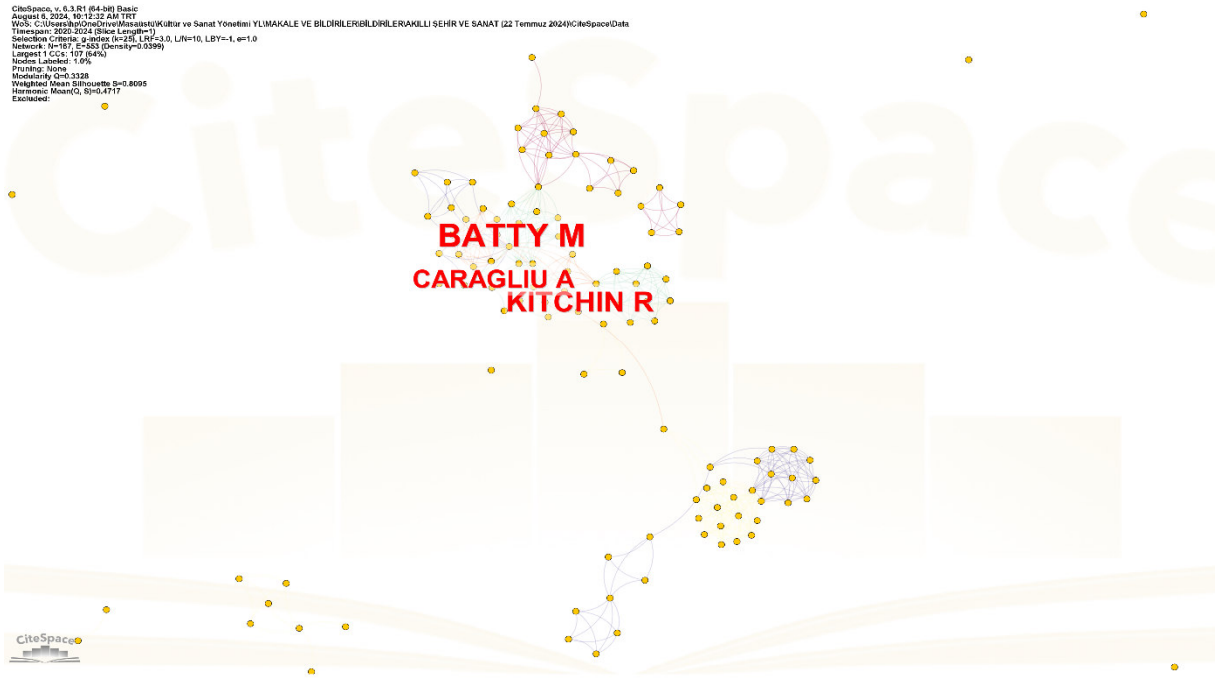
"Bir yayında atıf yapılan farklı kaynaklar Co- citation (ortak atıf) olarak adlandırılır." (Moç, 2023). Atıf sayısı minimum 5 seçilerek 13 birim üzerinden yapılan analize göre toplamda 3 küme, 49 bağlantı ve 182 toplam bağlantı gücü saptanmıştır" En fazla ortak atıf yapılan yazarlar Caragliu, A (10 atıf), Kitchin, R (9 atıf) ve Batty, M (8 atıf) olarak saptanmıştır.



Şekil 8. Ortak Atıf Yapılan Yazarlar Arası Bağlar (Network visualization)



Şekil 9. Ortak Atıf Yapılan Yazarlar Arası Bağlar (Density visualization)



Şekil 10. Ortak Atıf Yapılan Yazarlar Arası Bağlar (Network visualization)

TARTIŞMA VE SONUÇ

Sonuç olarak yapılan analizler sonucunda En fazla atıf alan ülkelerin Hindistan, Çin Halk Cumhuriyeti ve İngiltere olduğu tespit edilmiştir.

Akıllı Şehirler ve Sanat ile ilgili yayınlarda en sık kullanılan kelimelerin Smart City (Akıllı Şehir), IOT (Internet of Things), Smart Cities (Akıllı Şehirler) sözcükleri olduğu görülmüştür.

En fazla ortak atıf yapılan yazarlar ise Caragliu, A (10 atıf), Kitchin, R (9 atıf) ve Batty, M (8 atıf) olarak saptanmıştır.

"Genel olarak, yapılan analizler Akıllı Şehirler ve Sanat alanlarındaki ülkeler, yazarlar ve anahtar kelimeler arasındaki bağlantıları, eğilimleri ve ilişkileri anlamada önemli bilgiler sağlamıştır" (Koçar, 2024). Bu bulgular, Akıllı Şehirler ve Sanat konusunda gelecekteki araştırmaların yönünü belirlemede, iş birliklerini güçlendirmede ve etkili politikalar geliştirmede faydalı olacağı düşünülmektedir (Armutçu, 2023).

Araştırma bulguları Web Of Science Core Collection veritabanında ve 29 Temmuz 2024 ile 05 Ağustos 2024 tarihleri itibariyle bu şekilde görünmektedir. Araştırmaya ait bulgular başka bir zamanda ve başka veritabanlarında yapılacak araştırmalarda farklılık gösterebilir. Referans kaynaklara verilen atıf sayıları, alanyazına en fazla katkı veren yazarlar ve eser sayıları, en fazla eser veren ülkelerin değişimi olasılık dahilindedir. Ülkelerin teknolojiye olan yatırımları ve teknolojik ilerlemelerin kent idaresinde kullanımı, insan ihtiyaçları ölçüsünde akıllı şehirlerin sayısının artmasıyla birlikte akıllı şehirlerin yönetimi ve yönetişimi konusu gelecek yıllarda önemini ve güncelliğini koruyacağı tahmin edilmektedir (Koçar, 2024).

Çalışma sonucunda, Akıllı Şehirler ve Sanat alanlarında son yıllarda yapılan çalışmaların arttığı ancak yeterli olmadığı görülmüştür. En çok atıf alan ülkeler ve yazarlar arasında ülkemizin ve araştırmacılarımızın olmaması bu alana daha fazla önem verilmesi gerektiğini ortaya koymuştur.

KAYNAKLAR

Örselli, E., & Akbay, C. (2019). Teknoloji ve kent yaşamında dönüşüm: akıllı kentler. *Uluslararası Yönetim Akademisi Dergisi*, *2*(1), 228-241.

URL-1, 2024. https://www.akillisehirler.gov.tr/akilli-sehir-nedir/ T.C. Çevre, Şehircilik ve İklim Değişikliği Bakanlığı, Coğrafi Bilgi Sistemleri Genel Müdürlüğü Akıllı Şehirler Dairesi Başkanlığı. 06 Ağustos 2024.

Köseoğlu, Ö., & Demirci, Y. (2018). Akıllı Şehirler ve Yerel Sorunların Çözümünde Yenilikçi Teknolojilerin Kullanımı. Uluslararası Politik Araştırmalar Dergisi, 4(2), 40-57. https://doi.org/10.25272/j.2149-8539.2018.4.2.03

Temiz Topsakal, M., & Sağlık, A. (2024). Biyomimikrik Kentlerin Yeşil Altyapı Yönetimi ile Değerlendirilmesi. GSI Journals Serie A: Advancements in Tourism Recreation and Sports Sciences, 7(1), 239-259. https://doi.org/10.53353/atrss.1397762

URL-2, https://www.innova.com.tr/blog/akilli-sehirlerin-gunluk-yasama-etkileri/ İNNOVA, 06 Ağustos 2024.

URL-3, https://anatomisanatevi.com/blog/2019/06/02/78/ Anatomi Sanat Evi, 09 Ağustos 2024.

Van Eck, N. ve Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics, 84(2), 523–538. doi: 10.1007/s11192-009-0146-3

Chen, C. (2006). Information Visualization: Beyond the Horizon. (2nd Ed.). Springer.

Tekin, S., Burkut, E. B., & Dal, M. (2024). Culture and arts management: A bibliometric analysis using software. Cultural Heritage and Science, 5(1), 62-74. https://doi.org/10.58598/cuhes.1471765

Moç, T. (2023)Ethical Lidership Kavramı Üzerine Yapılan Çalışmaların Vosviewer İle Bibliyometrik Analizi. 3 rd International Conference on Scientific and Academic Research.

Koçar Uzan, H. (2024). Akıllı Şehir Ve Yönetişim Temalı Makaleler Üzerine Bibliyometrik Analiz. Yönetim Bilimleri Dergisi, 22(53), 938-960. https://doi.org/10.35408/comuybd.1398105

Armutçu, B. (2023). Yeşil Pazarlamanın Kavramsallaştırılması ve Öne Çıkan Temalar Üzerine VOSviewer ile Bir Araştırma. Uluslararası Akademik Birikim Dergisi, 6 (Özel Sayı).

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

TUNCELİ İLİ SOMUT KÜLTÜREL MİRAS ÖRNEKLERİNİN TARİHSEL VE İŞLEVSEL OLARAK İNCELENMESİ

Gökcan HALİS
Munzur Üniversitesi, Lisansüstü Eğitim Enstitüsü, Kültür ve Sanat Yönetimi
ORCID: 0009-0008-4478-3840

Prof. Dr. Murat DAL
Munzur Üniversitesi/Güzel Sanatlar, Tasarim ve Mimarlik Fakültesi/İç Mimarlik Tasarimi Bölümü
ORCID: 0000-0001-5330-1868

ÖZET
Kültür çok geniş anlam öğelerini barındıran ve çok sayıda farklı tanıma sahip bir kavramdır. Dünya toplumlarında medeniyetin ifadesi olan kültürü, Macmillan (1994) "Kültür, yetiştirilmesi zor bir meyve ve elde edilmesi zor bir üründür. Ancak, herhangi bir hasattaki gibi o yılki mahsülle değil, yıllarca toprağın hazırlanmasını sağlayan emekle doğru orantılır" sözü ile açıklamıştır. Tunceli İli de bu doğrultuda sahip olduğu sahip olduğu zengin somut olmayan kültürel miras çeşitliliği ve somut kültürel miras ürünleriyle ön plana çıkmaktadır. Tunceli il sınırlarında arkeolojik sitler ve taşınmaz kültür varlıkları, kaya mezarları, mağaralar, sivil mimari kalıntıları, kaleler, tarihi cami, kilise ve şapeller, koç biçimli ve sanduka tipi mezar taşları, köprüler, çeşmeler, hamamlar ve kaplıcalar, anıt ve abideler ve doğal sit alanları bulunmaktadır. Yapısal eleman olarak ise il sınırları içerisinde kemerler, tromp ve pandantifler, örtü sistemleri, kubbeler, tonozlar ve düz örtüler bulunmaktadır. Bu çalışma Tunceli ilinin somut kültürel miraslarını, il için kültürel miras arz eden önemli yapılar üzerinden ele alıp, bu yapıların mevcut durumlarını, işlevlerini, tarihlerini ve mevcut durumları ele almaktır. Amaç yapıların farkındalığını ve ihtiyaçlarını ortaya koyup Tunceli ili için kültür turizmi katma değerini artırmaktır. Yapılan bu çalışma Tunceli il sınırlarındaki höyükler, kaya mezarları ve mağaralar, kaleler, kiliseler ve tarihi köprüler ile sınırlandırılmıştır.
Anahtar Kelimeler: Tunceli, Somut Kültürel Miras Ürünleri, Yapı

HISTORICAL AND FUNCTIONAL ANALYSIS OF TANGIBLE CULTURAL HERITAGE EXAMPLES OF TUNCELI PROVINCE

ABSTRACT
Culture is a concept that contains a wide range of meaning elements and has many different definitions. Macmillan (1994) defines culture, which is the expression of civilisation in the societies of the world, as "Culture is a difficult fruit to cultivate and a difficult product to obtain. However, it is not directly proportional to the crop of that year, as in any harvest, but to the labour that prepares the soil for years". In this direction, Tunceli Province stands out with its rich intangible cultural heritage diversity and tangible cultural heritage products. There are archaeological sites and immovable cultural assets, rock tombs, caves, caves, civil architecture ruins, castles, historical mosques, churches and chapels, ram-shaped and cist-type tombstones, bridges, fountains, baths and spas, monuments and monuments and natural protected areas within the provincial borders of Tunceli. As structural elements, there are arches, trumpets and pendants, covering systems, domes, vaults and flat covers within the provincial borders.

The aim of this study is to examine the tangible cultural heritage of Tunceli province through the important buildings that constitute cultural heritage for the province and to discuss the current status, functions, history and current conditions of these buildings. The aim is to reveal the awareness and needs of the buildings and to increase the added value of cultural tourism for Tunceli province. This study is limited to mounds, rock tombs and caves, castles, churches and historical bridges in Tunceli province borders.
Keywords: Tunceli, Tangible Cultural Heritage Products, Building

1. GİRİŞ

Kültür çok geniş anlama sahip olan ve çok sayıda farklı tanımı olan bir kavramdır. Dünya toplumlarında medeniyetin gelişimin ve aktarımın sembolü olan kültürü, Macmillan (1994) **"**Kültür, ortaya çıkması kolay olmayan bir bitki ve hasat edilmesi zor bir üründür. fakat, bir hasatta olduğu gibi ürün o yılki mahsulle değil, pek çok nesil için en iyi tohumun stoklarının yetiştirilmesi, yıllarca yapılan hazırlıklarla ve emekle doğru orantılıdır**"** sözü ile tanımlamıştır. Sir Burnet Taylor (2016) ise **"**Kültürü, en geniş etnografik anlamıyla alındığında, insanoğlunun toplumun bir mensubu olarak edindiği bilgi, inanç, sanat, töre, yasa, görenek ve diğer tüm yetenekler ile alışkanlıkların oluşturduğu karmaşık bir toplam'' olarak açıklamaktadır. Bu tanımlar ışığında kültür kavramını insan olgusunun temel yapı taşlarından biri olarak tanımlamak mümkündür. Gelecek nesillere aktarılmayı başarabilen kültürel miras ürünleri temel olarak somut kültürel miras ve somut olmayan kültürel miras ürünleri olarak açıklanmaktadır. Avrupa Konseyi kültürel mirası şöyle ifade eder; geçmişten kalan ve sürekli bir değişim içerisinde olan, gelenek görenek, yaşam tarzı, ritüeller, değerler gibi bütün birikimlerin toplamı olarak tanımlamıştır (Counsil of Europe, 2018). Toplumların yaşadığı zaman dilimlerinde yaptıkları, o zamanın yaşam şartlarına göre şekillendirdikleri yapılar ise somut kültürel miras unsurlarını oluşturur. Somut kültürel miras unsurları bilimsel eserler, mimari değeri yüksek yapılar ve arkeoloji eserlerden oluşmaktadır. Bir başka tanıma göre ise somut kültürel miras unsurları taşınır (resim, heykel, toprak, çini vb.) ve taşınmaz (kale, ibadethane, han, hamam, kervansaray vb. yapılar) olarak ikiye ayırabiliriz (Ahunbay, 2007: 22). (Can, 2009:3). Somut olmayan kültürel miras unsurları ise; dil, müzik, şiir, inanç sistemleri, folklorik öğeler, dini ritüeller, düşünce sistemler, değerler, deyişler, gösteri etkinlikleri, el sanatları vb. unsurlar olarak ele alınabilir. Bu araştırma Tunceli ilinin somut kültürel miraslarını, il için kültürel miras arz eden önemli yapılar üzerinden ele alıp, bu yapıların mevcut durumlarını, işlevlerini, tarihlerini ve mevcut durumları ele almaktır. Amaç yapıların farkındalığını, ihtiyaçlarını ortaya koyup Tunceli ili için kültür turizmi katma değerini artırmaktır. Yapılan bu araştırma Tunceli il sınırlarında tescillenmiş veya tescil bekleyen, höyükler, kaya mezarları ve mağaralar, kaleler. Kiliseler ve tarihi köprüler ile sınırlandırılmıştır.

2. ARAŞTIRMA VE BULGULAR

2.1. Arkeolojik Sitler ve Taşınmaz Kültür Varlıkları

2.1.1. Höyükler

Höyükler, yerleşkelerin aynı yerde aşamalar boyunca üst üste kurulup yıkılmasıyla oluşmuş tepe görünümlü yapılardır. İnsanların inşa ettikleri yapıların, farklı sebeplerden yıkılması ile birlikte, kalan kalıntıların üzerine yeni yapılar inşa edilmektedir. Yerleşme zemin yüksekliğinin zamanla yükselmesine neden olan kültürel katmanlar, yukarıdan aşağı yönlü, geç dönemlerden erken dönemlere dek stratigrafi temsil eder Bölgelere göre, höyük, hüyük, tepe, tell, til, tumba, magula v.b isimler ile adlandırılmıştır. Höyük yapıları iklim koşulları ve yapı malzemeleriyle ilintili olarak bölgesel farklılık gösterirler.

Örneğin Anadolu'da yaygın olan taş temel kerpiç duvar sistemi Trakya'ya bakıldığında dal örgü sistemi olarak göze çarpmaktadır (Sevin, 1999:71).



Şekil 2.1. Akpazar Til Höyüğü



Şekil 2.2. Mazgirt Göktepe höyüğü

2.1.1. Akpazar Til höyüğü

Tunceli, Mazgirt'e bağlı kuşçu beldesinde yer alan Til Höyüğü, Tunceli- Elazığ karayolunun bir km. güneyinde bulunmaktadır. Yaklaşık olarak 10.110 m² alan üzerine kurulu bu yer kültür ve tabiat varlıklarını koruma kurulu tarafından 1996 yılında 1. dere**ce arkeolojik sit alanı olarak** ilan edilmiştir, ancak iligili yer üzerine herhangi çalışma yapılmamıştır. (URL-1, 2024). İlgili yapı Erzurum Kültür ve Tabiat Varlıklarını Koruma Bölge Kurulu'nun 12.07.1996 tarih ve 787 sayılı kararı ile koruma altına alınmıştır.

2.1.2. Göktepe höyüğü

Tunceli- Elazığ illeri arasında kalan Göktepe Höyüğü, Mazgirt'e bağlı Göktepe Köyünün önündeki keban baraj sahasının önünde yer almaktadır. Tahmini büyüklüğü 2575 m² olan bu höyükde atıl durumda bulunmaktadır.(URL-2, 2024). Höyük' te bugüne kadar herhangi bir kazı yapılmamıştır. Zaman zaman yapılan kaçak define kazıları höyük için tehlike oluşturmaktadır. 2004 yılına kadar kolluk kuvvetleriyle korunan alan Erzurum Kültür ve Tabiat varlıklarını Koruma Bölge Kurulu'nun 27.04.1988 tarih ve 425 sayılı kararı ile koruma altına alınmış olmasına rağmen atıl durumdadır.

2.2. Kaya Mezarları ve Mağaralar

Kaya mezarları, toplumda yüksek mertebede bulunan kişiler için oluşturulmuş, oyulmuş ve işlenmiş kayalar ile yapılan mezarladır. (URL-3, 2024), mağaralar ise, ışık ile bağlantısı kaybolacak kadar derinlik mesafesine ve girilebilecek hacme sahip olan doğal oluşumlardır.



Şekil 2.4. Gelin odaları Pülümür



Şekil 2.5. Çemişgezek İn delikleri



Şekil 2.6. Kral Kızı kaya m.



Şekil 2.7. Çemişgezek kaya m.

2.2.1 Gelin Odaları (Mağaralar) Pülümür

Tunceli'nin Pülümür ilçesinde bulunan Gelin Odaları ilçe merkezine 3 km mesafede bulunmaktadır. Urartular tarafından yapıldığı düşünülen bu mağaralar Kültür ve Tabiat Varlıklarını Koruma Yüksek Kurulu tarafından 13.02.1986 tarih ve 1839 sayılı karar ile tescillenmiştir. İçerisinde bir kral tahtı ve zindanın olduğu bu odalar kaya içinin oyulmasıyla oluşturulmuş derinlere inen merdivenler sayesinde Pülümür çayına kadar inmektedir.

2.2.2. Çemişgezek İn Delikleri

Kimler tarafından yapıldığı bilenmemekle beraber Urartular dönemine ait olduğu sanılan yer. Üç kat halinde belirli bir düzene sahip odalar, büyük ışıklıklar ile uzun koridorlardan oluşmaktadır. Odalar 2.5 genişlik ve 1.7 metre derinlikte yapılmıştır. Ayrıca su gereksinimini karşılamak üzere, kayaların arasından sızan suların toplandığı sarnıçlar, yukarıdaki odalara ulaşmak için kayalardan yapılan merdivenler ve galeriler bulunmaktadır. İki kısımdan oluşan İn deliklerinin birinci kısmına dışarıdan merdivenle çıkılmaktadır. İkinci kısım çok dar olup, girişinde bir bekleme yeri mevcuttur. Bekleme yerinden sonra merdivenle uzun bir koridora çıkılmaktadır. Koridorun sağında ışık için pencereler, pencerelerin tam karşılarında oda kapıları yer almaktadır. Bu odaların bir kısmı düz tavanlı, bir kısmı ise tonoz biçimindedir. Bu odaların en üstünde daha zor çıkılabilen ve diğerlerine göre daha büyük olan oda Bey Odası olarak adlandırılmaktadır". (Kültür envanteri, 2009) Erzurum Kültür ve Tabiat Varlıklarının Koruma Bölge Kurulu 28.12.2002 tarih ve 1322 sayılı karar ile tescil kararı alınmıştır.

2.2.3. Kral Kızı Kaya Mezarları

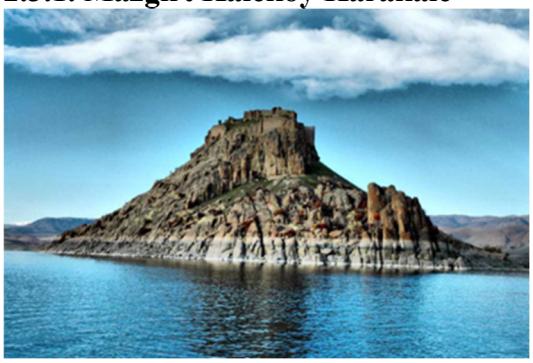
Tunceli ili, merkez ili, lazvan Köyünün batı bölümünde, bulunan ve Kral Kızı Mağarası olarak bilinen Kaya Mezarları kayalık bir bölgede yer almaktadır. İçeri girişin mümkün olmaması ile beraber aşağı kısımda bulunan ve yaklaşık 2 m. Genişliğinde güney kısmıda girişi olan mezar odasının derinliği 1.5 m. civarı iken, içte başka bir mekan varmış hissi yaratan niş izlerine rastlanılmaktadır. Kültür varlığı özelliği gösterdiğinden 3386 sayılı yasa ile değişik 2863 sayılı yasa gereğince ‘’ koruması gerekli taşınmaz kültür varlığı’’ olarak 2001 yılında Erzurum Kültür ve Tabiat varlıklarını Korunma Kurulu tarafından tescil edilerek koruma altına alınmıştır.

2.2.4. Çemişgezek Kaya Mezarları (Çukur Mahallesi)

Urartu dönemine ait olduğu sanılan yapı 3386 satılı yaza ile değişik 2863 sayılı yasa gereğince I. Derece Arkeolojik Sit Alan’ ı olarak tescil edilmiştir. Yapı hakkında yapılan bir çalışmaya rastlanılmamaktadır.

2.3. Kale ve Kiliseler

2.3.1. Mazgirt Kaleköy Karakale



Şekil 2.8. Pertek Kalesi



Şekil 2.9. Mazgirt Kaleköy Karakale



Şekil 2.10. Mazgirt Gölbağı Kilisesi



Şekil 2.11. Mazgirt Kale Kilisesi



Şekil 2.12. Ergen Kilisesi Tunceli

Kaleler korunma amacıyla ve kullanılan, yüksek duvarladan oluşan yapılardır. Mazgirt İlçesi, Kale Köyü sınırları içerisinde bulunan ve Karakale olarak adlandırılan yapı kalıntısının üzerinde yer aldığı alan Urartu dönemi Kült alanı olması nedeniyle 3386 yasa ile değişik 2863 sayılı yasa gereğince Erzurum Kültür ve Tabiat Varlıklarını Koruma Kurulu tarafından 2001 yılında "I. Derece Arkeolojik Sit Alanı" olarak ilan edilmiş ve koruma altına alınmıştır. Mazgirt İlçe merkezinin doğusunda, ilçeye 20 km. uzaklıkta olan kale köyünde bir tepe üzerinde kurulmuştur. Merdivenlerinin büyük bölümü zarar görmüştür. Giriş kapısının yan kısmına oyulmuş çivi yazılarının büyük oranda korunmuştur. Kalenin giriş kapısı ve iç bölümleri kayalar oyularak inşa edilmiştir. İç kısımda sarnıç bulunmaktadır.
Pertek ilçesinin güneyinde, Murat Irmağının kıyısında ki bir tepenin üzerinde inşa edilen Pertek Kalesi, Bu bölgenin Keban Baraj Gölü altında kalması nedeniyle bir ada görünümünde kalmıştır. Osmanlılar döneminde onarım gördüğü bilinen kalenin yapım tarihi kesin olarak bilinmektedir. 1071 yılından sonra yöreye hakim olan Mengüç oğulları tarafından yaptırıldığı sanılmaktadır. İç içi iki surdan oluşan kalede, surlar arasında yapı kalıntılar bulunmaktadır. Kalenin güney cephesindeki yontma taşların arasına kondurulmuş kırmızı sert tuğlalar ve serpiştirilmiş mavi çiniler vardır. Kalenin içinde bir sarnıç ve bina yıkıntıları mevcuttur. Yapı 2017 yılında restorasyon görmüştür.

2.3.3. Mazgirt Gölbağı Kilisesi

Mazgirt'te bulunan Ermeni kilisesi kesme ve moloz taş karışımı bir yapı olup, dört yapraklı yonca planındadır. Beşik Tonozlu girişten kubbeli ana mekana girilir. Doğudaki apsis yarım kubbeyle örtülüdür. Yapım tarihi kesin olarak bilinmeyen kilisede, 18.yüzyıla ait olduğu sanılan freskler bulunmaktadır. Tescilli olan kilisenin tabanı çökmüş olmakla birlikte duvarları halen sağlamdır.

2.3.4. Mazgirt Kale Kilisesi

Mazgirt ilçe merkezinin kuzeyinde, ilçeye hakim bir tepe üzerinde kurulu bulunan ve bugün büyük ölçüde yıkılmış olan kale alanı içerisinde bulunan kilisesin sadece bir duvarı ayak ta kalmıştır. Kültür ve Tabiat Varlıklarını Koruma Yüksek Kurulu tarafından 13.02.1986 tarih ve 1839 sayılı karar ile tescillenmiştir.

2.3.5. Tunceli Hozat Ergen Kilisesi

Henüz tecil bekleyen bu yapı Tunceli ilinin mevcutta bulunan en büyük kiliselerinden biri olmaktadır. Taşlarının sökülüp götürülmesi, kaçak define kazıları gibi olumsuzluklardan büyük zarar gören yapının içerisinde bir adet ermeni mezarı bulunmaktadır. Bu mezar kilisenin orta kısmında yer almaktadır. Yapılan yol çalışmaları esnasında kiliseye ait olduğu düşünülen bir tünel bulunmuş fakat alana giriş sağlanamadığından herhangi bir çalışma yapılmamıştır.

2.4. Tunceli İli Tarihi Köprüleri



Şekil 2.13. Tahar Köprüsü Tunceli



Şekil 2.14. Hatun K. restorasyon öncesi



Şekil 2.15. Hatun Köprüsü Tunceli- restorasyon sonrası

2.4.1. Çemişgezek Yusuf Ziya Paşa (TAHAR) Köprüsü

Köprünün güney bölümünde tahrip olmuş kitabe mevcuttur. Bu kitabede ‘’1222/1807tarihi okunabilmektedir. 1307(1891-1892) tarihli Mamuret-ül'aziz Salname'sinde, Çemişgezek'e 3km.mesafede Tağar Suyu üzerindedir. Gayet sanatkarane ve metindir. Yusuf Ziya Paşa tarafından 1222/1807'de yaptırılmıştır.‘’ (Ankara,1975) ibaresi geçmektedir. Bütün Yönleriyle Çemişgezek (Ankara-1997) adli kaynakta ise köprünün 1856 yılında Diyarbakır Valisi Akif Pasa tarafından tamir ettirildiği belirtilmektedir. ilçeye 3 km. uzaklıkta, Tahar Çayı üzerindeki taş köprü tek sivri kemerli, tek gözlüdür. Kesme taş malzeme ile yapılmıştır. Yapının boyu 55 m., uzunluğu 30 m., yüksekliği 9 m., kemer açıklığı 16 m. Ve genişliği 4.30 m’dir. Köprünün üst kısmında 70 cm. yükseklikte korkuluklar yer almaktadır. Bugün dahi ulaşım amaçlı kullanılmaktadır. 14.03.1980 tarih ve 11789 sayılı karar ile tescillenmiştir. Yapı durumu iyi durumdadır. 14.03.1980 tarih ve 11789 sayılı karar ile tescillenmiştir.

2.4.2. Pülümür Hatun Köprüsü

Yapılış Tarihi tam olarak bilinmeyen buna karşın Selçuklu döneminde yapıldığı düşünülen bu kemer köprü yılların yıpratıcı etkisine uğramıştır. Kültür Tabiat varlılarını Koruma Yüksek Kurulu tarafından 13.02.1986 tarih ve 1839 sayılı yasa ile tescillenmiştir. Köprü 12.60 m boy ve 5.50 metre genişliğe sahiptir iki ayağı arasındaki uzunluk 8m köprünün kalınlığı ise 90 cm'dir. Maalesef yapılan tartışmalı restorasyon sonucu yapı kimliğini tamamen kaybetmiştir.

4. SONUÇ VE ÖNERİLER

Tunceli ilinde tescil edilmiş çok sayıda somut kültürel miras çeşitliliği olsa da turizm kazanımı açısından restorasyon ve bakım çalışmaları çok azında mevcuttur. Maalesef az sayıda yapılan restorasyon çalışmalarında ise yapı kimlikleri ciddi zararlar görmüştür. Restorasyon yapacak firmaların mutlak bir denetimden geçmesi gerekirse her yaptıkları işlemin denetlenmesi gerekmektedir. Bu firmaların yapacağı hatalı işlemlerde cezaların yüksek düzeye ulaşması ve bu işten men edilmesi işin ciddiyetini şüphesiz artıracaktır. Ayrıca restorasyon çalışmalarının yavaş olması ve maliyeti nedeniyle alternatif çözümler üretilebilir. Teknoloji yardımıyla oluşturulacak bir sanal gerçeklik müzesinde ilimizin yapıları bire bir dönem koşullarına göre modellenip ziyaretçilere sunulabilir. Bu sayede ziyaretçiler ilin restore edilmesi beklenen yapılarını dönem koşullarına uygun olarak deneyimleyebilirler ve Tunceli İl turizmine yeni bir gelir kapısı açılabilir

5. KAYNAKLAR

Ateş, N., 1997. Bütün yönleriyle Çemişgezek. *Vakıflar Dergisi,* 2:88-89.

Bahçeci, M., 2006. Arkeolojik alanların yönetiminde uygun ve yararlı bir araç olarak arkeolojik alan sunumu; İzmir Urla, Limantepe yönetim modeli. Homer Kitabevi. İstanbul, 186s.

Bayram, S., 1971. Türk-İslam kültür ve medeniyeti - Turk's and Islamic civilizatioan, Foundations, Art, historical art, History. Önasya Dergisi, 7:16.

Çulpan, C., 1997. Türk taş köprüleri. Türk Tarih Kurumu Yayınları, Ankara, 88-89s.

Güles Kökek, D., 1970. Sanat Tarihi Yıllığı, https://dergipark.org.tr/tr/pub/iusty/article/1065408.

Harman, M., 2016. Dünden bugüne kalan; Tarihi eserleriyle Tunceli. Payda Yayınları, 86s.

Macmillan, D., 1994. Here Stand Our cultural Heroes, But Have They Stoodin Vain?, Editied by Fladmark, J.m., Cultural Tourism, Donhead Publishing, United Kingdom pp.7587.

Şeref Han., 1971. Şerefname I. Çeviri: M. Emin Bozarslan. Hasat Yayınları, İstanbul, 190s.

T.C. Tunceli Valiliği, 2009. Tunceli kültür envanteri. Tunceli Özel İdaresi Yayınları, 68-72s.

URL-1, 2024. Til Höyüğü, Kültür Portalı (kulturportali.gov.tr)

URL-2, 2024. Göktepe Höyüğü - Tunceli - Sosyal Bilgiler

URL-3, 2024. Tarihi mekanlar kişisel ansiklopedi Erol Şaşmaz (Türkiye'nin Tarihi eserleri.com)

URL-4, 2024. https://www.firatikesfet.com/tr/detail/tunceli/ergen-kilisesi

Uzun, C., 2018. Osmanlı döneminde Çemişgezek şehri Fırat Üniversitesi Sosyal Bilimler Dergisi, 28(1):261-279

Vakıflar Genel Müdürlüğü Arşivi, Dosya No: 200/1099

Yıldırım, A., Şimşek, H., 2021. Sosyal bilimlerde nitel araştırma yöntemleri. Seçkin Yayıncılık, 182s.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

BETON GÜVENLİK BARİYERLERİNİN KARBON FİBER TAKVİYELİ POLİMER KUMAŞ KULLANILARAK GÜÇLENDİRİLMESİ

Ayhan Öner YÜCEL
Aydın Adnan Menderes University, Faculty of Engineering, Department of Civil Engineering
ORCID: 0000-0001-5888-2809

ÖZET
Karbon fiber takviyeli polimer (CFRP) uygulamaları, yapısal elemanların güçlendirilmesinde yaygın olarak kullanılan metotlardan biridir. Beton bariyerlerin, özellikle köprü üstlerinde ve karayollarının virajlı kesimlerinde ağır vasıtaların yoldan çıkmasını önlemek ve araçları yol platformunda tutmak gibi önemli fonksiyonları vardır. Beton bariyerlere araç çarpması durumunda oluşabilecek deformasyonları ve hasarı minimize etmek için CFRP uygulanması makul bir alternatif olarak düşünülmektedir. Bu çalışmada, sonlu elemanlar analizleri kullanılarak CFRP kumaşlarla beton bariyerlere yapılan güçlendirmenin, araç davranışı ve bariyerde oluşacak deformasyonlar ve hasara etkileri incelenmiştir. Bu analizlerde, 10 ton ağırlığında ağır yük taşıtı (HGV) modeli 90 km/h hızda ve 15 derece açıyla beton bariyer modellerine çarptırılmıştır. Bu çalışmada toplamda 3 farklı beton bariyer tipi kullanılmış olup, ilk model orijinal beton bariyer sistemi, ikincisi donatı bağlantıları değiştirilerek zayıflatılmış beton bariyer ve son olarak zayıflatılmış beton bariyerin CFRP kumaş uygulanılarak güçlendirilmiş halidir. Bu bilgisayar simülasyonlarıyla CFRP kumaşlarla güçlendirilen bariyerin performansı diğer durumlarla karşılaştırılmıştır. Elde edilen sonuçlar, CFRP kumaş uygulamasının bariyerde oluşacak hasarı ve deformasyonları azalttığını göstermiştir. İleriki çalışmalarda, kritik yol kesimlerinde ve ağır vasıtaların risk oluşturduğu noktalarda mevcut beton bariyerlerin performansını geliştirmek için CFRP uygulama detaylarını değerlendirmek için tam ölçekli gerçek çarpışma testlerinin yapılması önerilmektedir.
Anahtar Kelimeler: CFRP, Beton bariyer, Sonlu elemanlar analizi, Çarpışma simülasyonu, LS-DYNA.

STRENGTHENING OF CONCRETE SAFETY BARRIERS USING CARBON FIBER REINFORCED POLYMER SHEETS

ABSTRACT
Carbon fiber reinforced polymer (CFRP) applications are commonly used in the strengthening of structural elements. Concrete barriers, especially those on bridges and curved sections of highways, serve crucial functions, such as preventing heavy vehicles from veering off the road and keeping vehicles on the road platform. Applying CFRP to concrete barriers is considered a reasonable alternative to minimize potential deformations and damage in the event of a vehicle collision. In this study, the effects of strengthening concrete barriers with CFRP sheets on vehicle behavior and the resulting deformations and damage to the barriers were investigated using finite element analyses. In these analyses, a 10-ton Heavy Goods Vehicle (HGV) model was crashed into concrete barrier models at a speed of 90 km/h and an angle of 15 degrees. A total of three different types of concrete barriers were used in this study. The first model is the original concrete barrier system, the second is a weakened concrete barrier with altered reinforcement connections, and the third is the weakened concrete barrier strengthened by the application of CFRP sheets. With these computer simulations, the performance of the barrier reinforced with CFRP sheets was compared to the other cases.

The results obtained showed that the application of CFRP sheets reduced the damage and deformations in the barrier. In future studies, it is recommended to conduct full-scale real crash tests to evaluate the details of CFRP application for enhancing the performance of existing concrete barriers at critical road sections and areas prone to risks from heavy vehicles.
Keywords: CFRP, Concrete barrier, Finite element analysis, Crash simulation, LS-DYNA.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

CULVERT BOX CONSTRUCTION STAGES, IMPORTANT PROBLEMS, SITE SELECTION CRITERIA AND SOLUTION SUGGESTIONS

Abdullah HAMEDY
Karabük University, Faculty of Civil Engineering, Department of Hydrology
ORCID: 0009-0002-9153-0455

Ertugrul ESMERAY
Karabük University, Faculty of Civil Engineering, Department of Hydrology
ORCID: 0000-0003-0460-447X

Abstract
Box culverts are crucial for managing water flow under road infrastructures, especially in challenging areas. They offer high resistance to natural factors, extending the lifespan of roads. Constructed from reinforced concrete, box culverts provide superior durability against both horizontal and vertical forces. The key materials used in their construction include gravel, sand, cement, water, and iron.
The implementation of box culverts requires a thorough assessment of local conditions such as soil, weather, and topography. Site preparation involves removing obstacles, excavation, and leveling the ground. Proper site selection is essential, involving the evaluation of water flow intensity, seasonal soil erosion, and the passage of high-tonnage loads. These factors are incorporated into the design calculations to ensure that the culverts can withstand horizontal and vertical forces and natural elements effectively.
Choosing high-quality materials and adhering to engineering standards, based on codes from construction organizations tailored to local conditions, enhances the longevity and durability of the culverts. This comprehensive approach ensures effective water management and the resilience of road infrastructure. By thoroughly evaluating and preparing the site and selecting the best materials, box culverts can significantly improve water flow control and road stability in various environments, thereby ensuring sustainable infrastructure development and maintenance.
Keywords: Culvert, Location Determination, Selection Criteria.

1. Introduction
Throughout history, culverts have been essential structures for facilitating water passage across obstacles like rivers, streams, and roads. The earliest examples of box culverts were simple and made from local materials such as stone or wood. However, with advancements in technology and engineering, various shapes and sizes of box culverts are now constructed using materials such as precast and cast-in-place concrete. [1,2].
Today, box culverts are considered primary solutions in hydraulic engineering due to their efficiency in facilitating water flow and their significant economic advantages. Modern design and implementation processes leverage technologies such as structural analysis and hydraulic simulations to optimize performance. The main purpose of culvert design is to ensure smooth water flow, prevent blockages and damage, and provide consistent water transfer. This is achieved by carefully calculating the dimensions and positioning of the culverts to match the hydraulic requirements of the specific site. [3].

The challenges posed by construction sites and the necessity to maintain consistent dimensions necessitate thorough pre-construction research on box culverts. Engineers must assess the site conditions, including soil type, water flow patterns, and environmental impact, to design culverts that will withstand local conditions. Environmental and economic factors should be planned for over a hundred years, considering the potential for changes in water flow due to climate change or urban development. Regular maintenance and inspections are crucial to ensure the longevity of these structures, as neglected culverts can lead to catastrophic failures and costly repairs. [4,5]. Quality material selection, such as reinforced concrete, prestressed concrete, or steel, profoundly influences the durability and performance of culverts. Proper material selection should take into account factors such as durability, corrosion resistance, and environmental compatibility. For instance, in areas prone to acidic water, materials resistant to corrosion should be prioritized. Additionally, the choice of materials affects the overall sustainability of the project, with an emphasis on using environmentally friendly and recyclable options where possible. [4,5].

Adhering to established design standards and specifications is crucial to ensuring the structural adequacy and hydraulic performance of box culverts. Quality control measures during production and installation play a critical role in detecting and preventing defects. This includes thorough testing of materials, monitoring of construction processes, and ensuring that all components meet the required standards. Implementing quality assurance programs, which include regular inspections, testing procedures, and comprehensive documentation, helps maintain consistent quality and performance throughout the entire life cycle of the culverts. [6].

Long-term maintenance, which includes regular inspections, cleaning, and repairs, plays a crucial role in preserving the quality and functionality of box culverts over time. Inspections should be carried out periodically to detect signs of wear and tear, blockages, or structural damage. Cleaning processes help remove debris that can obstruct water flow and cause flooding or structural damage. Repairs, whether minor or major, should be conducted promptly to prevent small issues from escalating into significant problems. Collaborating with construction and hydraulic engineering experts is essential for ensuring project success and optimizing the performance of the culverts. Effective management and maintenance of these structures are vital in preventing accidents and minimizing economic losses. [7,8].

By incorporating advanced technologies and adhering to rigorous standards, the engineering community can continue to enhance the effectiveness and reliability of box culverts. As urbanization and environmental challenges evolve, so too must the approaches to designing and maintaining these critical infrastructure components, ensuring they meet the needs of future generations.

2. Culvert construction stages,

Before initiating any construction project, it is crucial to conduct a comprehensive site assessment and carry out detailed mechanical design. This process includes evaluating the site conditions, determining the appropriate size and placement of project components, and ensuring that all engineering requirements are met. Additionally, securing all necessary permits and ensuring compliance with local regulations and building codes is essential for obtaining the required approvals from relevant authorities. Adhering to environmental regulations is also vital to minimize the project's impact on the surrounding area [9].

2.1. The procurement of construction materials, meticulous planning of operations, scheduling, and addressing the technical aspects of the project play a significant role in the successful execution of the project. Given the substantial financial investment required for construction projects, meticulous planning and precise execution are imperative. Contractors must strictly follow the project plan to effectively manage logistics and transportation, ensuring that materials and resources are delivered and utilized efficiently [10]. Furthermore, continuous monitoring and adjustment of the project plan may be necessary to address any unforeseen challenges or changes in scope, ensuring that the project remains on track and within budget.

2.2. Maintaining a construction site, especially in urban areas, involves minimizing disturbances from noise and light to reduce their impact on neighbors. Ensuring that all necessary permits are obtained and regulations are followed is critical. The site must be cleared of vegetation, debris, or obstacles, and excavations must be carried out according to the plan. Proper site marking, ground leveling, and soil compaction are necessary to create a solid foundation. Filling and compacting the surrounding area with suitable materials such as gravel or compacted soil is vital to prevent settling and ensure structural integrity. Control measures to prevent erosion and restore vegetation, if needed, must be implemented. Throughout the construction process, each phase must be carefully inspected to ensure that design specifications and regulatory requirements are met and any issues are promptly addressed [11].

2.3. Rebar Placement, the key considerations for placing rebar between the boxes include ensuring alignment with design requirements [12,13]. These requirements typically specify the type, size, and spacing of rebar based on expected loads and environmental conditions. Proper spacing and adequate concrete cover for rebar are essential to prevent corrosion [14]. Various techniques, such as using support chairs and spacers, can ensure correct rebar placement. Continuous inspection and quality control measures are crucial to verify that rebar placement adheres to specifications [15].

2.4. Concrete Pouring, pouring concrete for box culverts is a vital process. Initially, the box culvert is placed on a suitable foundation, and forms are constructed [16]. Concrete is poured using a mixer, then leveled and compacted uniformly using vibrators and leveling tools. After pouring, the concrete surface is leveled and left to cure properly before removing the forms [17]. The curing process, which involves keeping the concrete moist, enhances its strength. For instance, fresh concrete can be covered with wet clothes or plastic sheeting to maintain moisture [18].

2.5. Backfilling and Final Inspection, after positioning the culvert, the area around it is backfilled with soil and compacted to increase stability and load-bearing capacity [19]. Post-backfilling, the surface is graded and stabilized. Finally, the box culvert's structural integrity, dimensions, alignment, clearances, and safety features are checked. Additionally, environmental impacts are assessed, and all necessary documentation is completed [20,21]. These steps ensure the box culvert's safety, performance, and compliance with legal requirements [22].

3. Important Problems,

Box culverts are critical infrastructural elements designed to facilitate the passage of water beneath roads, railways, and various other structures. Their primary function is to ensure that these essential systems remain operational and safe under a range of hydrological conditions, including both normal and extreme weather events [23,24]. Despite their importance, box culverts face several significant challenges that can affect their effectiveness.

One of the most pressing issues with box culverts is their hydraulic capacity. Hydraulic capacity refers to the ability of the culvert to handle and convey water without causing adverse effects such as flooding. When a box culvert's hydraulic capacity is insufficient, it can result in severe problems, including localized flooding during periods of heavy rainfall or high-water flow conditions. This problem is often exacerbated by factors such as sediment buildup, which can accumulate over time and reduce the effective cross-sectional area of the culvert. Debris accumulation from environmental sources, including leaves, branches, and litter, can further obstruct water flow, compounding the risk of flooding. Additionally, box culverts that are undersized relative to the drainage areas they are meant to serve are more susceptible to these issues, as they may not be able to handle the increased water volume effectively. The situation is made worse by urbanization, which introduces a higher volume of runoff due to increased impervious surfaces like asphalt and concrete. As urban areas expand, the demand on drainage systems increases, highlighting the critical need for thoughtful design, regular inspection, and proactive maintenance to manage flood risks and ensure the ongoing effectiveness of these vital structures [25,26].

The dimensions of box culverts are highly variable and are tailored to meet the specific needs of each project. Typically, the width of a box culvert ranges from 1.5 meters to more than 6 meters, while the height usually spans from 1 meter to 6 meters. These dimensions can be adjusted according to specific project requirements, which may include factors such as the volume of water to be managed and the spatial constraints of the installation site. The lengths of box culverts can also vary significantly, extending from a few meters to several tens of meters, depending on the required coverage. Additionally, the thickness of the walls can range from 15 to 60 centimeters or more, which is determined by the structural requirements and the design specifications necessary to support the culvert under various loading conditions. Box culverts can be constructed in a range of shapes, including rectangular, square, and circular, and can be made from different materials such as reinforced concrete or steel. These design variations are intended to meet the specific demands of each project, including considerations of local environmental conditions, traffic loads, and durability requirements. Ensuring that these designs adhere to industry standards is essential for achieving optimal functionality and longevity of the culverts [27,28,29,30].

To effectively manage water flow within box culverts, various hydraulic control mechanisms are often incorporated. These mechanisms include hydraulic cylinders, valves, and other control systems that are crucial for regulating water flow, controlling pressure, and ensuring the efficient distribution of water through the culvert. Such systems are especially important in complex applications like irrigation channels, dams, water treatment facilities, and hydroelectric power plants. By employing hydraulic grade lines and energy equations, these mechanisms assist in managing flow rates, minimizing hydraulic losses, and maintaining the reliability of operations. Proper management of these systems helps prevent potential damage to infrastructure and ensures that the water flow remains within designed parameters, thereby protecting the culverts and the surrounding infrastructure from potential impacts of uncontrolled water flow [31,32,33,34].

Maintenance and debris clearance are essential for the preservation and functionality of box culverts. Regular cleaning is necessary to prevent blockages caused by sediment or debris, which can impede water flow and lead to operational problems. Additionally, repairs may be required to address significant damage or structural issues that arise from wear and tear, environmental stress, or accidental impacts. Effective management and planning are crucial for maintaining the integrity of box culverts over time.

This includes considering local environmental conditions, such as soil erosion and vegetation growth, as well as operational requirements to prevent issues such as structural instability and erosion. Ensuring that these maintenance practices are sustainable is vital for the long-term effectiveness and durability of the culverts [35,36,37].

4. Site Selection Criteria and Solution Suggestions

Box culverts are integral components of modern infrastructure projects, providing essential underground passages for water flow and structural support for roads, railways, and other critical transportation networks [38,39]. Their design and construction require careful consideration of a wide range of factors to ensure their effectiveness and longevity.

4.1. Design and Construction Considerations

The design and construction of box culverts involve a meticulous evaluation of several key factors. Hydrological conditions, including rainfall patterns and water flow rates, must be thoroughly assessed to determine the appropriate size and capacity of the culvert. Traffic patterns and load-bearing requirements are also crucial, as they affect the structural integrity and safety of the culvert. Geotechnical aspects, such as soil type and groundwater levels, play a significant role in determining the foundation and support structures needed. Additionally, environmental impacts must be considered to mitigate potential effects on local ecosystems, water quality, and biodiversity [40]. Long-term durability is another critical factor, requiring careful selection of materials and construction techniques to withstand environmental stresses and operational demands.

4.2. Advanced Engineering Tools and Techniques

Utilizing advanced engineering software is essential for developing precise and effective box culvert designs. Tools such as AutoCAD Civil 3D and STAAD.Pro provide capabilities for 3D modeling, structural analysis, and hydraulic flow assessments. These tools enable engineers to create detailed designs, simulate various conditions, and evaluate performance before construction begins [41,42]. Techniques like Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD) further enhance design efficiency and performance. FEA allows for the detailed analysis of structural components under various loading conditions, while CFD helps in understanding and optimizing fluid flow through the culvert. Building Information Modeling (BIM) integrates these analyses into a comprehensive digital model, improving coordination and communication among stakeholders [43,44].

4.3. Environmental Impact and Construction Management

Conducting thorough environmental impact assessments is crucial for identifying potential ecological risks associated with box culverts. This process involves evaluating factors such as biodiversity, ecosystem health, water quality, and habitat fragmentation. Effective construction management practices are essential to ensure that the culverts are built according to specifications, on schedule, and within budget. This involves meticulous project planning, resource management, and quality control. Adhering to health, safety, and environmental standards is also critical to prevent adverse effects during construction and to ensure worker safety [45,46,47]. Project managers must implement robust protocols for monitoring construction activities and ensuring compliance with regulations.

4.4. Maintenance and Emergency Response

Regular monitoring and maintenance are vital for maintaining the functionality and safety of box culverts over time. Establishing a comprehensive program for inspections, maintenance, and record-keeping helps in identifying and addressing potential issues before they escalate. Proactive maintenance strategies, such as routine cleaning and repairs, are essential to prevent blockages and structural damage.

Additionally, having emergency response plans in place is crucial for addressing unforeseen hazards or failures quickly and effectively [48,49,50]. This ensures that the culverts continue to perform their intended function and do not pose risks to the surrounding infrastructure or environment.

4.5. Conclusion

By integrating advanced engineering practices, thorough environmental assessments, and effective construction and maintenance strategies, engineers and planners can design and construct box culverts that fulfill their intended purposes efficiently. This comprehensive approach not only ensures the structural and operational integrity of the culverts but also minimizes their impact on the environment, contributing to sustainable infrastructure development and resilience in the face of evolving challenges [51,52].

References

[1] D. M. Price, T. Quinn, and R. J. Barnard, "Fish Passage Effectiveness of Recently Constructed Road Crossing Culverts in the Puget Sound Region of Washington State," *North Am. J. Fish. Manag.*, vol. 30, no. 5, pp. 1110–1125, 2010, doi: 10.1577/m10-004.1.

[2] K. Lee, J. Kim, and S. I. Woo, "Analysis of Horizontal Earth Pressure Acting on Box Culverts through Centrifuge Model Test," *Appl. Sci.*, vol. 12, no. 4, 2022, doi: 10.3390/app12041993.

[3] "Amerikan Beton Enstitüsü (ACI). (2019). ACI 543R- 19: Beton Menfezlerin Tasarımı, İmalatı ve Montajı Rehberi," p. 2019, 2019.

[4] "Amerikan Eyalet Yolları ve Ulaştırma Yetkilileri Birliği (AASHTO) (2020). AASHTO LRFD Köprü Tasarım Özellikleri," p. 2020, 2020.

[5] "American Society of Civil Engineers Guideline for Condition Assessment of the Building Envelope," p. 2019, 2019.

[7] "U.S. Army Corps of Engineers (USACE). (2013). Quality Control and Quality Assurance Procedures for Pre-stressed Concrete Construction.," p. 2013, 2013.

[8] Robert. L Peurifoy, C. J. Schexnayder, and A. Shapira, *Construction Planning, Equipment and Methods 7th Ed.* 2006. [Online]. Available: https://www.pdfdrive.com/construction-planning-equipment-and-methods-mcgraw-hill-series-in-civil-engineering-d157233084.html

[9] ASTM C1433 - 14, "Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers," *ASTM Int.*, no. November 2002, pp. 1–36, 2014.

[10] W. Gowers, "This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible. https://books.google.com," *Oxford Univ.*, vol. I, p. 60, 1895.

[11] R. M. Barker and J. A. Puckett, "Design of Highway Bridges. An LRFD Approach, 2Ed," *Architectural Engineering*. p. 1025, 2007.

[12] S. Belyaeva, O. Belyantseva, N. Safonova, and O. Vasilyeva, "Methodical foundations of the preparation of highly valued personnel for high-rise construction," *E3S Web Conf.*, vol. 33, pp. 1–9, 2018, doi: 10.1051/e3sconf/20183303021.

[13] I. A. Rubaratuka, "Influence of Formwork Materials on the Surface," *Int. J. Eng. Appl. Sci.*, vol. 4, no. 5, pp. 31–34, 2013.

[14] "Ausf u¨ hrung von Tragwerken aus Beton konsolidierte und kommentierte Fassung von DIN EN 13670 und DIN 1045-3 f u¨r die Praxis," p. 13670, 2012.

[15] "1. Johnson, Emily. 'Reinforcement Placement Techniques for Box Culverts.' Transportation Engineering Conference Proceedings, 20XX, ss. 112-125.," p. 125.

[16] E. G. Nawy, "Concrete construction engineering handbook, second edition," *Concr. Constr. Eng. Handbook, Second Ed.*, no. June, pp. 1–1563, 2008.

[17] and W. C. P. Steven H. Kosmatka, Beatrix Kerkhoff, S. H. Kosmatka, B. Kerkhoff, and W. C. Panarese, *Design and Control Design and Control of*. 2002.

[18] B. Gerwick, "Construction of Marine and Offshore Structures, Second Edition," *Constr. Mar. Offshore Struct. Second Ed.*, no. March, p. 2007, 1999, doi: 10.1201/9781420049602.

[19] K. Zdanowicz, B. Schmidt, M. Hansen, and S. Marx, "Biege- und Verbundverhalten von chemisch vorgespannten textilbewehrten Betonelementen," *Beton- und Stahlbetonbau*, vol. 115, no. 12, pp. 972–979, 2020, doi: 10.1002/best.202000039.

[20] C. Darwin, "This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible. https://books.google.com," *Oxford Univ.*, vol. XXX, p. 60, 1895.

[21] J. Brown, "This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible .," *Biol. Cent.*, vol. 2, pp. v–413, 2004.

[22] P. A. Vesilind, "Evolution of the American society of civil engineers code of ethics," *J. Prof. Issues Eng. Educ. Pract.*, vol. 121, no. 1, pp. 4–10, 1995, doi: 10.1061/(ASCE)1052-3928(1995)121:1(4).

[23] J. M. Norman, R. J. Houghtalen, and W. J. Johnston, "Hydraulic design of highway culverts.," no. 5, 1985.

[24] W. H. Hager and R. Wanoschek, "Culvert Hydraulics.," *Wasserwirtschaft*, vol. 76, no. 5, May 1986, pp. 197–202, 1986, doi: 10.3141/2060-16.

[25] F. Nhi-, H. D. S. No, J. M. Norman, R. J. Houghtalen, and W. J. Johnston, "Hydraulic Design of Highway Culverts , Second Edition Ayres Associates Ft . Collins , CO DTFH61-97-D-00025 ` Office of Bridge Technology National Highway Institute FHWA , Room 3203 4600 N . Fairfax Dr ., Suite 800 400 Seventh Street , SW Arlington , Virgi," no. 5, p. 22203, 2001.

[26] A. Sedmak, M. Ković, and S. Kirin, "Structural Integrity-Historical Context," *Teh. Vjesn.*, vol. 29, no. 5, pp. 1770–1776, 2022, doi: 10.17559/TV-20220321074430.

[27] D. A. Chin, "Hydraulic Analysis and Design of Pipe Culverts: USGS versus FHWA," *J. Hydraul. Eng.*, vol. 139, no. 8, pp. 886–893, 2013, doi: 10.1061/(asce)hy.1943-7900.0000748.

[28] M. Cooper, "Advanced Bash-Scripting Guide An in-depth exploration of the art of shell scripting Table of Contents," *Okt 2005 Abrufbar uber httpwww tldp orgLDPabsabsguide pdf Zugriff 1112 2005*, vol. 2274, no. November 2008, pp. 2267–2274, 2010, doi: 10.1002/hyp.

[29] E. Neachell, "Book Review - Environmental flows: Saving rivers in the thrid millennium," *River Res. Appl.*, vol. 30, no. January, pp. 132–133, 2014, doi: 10.1002/rra.

[30] C. D. Practices and A. O. Passage, "Culvert Designs for Aquatic Organism Passage : Culvert Design Practices," no. March, pp. 3–21, 2013.

[31] L. Fahrig, "Effects of Habitat Fragmentation on Biodiversity," *Annu. Rev. Ecol. Evol. Syst.*, vol. 34, pp. 487–515, 2003, doi: 10.1146/annurev.ecolsys.34.011802.132419.

[32] F. Majdzadeh Moghadam, "Neural Network-Based Approach for Identification of Meteorological Factors Affecting Regional Sea-Level Anomalies," *J. Hydrol. Eng.*, vol. 22, no. 3, p. 4016057, 2017, doi: 10.1061/(asce)he.1943-5584.0001472.

[33] D. Wyant, *Assessment and Rehabilitation of Existing Culverts-A Synthesis of Highway Culverts*. 2002. [Online]. Available: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_303.pdf

[34] AASTHO, "Roadside Design Guide," no. 3, p. 2018, 1996, [Online]. Available: http://trid.trb.org/view/1149216

[35] "Kaynak: Federal Highway Administration (FHWA). (n.d.). 'Traffic Analysis Tools: Traffic Volume.' Alıntı: https://ops.fhwa.dot.gov/trafficanalysistools/trafficvolume.htm".

[36] "American Society of Civil Engineers (ASCE). (2018). 'Hydraulic Design of Highway Culverts: Third Edition.' Reston, VA: ASCE Press.," p. 2018, 2018.

[37] "4 Transportation Research Board (TRB). (2010). 'Hydraulic Design of Highway Culverts.' National Cooperative Highway Research Program (NCHRP) Report 654. Washington, DC: National Academies Press . .," p. 2010, 2010.

[38] "1. Federal Highway Administration (FHWA). (2012). 'Culvert Design for Aquatic Organism Passage.' This FHWA publication provides guidance on designing culverts to facilitate aquatic organism passage, thereby reducing habitat fragmentation and maintaining e," p. 2012, 2012.

[39] A. Garg, V. K. Gadi, H. H. Zhu, A. K. Sarmah, P. Sreeja, and S. Sekharan, "A geotechnical perspective on soil-termite interaction: Role of termites in unsaturated soil properties," *Sci. Total Environ.*, vol. 895, no. May, p. 164864, 2023, doi: 10.1016/j.scitotenv.2023.164864.

[40] W. F. Kabeta, M. Tamiru, D. Tsige, and H. Ware, "An integrated geotechnical and geophysical investigation of landslide in Chira town, Ethiopia," *Heliyon*, vol. 9, no. 7, p. e17620, 2023, doi: 10.1016/j.heliyon.2023.e17620.

[41] R. E. Hunt, *GEOTECHNICAL ENGINEERING INVESTIGATION HANDBOOK, Second Edition*. 2005. doi: 10.1201/9781420039153.

[42] H. M. Alshuwaikhat, "Strategic environmental assessment can help solve environmental impact assessment failures in developing countries," *Environ. Impact Assess. Rev.*, vol. 25, no. 4, pp. 307–317, 2005, doi: 10.1016/j.eiar.2004.09.003.

[43] B. Carroll, J. Fothergill, J. Murphy, and T. Turpin, "EIA in context," *Environ. Impact Assess. Handb.*, pp. 1–12, 2019, doi: 10.1680/eiah3e.61415.001.

[44] C. Hendrickson, *Project management for construction PMBOK. department of civil and environmental engineering, carnegie mellon university, pittsburgh, PA l52l3 copyright C. Hendrickson 1998. first edition originally printed by prentice hall, ISBN 0-13-731266-0, 1989 with*. 2008.

[45] A. Windapo, *Fundamentals of Construction Download free books at Fundamentals of Construction Management*. 2013. [Online]. Available: bookboon.com

[46] B. Fryer and M. Fryer, "The Practice of Construction Management: People and Business Performance," p. 351, 2004, [Online]. Available: http://books.google.com/books?id=JbtHSNwBa8QC&pgis=1

[47] C. Systematics, "National Cooperative Highway Research Program (NCHRP) Project 25-25 , Task 67 Optimizing Conservation and Improving Mitigation Cost / Benefit : Task 1 : Literature Review and Interviews Table of Contents," pp. 1–53, 2010.

[48] A. M. Najafi, S. Salem, D. Bhattachar, and B. Salman, "An Assessment Management Approach for Drainage Infrastructure and Culverts (No. MRUTC 06-08)," *Midwest Reg. Univ. Transp. Center, Univ. Wisconsin, Madison.*, 2008.

[49] Y. Tekn, İ. K. Ü. N. İ. Vers, and Y. L. İ. S. T. E. Z. İ, "MODELLENMESİ : OKUR DİLE DERESİ ÖRNEĞİ," 2021.

[50] “UNIVERSITY OF GAZİANTEP GRADUATE SCHOOL OF NATURAL & APPLIED SCIENCES SIMULATION OF BLOCKAGE EFFECTS ON SCOURING DOWNSTREAM OF BOX CULVERTS UNDER UNSTEADY FLOW CONDITIONS IN BY,” no. March, 2018.

[51] “MARCH , 2017 M . Sc . Thesis – Civil Engineering,” no. March, 2017.

[52] “MENFEZLERİN PRO J ELENDİRİLMESİNDE TAŞKIN DEBİSİ SAPTAMA YÖNTEMLERİNİN İRDELENMESİ Şeymanur TOPUKSAK İNŞAAT MÜHENDİSLİĞİ Tez Danışmanı Prof . Dr . Tülay EKEMEN KESKİN,” 2021.

NUMERICAL STUDY OF PHYSIOLOGICAL BLOOD FLOW WITH STRETCHING CAPILLARY ON MHD MICROPOLAR FLUID

Dr. Binyam Zigta
Wachemo University, College of Natural and Computational Science, Department of Mathematics

Abstract
Numerical analysis of mixed convection flow of MHD micropolar fluid with stretching capillary in the presence of thermal radiation, chemical reaction and viscous dissipation has been studied. The governing non linear partial differential equations of momentum, angular velocity, energy and concentration are converted into ordinary differential equations using similarity transformations which can be solved numerically. The dimensionless governing equations are solved using ode45. The effect of physical parameters such as micropolar parameter, Hartmann number, microinertial density parameter, thermal radiation parameter, Eckert number, Schmidt number and chemical reaction parameter on flow variables i.e., velocity of micropolar fluid, microrotation, temperature and concentration has been discussed graphically. MATLAB code is used to analyze numerical facts. Furthermore, computational values of local skin friction coefficient, local wall coupled coefficient, local Nusselt number and local Sherwood number for different values of parameters have been investigated.
Keywords: thermal radiation, chemical reaction, viscous dissipation, micropolar fluid, similarity transformation**.**

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

STABILITY AND REGULARITY ANALYSIS OF NONLINEAR WAVE EQUATIONS WITH LOCALISED INTERNAL AND VENTCELL BOUNDARY CONDITIONS

Rayan Ikram ADDOUN
University m'hamed Bougara of Boumerdes
ORCID: 0009-0005-0467-6950

Abstract
Introduction: This paper investigates the exponential decay stability and regularity of solutions to a nonlinear wave equation with localized internal damping, characterized by a Carathéodory function and Ventcel-Dirichlet boundary conditions.
Objective: The main goal is to analyze both the stability and the regularity of these solutions within the given framework.
Methodology: The study achieves stability through exponential decay by developing new Lyapunov functions and utilizing multiplier techniques. The influence of the memory term at the boundary on the solution is also examined, adding a level of complexity to the analysis.
Conclusion: The research highlights the critical role of the memory term in boundary conditions and its impact on the solution, introducing a degree of uncertainty that must be considered in further studies.
Keywords: Exponential decay stability, regularity, nonlinear wave equation, localized internal damping, Ventcel boundary conditions.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

THE CONNECTION BETWEEN HX GROUPS AND C++ PROGRAMMING LANGUAGE

Andromeda Sonea Pătrașcu
Iași University of Life Sciences, Iași, Romania

Abstract
The Chinese mathematicians Mi Honghai and Li Honxing introduced the notion of an HX group, which represents a natural generalization of groups. Let (G,.) be a group and P*(G) be the set of all nonempty subsets of G. For any A, B from P*(G), we have AoB= {a.b/ a∈A, b ∈ B}. A non-empty subset H from P*(G) is called an HX group as G group support if (H, o) is a group with the neutral element denoted by E.
In this paper, we consider the reunion of all HX groups with dihedral group Dn as support for a fixed natural number n, and we study this new structure.
The central concept of our work is to elucidate the HX groups with the dihedral group Dn as support, leveraging the power of the C++ programming language. This provides a robust foundation for our research, ensuring its reliability and enriching our understanding of the subject.
From an algebraic perspective, composing two HX groups with the dihedral group as support is complex and time-intensive. However, our program, developed in Microsoft Visual Studio 2022 and powered by the C++ programming language, significantly reduces this complexity, demonstrating its practical efficiency.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

ESTIMATES FOR SOLUTIONS OF *DIFFERENTIAL* EQUATIONS In Unit Disc

Dr. FETTOUCH Houari
Laboratory of Pure and Applied Mathematics, University of Mostaganem, UMAB

ABSTRACT
We study the growth of solutions to a class of linear lane. Differential equations around an isolated essential singularity point. By using conformal mapping we apply some results from the complex plane to a neigh-Boyhood of a singular point. We point out that there are several similarities between the results for complex.
We assume that the reader is familiar with the fundamental results and the standard notations of the Nevanlinna value distribution theory of meromorphic function on the complex plane $\mathbb{C}$ and in the unit disc D={z∈$\mathbb{C}$:|z|<1} (1). The importance of this theory has inspired many authors to find modifications and generalizations to different domains. Extensions of Nevanlinna Theory to annuli have been made by (2) .In this paper, we concentrate our investigation near an isolated essential singular point. We start to give the appropriate definitions. Set $\mathbb{C}=\mathbb{C}\cup\{\infty\}$ and suppose that f(z) is meromorphic in $\mathbb{C}$-{z_0}, where $z_0\in\mathbb{C}$.

$$N_{z_0}(r,f) = -\int_{\infty}^{r} \frac{n(r,f) - n(\infty,f)}{t}\,dt - n(\infty,f)\log r,$$

where n(t,f) counts the number of poles of f(z) in the region {z∈$\mathbb{C}$: t≤|z-z_0|}∪{∞} each pole according to its multiplicity
Theorem: Let z_0, a, b be complex constants such that $\arg a \neq \arg b$ or $a = cb$ $(0 < c < 1)$ and n be a positif integer. Let $A(z), B(z) \not\equiv 0$ be analytic functions in $\overline{\mathrm{C}} - \{z_0\}$ with $\max\{\sigma(A, z_0), \sigma(B, z_0)\} < n$. Then, every solution $f(z) \not\equiv 0$ of the differential equation

$$f'' + A(z)e^{\frac{a}{(z_0-z)^n}} f' + B(z)e^{\frac{b}{(z_0-z)^n}} f = 0.$$

satisfies $\sigma(f, z_0) = \infty$ with $\sigma_2(f, z_0) = n$.

Keywords: Linear differential equations , local growth of solutions, isolated essential singularity.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

MATHEMATICAL ANALYSIS OF QUANTIFICATION OF POPULATION IN EPIDEMIC MODEL- - A REFERENCE TO INDUSTRIAL POLLUTION

Ashwini M Rao
Department of Mathematics, Bapuji Institute of Engineering and Technology

Basavarajappa K S
Department of Mathematics, Bapuji Institute of Engineering and Technology

Mani K S
Department of Mathematics, Bapuji Institute of Engineering and Technology

Krishnakumar T K
Department of Physics, Bapuji Institute of Engineering and Technology

Sathisha A B
Department of Mathematics, Government First Grade College

ABSTRACT
The present paper concerns the study of spread of industrial pollution which leads to cause of epidemic diseases. Analytical Formulations have been built to investigate the susceptible S(t), Infective I(t) and Removal R(t) population in the form of simultaneous ordinary differential equations. The spread of infectious disease through a population is considered where, the disease is transmitted from an infected individual to a healthy but susceptible individual at a certain stage. The case of removal and immigration is employed in the analysis to allow for the increase of susceptible at a constant rate μ. Their interactions modelled via differential equations have been solved analytically to obtain S(t), I(t) and R(t) populations involved in SIR model.
Keywords: Industrial Polltion, Epidemic, Infectious diseases

AVIAN PATHOGENIC ESCHERICHIA COLI ZOONOTIC RISK, ANTIBIOTIC RESISTANCE AND HOW TO PREVENT AND CONTROL

CHOUAIB Ahlem
Department of Veterinary Medicine, Institute of Agronomic and Veterinary Sciences, university of Souk-Ahras

ABSTRACT

Because of its heavy economic losses, antibiotic resistance, and zoonotic risk, avian pathogenic Escherichia coli (APEC) has attracted considerable attention.

Avian pathogenic Escherichia coli (APEC) as the primary causative agent or as a secondary pathogen complicating viral, bacterial, and parasitic diseases causes a number of different localized and systemic infections in avian species, resulting in considerable losses in the poultry industry, and due to genetic similarities with human uropathogenic E. coli (UPEC) and neonatal meningitis E. coli (NMEC) recent reports have suggested APEC abilities to cause urinary tract infections and meningitis in humans, on the other hand APEC serves as a reservoir of virulence and resistance genes for human Extraintestinal pathogenic E. coli (ExPEC), because these virulence and resistance genes can be transferred to humans through food animals. Thus, it is necessary to consider the zoonotic potential of APEC.

In poultry industry antibiotics are broadly used in order to prevent and treat APEC infections. According to the misuse of these antibiotics many reports have described increased multidrug resistance of APEC which may pose a high risk to humans, and that by genes resistance transmitted through the food chain to humans.

Herein, we highlight the recent advances in zoonoses' potential characteristics, antibiotic resistance, and control strategies of APEC to provide guidance for the prevention and control of avian colibacillosis.

Keywords: APEC, ExPEC, antibiotic resistance, zoonotic, control strategies.

PREVALENCE OF ANCYLOSTOMIDAE SP. IN PETS DOGS IN BELGRADE AREA

Academician Prof. Dr. Ivan PAVLOVIC
Scientific Institute of Veterinary Medicine of Serbia
ORCID: 0000-0003-4751-6760

ABSTRACT

Dogs are carriers and the true hosts to large numbers of species of zoonotic parasites like *Toxocara canis*, *Ancylostomidae* sp., *Echinococcus* sp. and etc. whose eggs they eliminate through feces and polluted public places. In the aim of evaluating the intestinal parasites fauna of pet dogs from Belgrade area, in period 2020-2022 we examined fecal samples of 504 pet animals. All animals had clinical symptoms that indicated parasitic infections (weight loss, stunted growth, foul-smelling diarrhea; feces with blood, with findings of swallowing, etc.). Fecal samples we examined with flotation methods and determination of parasite eggs was made on the basis of their morphological characteristics. During our examination presence of *Ancylostomidae* sp. were found in 43.55%. Hookworms (*Ancylostoma canininum* and *Uncinaria stenocephala*) are common infections of dogs and particularly puppies. Adult hookworms reside in the small intestine. Transmission may result from ingestion of infective larvae from the environment and additionally, in the case of *A caninum*, via the colostrum or milk of infected bitches. Infections with *A caninum* can also result from larval invasion via the skin. Skin penetration in young pups is followed by migration of the larvae via the blood to the lungs, where they are coughed up and swallowed to mature in the small intestine. However, in animals > 3 months old, *A caninum* larvae, after migration via the lungs, are arrested in the somatic tissues, eg, muscle, fat, and mucosa of small intestine. These arrested larvae may be activated during pregnancy, then accumulate in the mammary glands. Reactivation of dormant larvae, which may also occur after removal of adult worms from the intestine and for other unknown reasons, results in development of patent infections and is referred to as "larval leak." In addition to the parasites themselves important to the health of dogs, they have a great epidemiological significance (especially *Uncinaria stenocephala*).

Keywords: dogs, *Ancylostomidae* sp., epidemiology, Belgrade

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

HAEMATOLOGICAL INDICES OF BROILER CHICKS FED PALM KERNEL OIL (PKO) SUPPLEMENTED FEED

NTAGBU FOLASHADE GIFT
Department of Science Laboratory Technology,Federal College of Wildlife Management

MUHAMMAD H. G
Department of Biochemistry, Federal University

ABORISADE, W. T
Department of Microbiology, Kwara State University

BAMIGBOYE, O. F
Department of Science Laboratory Technology, Oyo State College of Agriculture and Technology

Abstract
A total of 60-day-old broiler chicks were used in this study to evaluate the haematological indices of broilers fed diets supplemented with palm kernel oil (PKO). The birds were randomly divided into five experimental treatments, each replicated twice, with 12 birds per replicate, using a completely randomized design. They were placed on formulated diets containing 100 ml/kg, 75 ml/kg, 50 ml/kg, and 25 ml/kg of PKO, respectively. A diet with 0 ml/kg PKO served as the control.
The results showed significant ($p < 0.05$) differences across all evaluated parameters. The highest percentage of PCV values was observed in T5 (31.57 %), followed by T4 (24.26 %), T3 (28.32 %), T2 (28.72 %), and T1 (22.06 %). Haemoglobin levels followed a similar pattern, except that T2 and T3 were significantly similar to T5. The highest WBC count was recorded in T5 ($10.52 \times 10^9 \pm 0.15$), which differed significantly ($p<0.05$) from the other treatment groups. T1, T2, and T3 were significantly different from each other. The highest RBC count was also recorded in T5 ($5.95 \times 10^{12} \pm 1.75$), which was significantly higher than the values obtained for the other treatments. There is no significant difference ($p>0.05$) in the RBC values among the treatments; T1 ($2.96 \times 10^{12} \pm 0.40$), T2 ($2.94 \times 10^{12} \pm 1.40$), T3 ($3.59 \times 10^{12} \pm 0.34$), and T4 ($4.00 \times 10^{12} \pm 0.29$ respectively.
The study suggests that palm kernel oil (PKO) should be included in broiler diets at levels not exceeding 25 ml/kg.
Keywords: Palm kernel oil (PKO), Broiler chicken, Haematological indices, RBC, WBC.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

A STUDY ON THE IMMUNE RESPONSE TO *Helicobacter pylori* AND HISTOLOGICAL CHANGES IN WHITE MALE RATS

Samir Sameer Hadi Al-Jabir
Graduate School of Natural and Applied Sciences, Biology PhD Degree Program, Çankırı Karatekin University
ORCID: 0000-0002-4017-8941

Asst. Prof. Müge FIRAT
Eldivan Vocational School of Health Services, Veterinary Department, Çankırı Karatekin University
ORCID: 0000-0002-3899-8078

ABSTRACT
Current study was performed investigate that immunologic effects *Helicobacter pylori* Ag (Killed Sonicated Whole Cell Antigen-*Helicobacter pylori*/KWSAg-HP) of white male rats by determining the role of delayed type hypersensitivity skin test (DTH), measuring immunoglobulin gamma (IgG) and inlerleukin-6 (IL6), counting differential white blood cells, and also study the histopathological changes of different organs in immunized and infected animals. Thirty six white male rats were weighed and divided into five groups; four groups were as the followings: G1 was immunized with 1 mg/mL of KWSAg-HP, two doses (SC) with 14 days intervals. G2 was immunized with 0.5 mg/mL of KWSAg-HP, First group two doses with 14 days intervals. G3 was immunized with $1x10^9$ CFU/mL of KWSAg-HP 1st, two doses with14 days intervals. G4 used as control sub and divided into positive and negative control groups injected post immunization with 1 mL PBS and was infected with *H. pylori* dose $1x10^7$ CFU/mL. Post immunization serum IgG, IL-6 and white blood cells count. Post immunization at day 18. Post immunization IgG and IL-6 were measured at day 28, 42 and 56 post challenges.Virulent was given orally after 18 days of immunization, to 3 rats from of the group animals were euthanized after 1 week post challenge and the post mortem examination of preserved specimens from the organs in 10% formalin solution for histopathological study.While the result of ELISA test expresses high value of Il-6 titer in 1st group was 581.33±38.68 at day 12 post immunization and the high value of IgG titer in 1st group was 56.58±6.66 at day 28 post immunization as compare with other groups G2 and G3.The histopathological findings in immunized groups showed multiple mononuclear cells infiltration with lymphoid hyperplasia and hepatic per vascular infiltration with evidence of apoptosis mainly observed in G1 group together granulomatous inflammatory reaction that seen in lung, kidney G2.

Introduction
The most common digestive diseases in the world are caused by damage due to poor diet or luxury as well as genetic and environmental influences, regardless of the developmental level. Helicobacter pylori is one of the most successful pathogens infecting humans worldwide. It is acquired in early childhood and, if not treated with antimicrobial drugs, is carried throughout life (Weyermann et al., 2006). It causes gastritis in all infected patients in both developing and developed countries (Tabatabaei, 2012) and is considered a class I carcinogen that specifically colonizes the human gastric epithelium as a unique niche, causing inflammatory diseases such as ulcers, chronic gastritis, malignant gastritis, etc.

Neoplastic diseases, mucosa-associated lymphoid tissue [MALT] lymphomas, and gastric cancer can all be caused (Kargar et al., 2011). The latter is the second most common cause of cancer-related deaths worldwide (Raei et al., 2016). Transmission occurs from person to person and can be either fecal-oral or oral-oral. Mohamed and El-Gohari (2012) found that H. pylori can be transmitted from animals to humans and that the infection rate increases with age (Chey and Wong, 2007). Calves and horses can act as reservoirs and transmitters of H. pylori (Quaglia et al., 2009). It may be a candidate for gastritis. Animal models include littermates, non-human primates, pigs, dogs, rats, cats, gerbils, and mice (Fox, 1994). Veterinarians and butchers are more likely to have high antibodies to this bacterium than others (Mohamed and El-Gohari, 2012). These bacteria have multiple virulence mechanisms, mainly the production of urease, which protects against the acidic environment by producing highly active and large amounts of ammonia, thus creating a suitable microenvironment for survival in the acid medium of the stomach. Three major gastric phenotypes have been identified: (i) gastric glandular phenotype (G type), which consists of at least one gastric epithelial cell phenotype; (ii) mixed gastric and intestinal phenotype (GI type), which has both gastric and intestinal phenotypes; and (iii) intestinal glandular phenotype (type I) (Lee, 1993).

When infected with H. pylori, specific antibodies are produced and can be found in serum and gastric fluid. Increased titers of immunoglobulin G (IgG) and immunoglobulin A (IgA) antibodies against membrane proteins (MP), flagellin, urease, lipopolysaccharide (LPS) and H. pylori adhesin A (HpaA) have been observed in infected patients. The infected gastric mucosa contains a large number of macrophages that produce nitric oxide, interleukin 6 (IL-6), interleukin 1 (IL-1), tumor necrosis factor alpha (TNF-α) and interleukin 12 (IL-12), and a T helper 1 response responsible for the production of interferon (INF), interleukin 4 (IL-4) and interleukin 5 (IL-5) (Mattsson et al., 1998). There are also immune cells that respond to H. pylori, producing IL-6, interleukin 8 (IL-8), interleukin 10 (IL-10), and (IL-12), and increasing the expression of clusters of differentiation 80 (CD80), 83 (CD83), and 86 (CD86). Another subset of cluster 4 (CD4+ T cells) are T regulatory cells that produce IL-10 and transforming growth factor (TGF) (D'Elios et al., 2004). H. pylori induces infiltration of T lymphocytes, plasma cells, mononuclear phagocytes, and neutrophils, stimulating the expression of proinflammatory cytokines such as TNF-α, IL-1, interferon-γ (IFNγ), IL-4, and IL-8. Despite the presence of specific humoral and cellular immune responses, in most cases the infection persists lifelong (Atherton, 2006).

The inability to eliminate H. pylori may be due to bacterial virulence determinants and immune evasion strategies, as well as inappropriate host immune responses. Gastric pathology appears to be closely associated with H. pylori virulence genes (Qiao et al., 2003). Previous studies worldwide have explored the relationship between dietary habits and H. pylori, many of which have been published for more than 20 years. Some studies have found that salty, pickled, fermented, or smoked foods increase the risk of H. pylori infection (Fox et al., 1999). Experimental models of gastric mucosal injury are important for studying the etiology and mechanism of injury. The use of animal models is important for evaluating the biochemical changes of H. pylori infection and studying chemotherapeutic interventions (Fukumoto et al., 2003).

A rat model of Helicobacter pylori infection was established by Zeng et al. (1998) as described. They found that the bacterium could induce chronic active gastritis at 8, 12, and 24 weeks. In addition, rats with normal mucosa were inoculated with filtrate without Helicobacter pylori and gastric ulcers were surgically created (Ross et al., 1992).

The rat is one of the most commonly used experimental animals in gastrointestinal research and its gastric physiology has been intensively studied; although other animal models of Helicobacter pylori infection have provided important information, the rat model of Helicobacter pylori infection is useful for studying pathophysiological events in the gastrointestinal tract during chronic infection and all of the above (Lee et al., 1997). The purpose of this study was to evaluate the immune response to Helicobacter pylori in rats as an animal model.

The aims of study:
Study the bacterial properties and characteristic features of H. pylori in rats.
Evaluation of the immune response of H. pylori antigens in rats (Animal models).
Study histopathological changes in the vital organs spleen, liver, lungs, kidney, stomach and small intestine.

History of *Helicobacter pylori*
In the 20th century, some researchers reported the presence of spiral-shaped microorganisms in the stomachs of animals (Bizzozero, 1893). Soon after, similar spiral-shaped bacteria were observed in humans (Krienitz, 1906), some of whom suffered from gastric ulcers or gastric cancer. The microorganism was originally called "Campylobacter-like", (CLO), "Campylobacter-like in the stomach", "Campylobacter helicobacter", and "Campylobacter pylori", but is now called Helicobacter pylori because the microorganism originates from a member of the genus Campylobacter (Goodwin et al., 1990). Causes chronic active gastritis, gastric ulcers, distal gastric adenocarcinoma, and gastric lymphoma (Ernst & Gold 2000).

Characteristics of *Helicobacter pylori*
Helicobacter pylori is a spiral or rod-shaped, highly motile, multiflagellated Gram-negative bacterium. It has 5-7 flagella at one end (Abid et al., 2015). It is oxygen sensitive and requires a microaerobic atmosphere, and the Helicobacter genus is very similar to catalase-positive Campylobacter (Tanih et al., 2008). Helicobacter belongs to this family and is mainly found in the human gastrointestinal tract (George and David, 2012). It grows in the optimum range of temperature (34 to 40°C); pH (5.5 to 8.0), but can survive at pH 4, and the main characteristic of its microaerobic requirement is that it grows at the optimal level of 2-5% oxygen, 5-10% carbon dioxide, and 85% nitrogen (Al-Mofarji, 2013). Lipopolysaccharide (LPS) is a primary component of the bacterial outer membrane, it consists of three parts: the lipid A domain, a set of core sugars, and a long chain of oligosaccharide repeats known as the O-antigen (Wang and Quinn,2010).

Epidemiology of *Helicobacter pylori*
The epidemiological significance of H. pylori is ubiquitous. It is estimated that approximately 50% of the world's population is infected with this organism. The prevalence of H. pylori infection is similar in men and women, and the bacteria are thought to remain in the body for life after infection (Duca et al., 2009). Since H. pylori is a serious and widespread infection that causes most cases of peptic ulcer (PU) and gastric cancer (GC), fecal-oral, oral, or gastrointestinal transmission of the bacteria is the most likely explanation. However, food and water are also possible (Bui et al., 2016). Most transmission occurs during childhood, most likely from mother to child and from siblings (Kivi et al., 2005; Weyermann et al., 2006);

it seems more likely that transmission occurs in situations in which gastric content can be transferred quickly from person to person for example, gastric-oral transmission is suggested in association with gastroenteritis with vomiting (Brown, 2000). Fecal–oral transmission may also be possible. H.pylori transmissions show that the majority of infections tend to occur within families through close person-to-person contact and there is a very large population of humans throughout the world that is colonized with H. pylori (Falush et al., 2003).

Helicobacter pylori a zoonotic pathogen

The possibility ofzoonosis was indirectly confirmed. They examined the risk factors of acquis ition and transmission of infection, childhood residence and parents' residence (village), consu mption of raw vegetables, presence
pets, contact with pets, consumption of raw (unpasteurized) milk (from milking animals only) during childhood, and presence of rodents near or in the house (animal impact parameters as risk factors).
These factors were significantly associated and were strong predictors of H. pylori seropositivity (Mladenova-Hristova, 2000). H. pylori infection can be considered a zoonosis. This causal relationship needs to be proven by long-term cohort studies (Mladenova-Hristova et al., 2017).

The virulence factors and associations with clinical outcomes

Virulence factors of *H. pylori* may be divided into two colonization factors; which allowed it to evade host defense, and factors that are responsible for tissue injury, colonization factors allow microorganism to establish its presence and to persist despite the host's attemptsto rid himself of infection (Xu *et al* ., 2016). There are organisms do buffer their periplasm that lies between their inner and outer membrane, in acidic pH, using their intra bacterial urease activity (Amieva, and El–Omar, 2008). In contrast with surface or free urease, measurement of intra bacterial urease activity at different pH values, shows low urease activity at neutral pH, rapid increase between pH 6.0 and 5.0, and steady activity down to a pH of 2.5 but still present at pH 2.0 (Alfarouk *et a l*., 2019).

Adherence and Colonization of *H.pylori*

Adhesion of H. pylori to the gastric epithelial mucosal an important role in the initial colonization and persistence
of the bacterium in the stomach.
Gastric colonization byH.pylori triggers humoral and cellular immune responses, but in most cases does not lead to
bacterial elimination. The bacterium has evolved a unique set of factors that actively support i ts successful survival and persistencea naturally hostile niche. The bacterium is one of the mo st diverse and versatile bacterial species known, which provides a valuable advantage in evadi ng the host immune system (Amieva et al., 2002).

Antigenic Structure of *Helicobacter pylori*

The bacterial surface is the first line of defense against stress caused byantimicrobial molecule s and changes in the bacterial environment. Many molecules on the bacterial cell surface are v irulence determinants. It is important to characterize the molecular structure of bacterial cell surfaces and understand how bacteria change this structure in response to their d ifferent environments, including that of host plants or animals (Raskov et al., 2017).

These environments are mostly heterogeneous and can be very complex,
for example due to soil type and other abiotic factors (e.g. water supply and temperature). Sig nificant differences in microenvironments may result in surface molecules (LPS) that need to be adapted to
these conditions, which undergo structural changes during commensal and pathogenic interact ions (Bäckhed et al., 2013). The role of O antigens in the pathogenesis of H. pylori in gastroduodenal diseases has been the subject of intense speculation.
It has been suggested that these structures may play a role in protecting H.
pylori from antigen-specific host defense mechanisms through molecular mimicry (Kuipers et al., 1997) and that the production of antibodies against O antigens may be induced during infection. Lewis et al. suggested that O antigens could bind to the gastric epithelium and cause autoimmune-mediated inflammation. (Appelmelk *et al* ., 1996).The expression of *H. pylori* O-antigen is subject to phase variation (Claeys *et al*., 1998).

Pathogenesis

Once in the host stomach,H.pyloriuses its urease activity to neutralize the hostile acidic condi ions at the onset of infection. Two essential nickel-containingenzymes, urease and hydrogenase, play a crucial role in the survival of this bacterium in the highly acidic gastric environment.
Ureasehydrolyzesurea into ammonia and bicarbonateto neutralize gastric acid and increase the local pH (Van Vliet et al., 2004).While hydrogenase allows *H. pylori* to utilize the hydrogen gas produced by other host flora as an energy source **(Olson and Maier, 2002)**. Flagella-mediated motility is then required for *H. pylori* to move toward host gastric epithelium cells, followed by specific interactions between bacterial adhesins and host cell receptors, which thus leads to successful colonization and persistent infection. Finally, *H. pylori* releases several effector proteins/toxins, including (CagA)and (VacA), causing host tissue damage; in addition, the gastric epithelium layer, which forms the major interface between *H.pylori* and the host, secretes chemokines to initiate innate immunity and activate neutrophils, consequently lead to the formation of clinical diseases such as gastritis and ulcer (Haiko and Westerlund-Wikström .2013). Infection and Gastric Diseases

Gastritis

Healthy stomach mucosa contains very few inflammatory cells, however when *H. pylori* colonies the stomach, polymorph nuclear cells and neutrophils migrate to the area causing acute inflammatory response (Atherton, 2006). Hypochlorhydria or reduced gastric acidity is the results of acute infection. Neutrophils, T cells, B cells and macrophages infiltrate in the gastric mucosa (Brandt *et al*., 2005).

Gastric Ulcer

Gastric ulceration (GU) is associated with a pan-gastritic inflammation pattern and reduced or normal acid production (Dixon, 2001; Atherton, 2006). GU develops most commonly at the transitional zone between antrum and body on the lesser gastric curve. *H.pylori* are found in 80% of patients with gastric ulcer (Mobley *et al*., 2001); but with normal or high acid secretion, *H. pylori* does not normally colonize the corpus because of the low pH, however, when there is low acid secretion, the colonization will be consistently spread throughout gastric mucosa (Dixon, 2000).

Duodenal Ulcer

Duodenal ulcer (DU) is associated with dense *H. pylori* infection and severe inflammation but only when inflammation is largely confined to the antrum, probably as a result of increased basal acid output and a heightened parietal cell response to stimulation. *H. pylori* are found in 95% of patients with duodenal ulcers (**Fikret et al., 2001; Atherton, 2006)**.

Gastric Cancer

Gastric adenocarcinoma is the second highest cause of cancer deaths worldwide (Abdallah, 2018); with the high prevalence of *H. pylori* infection (Oguma *et al*., 2010). Distal gastric adenocarcinoma, which is *H. pylori* associated, is more common than the proximal form, in addition, *H. pylori* cause MALT or B cell mucosa associated lymphoid tissue (MALT), lymphoma of the stomach (Moss & Malfertheiner, 2007).

Immune Response to *H. Pylori*

In the case of *H.pylori* infection, the resulting inflammation can lead to severe gastric immunopathology and cancer **(Polk, and Peek 2010)**. *H. pylori* initiate a robust immune response. TLR2 is the major innate receptor for the recognition of *H. pylori* infection and resulting inflammation. *H.pylori* Neutrophil-activating protein (HP-NAP) has been shown to be the dominant receptor for intact *H. pylori* bacteria. TLR2 is also activated by *H. pylori* **(Torok *et al*., 2005).** TLR4 (LPS receptor) and TLR5 (flagellin receptor) have also been implicated in innate immune responses to *H. pylori* **(Takenaka *et al*., 2004)**.
Activation of these innate receptors leads to activation of nuclear factor kappa-light-chain-enhancer of activated B cells (NF- κ B), cysteine aspartic proteases (caspase), and interferon pathways that result in production of pro-inflammatory cytokines such as IL-1 β , TNF-α,IL-6,IL-8, Monocyte chemoattractant protein-1 (MCP-1), and IFN β (Mandell *et al* .,2004) as well as production of cytokines including IL-12, IL-23, and IL-10 (Wang *et al*., 2010). These cytokines attract acute inflammatory mediators such as neutrophils as well as lymphocytes leading to activation of the adaptive immune response, chronic infections with
H. pylori lead to a persistent immune response by the host that contributes to gastric malignancies (Peek *et al*., 2010).

Cytokines

Cytokines are a family of small-molecular-weight, soluble proteins that activate or inhibit the function of cells; with in the cytokine family are (ILs), (IFNs), and other factors that stimulate the differentiation of stem cells in bone marrow, ILs and IFNs facilitate cross-talk between immune competent cells, which results in an alteration of biologic function. Bone marrow–stimulating factors induce the differentiation of macrophages, granulocytes and their release into peripheral blood, cytokines, (ILs), and growth factors are small-molecular- weight messengers that activate or inhibit the function of leukocytes and accelerate the maturation of precursor cells (Joscelyn, and Kasper, 2011).

Diagnosis of *H. pylori*:

H. pylori infection is more prevalent in developing countries, early diagnosis helps in early initiation of treatment and thereby eradication of *H. pylori*, endoscopic examination and biopsy is a convenient procedure for accurate diagnosis, endoscopy is incomplete without biopsy and histopathology is the gold standard for the diagnosis of

endoscopically detected lesions, endoscopic biopsy correlation is important in understanding the biology and pathophysiology of the disease, awareness of the histomorphological features that are typical of *H. pylori* gastritis would be helpful to the clinicians to identify other conditions like atrophic gastritis and intestinal metaplasia thereby prevent the progression to carcinoma. This correlation provides new information about the prevalence of the disease and thereby assists in improving patient management (Graham *et al*., 2015).

Immunological Tests:
There are numerous immunological tests could be used for measuring and estimating the cellular and humoral immune responses ; the humoral immunity involve interaction of B cells with the antigen and their subsequent proliferation and differentiation antibody secreting cells, the prevalence of *H. pylori* is usually found by using serologic tests that detect immunoglobulin G antibodies to *H. pylori* infection, although IgA and IgM antibodies have also been used (Andersen *et al*., 1996; Atherton, 1997; Brown, 2000).

Enzyme Linked immunosorbent Assay (ELISA):
The method of enzyme-linked immunosorbent assay (ELISA) is developed by Engavall and Perlmann (1971), The ELISA test has been reported to be rapid, highly sensitive, and specific by determining the IgG, IgM, and IgA antibodies in blood and cerebrospinal fluid (CSF), moreover, it has been possible to detect more positive sera, higher titers and different classes of immunoglobulins with ELISA than with standardized test (SAT)(Araj *et al*., 1986; Araj and Kaufmann, 1989).

Materials andmethods
1-Bacterial isolate:
The isolate of *Hlicobacter.pylori* was provide from **Al-Nahrain University Biotechnology Research Center.** The purification and conformation of bacterial growth as isolate of *Hlicobacter.pylori* was estimated in the Microbiology laboratory (College of Veterinary Medicine) on selective media (Columbia blood base agar)**(8)** and by the biochemical test (catalase, oxidase & urease) all tests are positive.

2-Antigens Preparation:
A-Preparation of killed whole cell antigen of *H. pylori* (KWCA-*H. P*):
Helicobacter pylori Killed whole cell antigen was prepared according to **(9)** procedure with some modification,That measured according to McFarland tube (No.3) ($1x10^9$ cell/ml) to be used for white rats immunization.
B- Preparation of killed whole cell sonicated antigen of *H. pylori* (KWCSA-*H. P*):
Killed Whole cell sonicated *H. Pylori* antigens (KWCSAg-H.P) were prepared according to **(10)** with a modification of method and used for immunity measurement by skin test ; the protein concertation of *H. pylori* sonicated antigen preparation was measured by Biuret method **(11).**
C-Experimental design of immunization:
Twenty four (24) white male rats used divided into 4 groups each one included (6) rats which injected subcantously (S/C) as following**:**
Group1 (G1): (n=6) immunized with 1 mg/ml of KWCSA-*H.P*, two doses (S/C) with 14 days intervals.

Group2 (G2): (n=6) immunized with 0.5 mg/ml of KWCSA-*H.P*, two doses (S/C) with 14 days intervals.
Group3 (G3): (n=6) immunized with $1x10^9$ cell/ml of KWCA-*H.P*, two doses (S/C) with 14 days intervals.
Group4 (G4): (n=6) negative control give 1 ml PBS (pH7.2).
Booster dose at a day 14 for all immunized groups by their antigen. DTH Skin test was done at a day 18. Blood collection from all groups at a day 12,28,42&56.

B-Enzyme –Linked Immunosorbent assay (ELISA):
1- Rat Interleukin-6 (IL-6) ELISA Kit
The test was done by using Rat IgG (immunoglobulin G) **KOMABIOTECH company (Korea).**
2- Immunoglobulin G (IgG) ELISA:
The test was done by using Rat interleukin 6 (IL-6) **KOMABIOTECH company (Korea).**
Pathological study:
Three rats of each group were scarified for pathological examination of 1 week post challenge dose Abdulla,(2002), organ specimens (stomach, liver, lung, kidney, spleen and intestine). Preparation of the tissue for histopathological study was performed according to Luna and Lee, (1968), as the followings:
1. The organs were fixed directly was performed 10% neutral buffer formalin, for at least 72hrs.
2. Processing of fixed tissue specimens by in ascending graduate concentration of ethanolalcohol 70%, 80%, 90% and 100% 2hrs for each concentration.
3. Dehydrated tissue specimens were passed into clearing step by using xylene: Two times:2hrs for each step.
4. Impregnation by liquid paraffin waxes 54-56°C for blocking of tissue specimenswasperformed and kept until hardening.
5. Sectioning by rotary microtome: used for sectioning the paraffin blocking into slices 4- 5µm thickness and fixed on clean slides for 1hrs until to dry.
6. Tissue section staining was performed with hematoxylin and eosin protocol.

CYTOMEGALOVIRUS INFECTION DURING PREGNANCY

Ali Nadhim SHNDIWE KHIKANI
PhD Student, Graduate School of Natural and Applied Sciences, Biology PhD Degree Program, Çankırı Karatekin University
ORCID: 0009-0005-4178-0722

Asst. Prof. Müge FIRAT
Eldivan Vocational School of Health Services, Veterinary Department, Çankırı Karatekin University
ORCID: 0000-0002-3899-8078

Prof. Dr. Zaytoon Abdulrida IGHEWISH AL-KHAFAJI[3]
University of Babylon, Medicine College
ORCID: 0000-0003-2070-1202

ABSTRACT
Human cytomegalovirus (HCMV) is a common DNA virus that is part of the *Herpesviridae* family, making it one of the most prevalent human infections worldwide. HCMV is one of the the largest viruses, measuring around 250 nm. HCMV possesses a large genome composed of double-stranded DNA and has the ability to establish a latent infection that endures throughout an individual's lifetime. Periodic reactivations of the virus occur over the infected individual's lifespan. HCMV is the primary viral factor responsible for congenital birth abnormalities. *In utero* exposure to cytomegalovirus that occurs during pregnancy is a notable determinant of adverse health outcomes and death in both the fetus and newborn. Cytomegalovirus infection is a prevalent and potentially severe viral illness that can affect individuals of all age groups. However, it is particularly worrisome when infected during pregnancy. The primary repercussions of this infection include neurological disorders and sensorineural hearing loss (SNHL). The prognosis of pregnancy can be determined by detecting the presence of the virus in samples of amniotic fluid or by analyzing the HCMV DNA beyond the early 20-21 weeks. Infants can have central nervous system impairment as a result of congenital cytomegalovirus (cCMV) infection. Congenital CMV infection is the prevailing congenital infection and, in the absence of genetic alterations, the primary factor contributing to sensorineural hearing loss and intellectual disability in early childhood. Women who do not have antibodies against CMV and reside in areas with a low frequency of CMV infection have a 1-3% chance of being infected, but the transfer of the virus from mother to fetus through the placenta occurs in 30-50% of cases. Congenital CMV infections, typically resulting from maternal viral illness during pregnancy, can transmit across the placenta to the infant. Most babies with congenital infections are asymptomatic, whereas around 5-10% exhibit symptoms.
Keywords: Human cytomegalovirus, congenital cytomegalovirus infection, pregnancy, fetus

THE PREVENTIVE, CANCER RISK-REDUCING, AND THERAPEUTIC EFFECTS OF THE MEDITERRANEAN DIET

Noémi Mózes
Institute of Preventive Medicine and Public Health, Semmelweis University
ORCID: 0000-0001-8632-2120

Andrea Lehoczki
Institute of Preventive Medicine and Public Health, Semmelweis University
ORCID: 0000-0001-8632-2120
National Institute for Haematology and Infectious Diseases, Department of Haematology and Stem Cell Transplantation, South Pest Central Hospital

Tamás Csípő
Institute of Preventive Medicine and Public Health, Semmelweis University
ORCID: 0000-0001-8632-2120

Mónika Fekete
Institute of Preventive Medicine and Public Health, Semmelweis University
ORCID: 0000-0001-8632-2120

János Tamás Varga
Department of Pulmonology, Semmelweis University
ORCID: 0000-0002-8552-1336

Abstract
Numerous studies suggest that the Mediterranean diet plays a significant role in the prevention and treatment of chronic diseases. This diet is rich in vegetables, fruits, whole grains, fish, and olive oil, while low in red meats and processed foods. Research has shown that this diet reduces the risk of cardiovascular diseases, type 2 diabetes, and certain cancers. The Mediterranean diet, which is rich in antioxidants and anti-inflammatory components, can contribute to strengthening the body's defense mechanisms and preventing cellular damage. The aim of this presentation is to demonstrate the preventive, cancer risk-reducing, and therapeutic effects of the Mediterranean diet, as well as to summarize the latest research findings and practical recommendations for everyday application.
Keywords: mediterranean diet; disease prevention; cancer risk reduction; antioxidants; anti-inflammation; chronic diseases
Funding: The project was funded by the Ministry of Innovation and Technology under the National Cardiovascular Laboratory Program (RRF-2.3.1-21-2022-00003) from the National Research, Development and Innovation Fund. Project, no. TKP2021-NKTA-47 was funded by the National Research, Development and Innovation Fund under the TKP2021-NKTA, with the support from the Ministry of Innovation and Technology of Hungary.

INTRODUCTION

In recent decades, the Mediterranean-style diet has become a part of the UNESCO World Heritage and is promoted worldwide as one of the healthiest dietary patterns (Madarász et al., 2023).

Research indicates that the Mediterranean diet offers protective effects against chronic non-communicable diseases associated with aging and poor lifestyle, such as cardiovascular diseases, type 2 diabetes, insulin resistance, and cancer (M. Fekete et al., 2023; Fischer et al., 2019; Koloverou et al., 2016; Schwingshackl et al., 2017). As a key component of nutritional and lifestyle therapy, adherence to the Mediterranean diet has been shown to reduce mortality, particularly cardiovascular mortality, thereby increasing life expectancy. Additionally, the Mediterranean diet is associated with a lower risk and slower progression of age-related cognitive decline and neurodegenerative diseases, especially Alzheimer's disease. Furthermore, the diet's low environmental impact represents another positive advantage of the Mediterranean dietary style. Therefore, this paper provides a detailed review of its health-preserving benefits and therapeutic effects.

RESULTS

The Mediterranean diet is particularly associated with the traditional olive-growing regions of the Mediterranean and has been linked to lower rates of chronic diseases and longer life expectancy. Characterized by high intake of plant-based foods (fruits, vegetables, grains, potatoes, legumes, nuts, and seeds), minimally processed, seasonally fresh, and locally grown foods; fresh fruits as dessert; olive oil (especially extra virgin olive oil) as the primary fat source; moderate dairy consumption; weekly intake of 0-4 eggs; low to moderate amounts of fish and poultry; minimal red meat; and moderate wine consumption during meals, the MedDiet's notable features include high consumption of nuts and olive oil, as well as moderate consumption of wine, particularly red wine.

Certain foods and components of the MedDiet, such as extra virgin olive oil and nuts, have well-documented health benefits. Recent research has increasingly focused on the combination of foods within dietary patterns, which may have additive or synergistic health-promoting effects. A common characteristic is the central role of plant-based foods and the primary use of olive oil, although other unsaturated plant oils can also be incorporated into "Mediterranean-type" dietary patterns, which are also highly healthful. The most reliable evidence pertains to cardiovascular risk factors and diseases, but potential benefits of the MedDiet have also been observed for other health outcomes, including type 2 diabetes, metabolic syndrome, obesity, cancer, cognitive decline, and cardiovascular disease mortality.

Cardiovascular Diseases

A 2019 meta-analysis demonstrated that the highest adherence to the Mediterranean diet was associated with a 30% reduction in the risk of coronary heart disease (CHD) or myocardial infarction (MI) based on 11 cohort studies (Rosato et al., 2019). Similarly, the risk of stroke was reduced by 27% according to six studies. Another systematic review and meta-analysis, involving 38 cohorts, found that adherence to the MedDiet reduced cardiovascular disease (CVD) mortality by 21%, CHD incidence by 27%, CHD mortality by 17%, stroke incidence by 20%, stroke mortality by 13%, and MI incidence by 27% (Becerra-Tomás et al., 2020).

The Lyon Diet Heart Study is a landmark in research on the health benefits of the MedDiet (de Lorgeril et al., 1999). This randomized controlled trial (RCT) showed that the MedDiet reduced the risk of myocardial infarction and cardiovascular mortality by 47%. The PREDIMED study, the largest intervention study examining the cardiovascular preventive effects of the MedDiet, randomized 7,447 participants into three groups: a MedDiet with extra-virgin olive oil, a MedDiet with nuts, and a control group (Estruch et al., 2018). After 4.8 years of follow-up, the risk of cardiovascular events was reduced by 30-28% in the MedDiet groups. Current evidence indicates that adherence to the MedDiet lowers the risk of cardiovascular outcomes.

These findings are consistent across various populations, including those outside the Mediterranean region. The benefits of the MedDiet are partly attributed to its effects on known risk factors such as diabetes, metabolic syndrome, dyslipidemia, hypertension, and endothelial function.

Diabetes and Metabolic Syndrome

Observational studies and randomized controlled trials provide strong evidence that the Mediterranean diet reduces the risk of type 2 diabetes and improves glycemic control (Jannasch et al., 2017). The PREDIMED study corroborated the findings from observational cohort studies (Salas-Salvadó et al., 2014). The MedDiet, whether supplemented with extra-virgin olive oil or nuts, reduced the risk of diabetes by 30% compared to the control group. In the ATTICA study, which included 3,042 participants, high adherence to the MedDiet was associated with a 49% reduction in the risk of diabetes diagnosis in men and a 69% reduction in women over a 10-year follow-up (Koloverou et al., 2016). Observational studies have shown that the MedDiet is beneficial for reducing the risk of metabolic syndrome (MetS), and RCTs have confirmed its role in contributing to MetS remission. A meta-analysis reported that greater adherence to the MedDiet reduces the risk of MetS by 19% (RR: 0.81; 95% CI: 0.71–0.92) (Godos et al., 2017).

Obesity

Both observational and intervention studies indicate that the MedDiet is effective for weight management, particularly when combined with energy restriction. In a large study, individuals with high adherence to the MedDiet lost 0.16 kg and were 10% less likely to become overweight or obese (Romaguera et al., 2010). The CARDIA study found similar results with reductions in waist circumference (Steffen et al., 2014). The MedDiet led to greater weight loss compared to low-fat diets. A meta-analysis showed that the MedDiet reduces waist circumference and visceral fat, especially when combined with energy-restricted diets (Bendall et al., 2018).

Cancer

Numerous observational studies have evaluated the association between adherence to the Mediterranean diet and cancer risk (de Lorgeril et al., 1998; Toledo et al., 2015). A comprehensive meta-analysis, including 117 studies with over 3 million participants, found that higher adherence to the MedDiet was associated with a reduced risk of breast, colorectal, head and neck, respiratory, stomach, bladder, and liver cancers, as well as decreased cancer mortality and mortality risk among cancer survivors (Morze et al., 2021). However, no association was observed with prostate cancer. Another meta-analysis indicated that the MedDiet reduces the risk of estrogen receptor-negative breast cancer in postmenopausal women (Schwingshackl et al., 2017).

The role of diet in COPD progression

Chronic Obstructive Pulmonary Disease (COPD) is a slowly progressing lung disease characterized by chronic airflow limitation and obstruction. Scientific research increasingly demonstrates that the quality of diet significantly impacts the progression of COPD and the decline in lung function among patients (Fekete et al., 2022). An unhealthy "Western-type diet" accelerates the deterioration of respiratory function, while the consumption of fruits, vegetables, dietary fibers, vitamins C and E, polyphenols, and β-carotene is associated with a lower risk of COPD.

Additionally, vitamin D supplementation has a positive effect on quality of life and lung function. Incorporating these components into the diet reduces the risk of developing COPD and improves the quality of life and condition of patients (Fekete et al., 2021).

Cognitive Function

Based on observational studies and some randomized controlled trials, the MedDiet has beneficial effects on cognitive function and reduces the risk of neurodegenerative diseases. Higher adherence to the MedDiet is associated with less cognitive decline and a lower risk of dementia. A recent study found that MedDiet followers were 36% less likely to report worse subjective cognitive function compared to those with lower adherence to the MedDiet (Bhushan et al., 2018). In the PREDIMED study, the MedDiet plus extra-virgin olive oil and MedDiet plus nuts groups achieved better cognitive outcomes than the control group (Martínez-Lapiscina et al., 2013). Further research is needed to fully understand the impact of the MedDiet on the underlying pathology of Alzheimer's disease.

Longevity

Observational studies suggest that the Mediterranean diet contributes to increased longevity and may reduce mortality from all causes. According to a 2019 meta-analysis, adherence to the MedDiet was associated with a 10% reduction in all-cause mortality. Additionally, longer telomere length, a biomarker of aging, is associated with adherence to the MedDiet, indicating a potential slowing of biological aging (Soltani et al., 2019).

CONCLUSION

Recent studies have confirmed that the Mediterranean diet has beneficial effects on cardiovascular health, reducing cardiovascular diseases, obesity, hypertension, metabolic syndrome, and dyslipidemia. The MedDiet also lowers the incidence of diabetes and improves glycemic control. Prospective studies indicate that adherence to the MedDiet reduces mortality, particularly cardiovascular mortality, and alleviates cognitive dysfunction, such as the progression of Alzheimer's disease. The latest evidence supports the MedDiet's benefits in cardiovascular diseases, type 2 diabetes, metabolic syndrome, and breast cancer. The evaluation of the MedDiet's effects based on observational and interventional studies is well-supported, particularly in reducing cardiovascular risks. Transforming food systems and promoting sustainable lifestyles globally are necessary. The MedDiet represents not only a healthy diet but also a sustainable food system compatible with the agricultural resources and cultural traditions of a given country.

References

Becerra-Tomás, N., Blanco Mejía, S., Viguiliouk, E., Khan, T., Kendall, C. W. C., Kahleova, H., Rahelić, D., Sievenpiper, J. L., & Salas-Salvadó, J. (2020). Mediterranean diet, cardiovascular disease and mortality in diabetes: A systematic review and meta-analysis of prospective cohort studies and randomized clinical trials. Crit Rev Food Sci Nutr, 60(7), 1207-1227. https://doi.org/10.1080/10408398.2019.1565281

Bendall, C., Mayr, H., Opie, R., Bes-Rastrollo, M., Itsiopoulos, C., & Thomas, C. (2018). Central obesity and the Mediterranean diet: A systematic review of intervention trials. Critical reviews in food science and nutrition, 58(18), 3070-3084.

Bhushan, A., Fondell, E., Ascherio, A., Yuan, C., Grodstein, F., & Willett, W. (2018). Adherence to Mediterranean diet and subjective cognitive function in men. EUROPEAN JOURNAL OF EPIDEMIOLOGY, 33, 223-234.

de Lorgeril, M., Salen, P., Martin, J.-L., Monjaud, I., Boucher, P., & Mamelle, N. (1998). Mediterranean dietary pattern in a randomized trial: prolonged survival and possible reduced cancer rate. Archives of internal medicine, 158(11), 1181-1187.

de Lorgeril, M., Salen, P., Martin, J. L., Monjaud, I., Delaye, J., & Mamelle, N. (1999). Mediterranean diet, traditional risk factors, and the rate of cardiovascular complications after myocardial infarction: final report of the Lyon Diet Heart Study. Circulation, 99(6), 779-785. https://doi.org/10.1161/01.cir.99.6.779

Estruch, R., Ros, E., Salas-Salvadó, J., Covas, M. I., Corella, D., Arós, F., Gómez-Gracia, E., Ruiz-Gutiérrez, V., Fiol, M., Lapetra, J., Lamuela-Raventos, R. M., Serra-Majem, L., Pintó, X., Basora, J., Muñoz, M. A., Sorlí, J. V., Martínez, J. A., Fitó, M., Gea, A., . . . Martínez-González, M. A. (2018). Primary Prevention of Cardiovascular Disease with a Mediterranean Diet Supplemented with Extra-Virgin Olive Oil or Nuts. N Engl J Med, 378(25), e34. https://doi.org/10.1056/NEJMoa1800389

Fekete, M., Szőllősi, G., Németh, A. N., & Varga, J. T. (2021). Az ómega-3 zsírsavak pótlásának klinikai értéke krónikus obstruktív tüdőbetegségben [Clinical value of omega-3 polyunsaturated fatty acid supplementation in chronic obstructive pulmonary disease]. Orvosi hetilap, 162(1), 23–30. https://doi.org/10.1556/650.2021.31973

Fekete, M., Csípő, T., Fazekas-Pongor, V., Bálint, M., Csizmadia, Z., Tarantini, S., & Varga, J. T. (2023). The Possible Role of Food and Diet in the Quality of Life in Patients with COPD-A State-of-the-Art Review. Nutrients, 15(18). https://doi.org/10.3390/nu15183902

Fekete, M., Csípő, T., Fazekas-Pongor, V., Fehér, Á., Szarvas, Z., Kaposvári, C., Horváth, K., Lehoczki, A., Tarantini, S., & Varga, J. T. (2023). The Effectiveness of Supplementation with Key Vitamins, Minerals, Antioxidants and Specific Nutritional Supplements in COPD—A Review. Nutrients, 15(12), 2741.

Fekete, M., Szarvas, Z., Fazekas-Pongor, V., Lehoczki, A., Tarantini, S., & Varga, J. T. (2022). Effects of omega-3 supplementation on quality of life, nutritional status, inflammatory parameters, lipid profile, exercise tolerance and inhaled medications in chronic obstructive pulmonary disease. Ann Palliat Med, 11(9), 2819-2829. https://doi.org/10.21037/apm-22-254

Fekete, M., Szollosi, G., Tarantini, S., Lehoczki, A., Nemeth, A. N., Bodola, C., Varga, L., & Varga, J. T. (2022). Metabolic syndrome in patients with COPD: Causes and pathophysiological consequences. Physiology international, 10.1556/2060.2022.00164. Advance online publication. https://doi.org/10.1556/2060.2022.00164

Fekete, M., Fazekas-Pongor, V., Szőllősi, G., & Varga, J. T. (2021). A krónikus obstruktív tüdőbetegség metabolikus következményei [Metabolic consequences of chronic obstructive pulmonary disease]. Orvosi hetilap, 162(5), 185–191. https://doi.org/10.1556/650.2021.31984

Fekete, M., Kerti, M., Fazekas-Pongor, V., Balazs, P., Csizmadia, Z., Nemeth, A. N., Tarantini, S., & Varga, J. T. (2021). Effect of interval training with non-invasive ventilation in severe chronic obstructive pulmonary disease-a prospective cohort study with matched control group. Annals of palliative medicine, 10(5), 5289–5298. https://doi.org/10.21037/apm-21-378

Fischer, A., Johansson, I., Blomberg, A., & Sundström, B. (2019). Adherence to a Mediterranean-like diet as a protective factor against COPD: a nested case-control study. COPD: Journal of Chronic Obstructive Pulmonary Disease, 16(3-4), 272-277.

Godos, J., Zappalà, G., Bernardini, S., Giambini, I., Bes-Rastrollo, M., & Martinez-Gonzalez, M. (2017). Adherence to the Mediterranean diet is inversely associated with metabolic syndrome occurrence: a meta-analysis of observational studies. International journal of food sciences and nutrition, 68(2), 138-148.

Jannasch, F., Kröger, J., & Schulze, M. B. (2017). Dietary patterns and type 2 diabetes: a systematic literature review and meta-analysis of prospective studies. The Journal of nutrition, 147(6), 1174-1182.

Koloverou, E., Panagiotakos, D., Pitsavos, C., Chrysohoou, C., Georgousopoulou, E., Grekas, A., Christou, A., Chatzigeorgiou, M., Skoumas, I., & Tousoulis, D. (2016). Adherence to Mediterranean diet and 10-year incidence (2002–2012) of diabetes: correlations with inflammatory and oxidative stress biomarkers in the ATTICA cohort study. Diabetes/metabolism research and reviews, 32(1), 73-81.

Madarász, B., Fazekas-Pongor, V., Szarvas, Z., Fekete, M., Varga, J. T., Tarantini, S., Csiszar, A., Lionetti, V., Tabák, A. G., Ungvari, Z., & Forrai, J. (2023). Survival and longevity of European rulers: geographical influences and exploring potential factors, including the Mediterranean diet - a historical analysis from 1354 to the twentieth century. GeroScience. https://doi.org/10.1007/s11357-023-00957-5

Martínez-Lapiscina, E. H., Clavero, P., Toledo, E., Estruch, R., Salas-Salvadó, J., San Julián, B., Sanchez-Tainta, A., Ros, E., Valls-Pedret, C., & Martinez-Gonzalez, M. Á. (2013). Mediterranean diet improves cognition: the PREDIMED-NAVARRA randomised trial. Journal of Neurology, Neurosurgery & Psychiatry, 84(12), 1318-1325.

Morze, J., Danielewicz, A., Przybyłowicz, K., Zeng, H., Hoffmann, G., & Schwingshackl, L. (2021). An updated systematic review and meta-analysis on adherence to mediterranean diet and risk of cancer. Eur J Nutr, 60(3), 1561-1586. https://doi.org/10.1007/s00394-020-02346-6

Romaguera, D., Norat, T., Vergnaud, A.-C., Mouw, T., May, A. M., Agudo, A., Buckland, G., Slimani, N., Rinaldi, S., & Couto, E. (2010). Mediterranean dietary patterns and prospective weight change in participants of the EPIC-PANACEA project. The American journal of clinical nutrition, 92(4), 912-921.

Rosato, V., Temple, N. J., La Vecchia, C., Castellan, G., Tavani, A., & Guercio, V. (2019). Mediterranean diet and cardiovascular disease: a systematic review and meta-analysis of observational studies. Eur J Nutr, 58(1), 173-191. https://doi.org/10.1007/s00394-017-1582-0

Salas-Salvadó, J., Bulló, M., Estruch, R., Ros, E., Covas, M.-I., Ibarrola-Jurado, N., Corella, D., Arós, F., Gómez-Gracia, E., & Ruiz-Gutiérrez, V. (2014). Prevention of diabetes with Mediterranean diets: a subgroup analysis of a randomized trial. Annals of internal medicine, 160(1), 1-10.

Schwingshackl, L., Schwedhelm, C., Galbete, C., & Hoffmann, G. (2017). Adherence to Mediterranean diet and risk of cancer: an updated systematic review and meta-analysis. Nutrients, 9(10), 1063.

Soltani, S., Jayedi, A., Shab-Bidar, S., Becerra-Tomás, N., & Salas-Salvadó, J. (2019). Adherence to the Mediterranean diet in relation to all-cause mortality: a systematic review and dose-response meta-analysis of prospective cohort studies. Advances in Nutrition, 10(6), 1029-1039.

Steffen, L. M., Van Horn, L., Daviglus, M. L., Zhou, X., Reis, J. P., Loria, C. M., Jacobs, D. R., & Duffey, K. J. (2014). A modified Mediterranean diet score is associated with a lower risk of incident metabolic syndrome over 25 years among young adults: the CARDIA (Coronary Artery Risk Development in Young Adults) study. British Journal of Nutrition, 112(10), 1654-1661.

Toledo, E., Salas-Salvadó, J., Donat-Vargas, C., Buil-Cosiales, P., Estruch, R., Ros, E., Corella, D., Fitó, M., Hu, F. B., & Arós, F. (2015). Mediterranean diet and invasive breast cancer risk among women at high cardiovascular risk in the PREDIMED trial: a randomized clinical trial. JAMA internal medicine, 175(11), 1752-1760.

HEMOSYNC: REVOLUTIONIZING BLOOD BANK OPERATIONS

Mohana Radhai G
Computer Science, R.M.K Engineering

Pradeepa T
Computer Science, R.M.K Engineering

R Shivani
Computer Science, R.M.K Engineering

ABSTRACT
HemoSync aims to bridge the gap between hospitals, blood banks, and donors through a comprehensive digital platform. It employs a coin-based reward system to incentivize blood donation, coupled with demand prediction algorithms to optimize resource utilization and minimize wastage. Key features include user registration for donors, hospitals, and blood banks, with a homepage displaying real-time blood needs or excess.Leveraging geospatial data and advanced matching algorithms, the system efficiently identifies potential donors, expediting the procurement process and bolstering response times during critical situations. Conversely, in scenarios where blood wastage is detected, the system swiftly intervenes, orchestrating the redistribution of surplus blood to nearby hospitals or blood banks where demand is anticipated. For hospitals requiring blood, the system prompts them to input specific requirements, triggering a search for nearby donors. Conversely, in cases of blood wastage, the system identifies potential recipients through predictive analytics, directing surplus blood to where it's needed. Donors can track their contributions through earned coins, redeemable for vouchers or coupons via contracted partnerships within the app.
Keywords: Hospitals, Blood Banks, Donors, Digital platform, Coin-based reward system, Demand prediction algorithm.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

ANALYSIS OF LIGHTING FACTORS AND WORK STRESS IN FURNITURE WORKERS

Ranti Ekasari
Public Health Department, Medical and Health Science Faculty, Universitas Islam Negeri Alauddin Makassar
ORCID: 0000-0001-9049-6991

Lilis Widiastuty
Public Health Department, Medical and Health Science Faculty, Universitas Islam Negeri Alauddin Makassar

Nasril Nasruddin
Public Health Department, Medical and Health Science Faculty, Universitas Islam Negeri Alauddin Makassar

Sudarsin
Public Health Department, Medical and Health Science Faculty, Universitas Islam Negeri Alauddin Makassar

Khaerun Mawartisna Azzahra
Public Health Department, Medical and Health Science Faculty, Universitas Islam Negeri Alauddin Makassar

Nurul Bahjah Hasyim
Public Health Department, Medical and Health Science Faculty, Universitas Islam Negeri Alauddin Makassar

ABSTRACT
Lighting is one of the factors in obtaining a safe and comfortable environment and is closely related to human productivity in wooden furniture workers. Good lighting allows people to see the objects they are working on clearly and quickly. The aim of this research is to determine the relationship between lighting with work stress on furniture industry workers in Pattallassang District, Gowa Regency, South Sulawesi. This research uses quantitative analysis using an analytical approach and uses a cross sectional design. The sampling technique used in this research was Accidental Sampling with a sample of 30 furniture employees. The instrument used in this research is a questionnaire with samples taken from workers who were present at the time the research took place and were willing to be samples. The data analysis technique uses bivariate analysis, using SPSS to determine the relationship between independent and dependent variables using the chi-square test. In this study, the results obtained from the crosstab test carried out using Chi-Square, obtained a p-value of 0.001 (0.05) for lighting and work stress for wooden furniture workers. It was found that there was no significant relationship between lighting levels and work stress. Based on research, it shows that the lighting intensity value is ≥ 300 lux, it can be concluded that there is no influence of lighting on work stress on furniture industry employees in Pattallassang District, Gowa Regency, South Sulawesi.
Keywords: Lighting, Work Stress, Furniture Industry

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

EXPLORING FACTORS SHAPING HOSPITAL REPUTATION: INSIGHTS FROM INDIAN HEALTHCARE

Assistant Professor Dr. Ishwar Mittal
IMSAR, Maharshi Dayanand University

Assistant Professor Dr. Rosy Dhall
Gandhinagar University

Mikul
Research Scholar, IMSAR, Maharshi Dayanand University

Abstract
Amidst the dynamic healthcare landscape of India, hospitals are engaged in a spirited pursuit to uphold their prominence and trust among patients. This study embarked on a journey to unravel the intricate factors shaping the brand equity of hospitals. Following meticulous standardization, we distributed questionnaires to 200 patients admitted to hospitals in Northern Indian states. Finally, we employed Structural Equation Modeling (SEM) using Smart PLS software to evaluate the causal relationships between variables. The path coefficient between brand trust, brand loyalty, and brand equity was positive. These results underscore the importance for hospitals to prioritize attention to dimensions and factors affecting brand equity to sustain their societal position and deliver effective services.

EVALUATION OF HAEMATOLOGICAL PARAMETERS IN DIFFERENT STAGES OF HIV POSITIVE PATIENTS PRESENTING IN SOUTHWEST NIGERİA

Akinbola, Abraham Ifeoluwal
Department of Haematology, Ladoke Akintola University of Technology Ogbomoso

Olufemi-Aworinde, Kehinde Joyce
Department of Chemical Pathology, LAUTECH Teaching Hospital, Ogbomoso

Akinbola, Ibukun Oluwatoyin
Department of Biochemistry, Ladoke Akintola University of Technology Ogbomoso

Ojedokun ,Samson Aderemi
Department of Chemical Pathology, LAUTECH Teaching Hospital, Ogbomoso

ABSTRACT

Background: Haematological abnormalities are common in HIV-positive individuals and can significantly affect their health and well-being. Haematological profiles is one of the cheapest investigation that can be done in a resource poor country like Nigeria that can give high index of suspicion of other comorbidities in HIV positive patients. Understanding these variations in haematological profiles is crucial for optimizing patients care and treatment outcomes in this population.

Aims: This study aimed to comprehensively assess the haematological profiles of individuals living with Human Immunodeficiency Virus (HIV).

Methodology: The study was a cross sectional hospital based, Ethical considerations was adhered to, with sample size of one hundred and twenty seven. Data collection involved standardized procedures, including blood samples and laboratory analyses, to accurately measure a range of hematological parameters. Socio-demographic and clinical data were also collected to provide context for the results.

Results: Ages of the study population fell majorly between 40-49 years (43.3%) with male to female ratio of about 1:2. There is clinical significance of majority of the study population (83%) and 70% having lymphocytosis and neutropaenia respectively. Also majority of the cases (86.6%) has normal red blood cell count with 22.8% having anaemia. However , majority (70.1%) of the study population has reduced mean cell haemoglobin concentration with mean cell haemoglobin (18.1%) and mean corpuscular volume (28.3%) being marginally low. 34.6% of the population has thrombocytosis. There was significant association between red blood cell count and WHO staging of HIV, p=0.000.

Conclusion : The findings of this study showed that there is a subtle ongoing iron deficiency anaemia in HIV positive patients which might results into frank anaemia as the disease progresses.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

IN-DEPTH APPRECIATION OF SOCIAL INEQUALITIES IN CHARLES DICKENS'S *OLIVER TWIST*

ABODOHOUI Orerien Olivier
University of Abomey-Calavi

Abstract
This study intends to appreciate the issues of social inequalities that the world is facing as disclosed in Charles Dickens's *Oliver twist* in the Victorian period. Understanding the historical, social, political and economic contexts in the Victorian Period that paved a way to social inequalities in England is crucial for an in-depth appreciation of the matter. In exploring social realism in Dickens' *Oliver Twist,* it becomes obvious that the novel serves as a powerful lens into the harsh realities of Victorian London's social inequalities that the author experienced during his lifetime as British author during the industrial revolution. The stark contrast between the wealthy and the poor, the harsh conditions faced by the working class, and the social injustices prevalent in 19th-century influenced Dickens's portrayal of society in the novel under study through the story of an orphan boy named Oliver Twist. The main purpose of this study is to appreciate how social inequalities are demonstrated in England, particularly through Charles Dickens's *Oliver twist* and its impacts or effects on the society and individual. To achieve my goals, I have used qualitative research with Charles Dickens's *Oliver twist* as primary source. Moreover, Marxism, structuralism and New Historicism have been used as appropriate theories. My research reveals that Charles Dickens has used his fictional world to shed light on many social inequalities such as poverty, social stratification and child labor. It illustrates that inequality is source of many offences. Social inequalities appear as an actual fact for the balance of the social environment. Thus, this article ends up giving some alternatives on how to reduce social inequalities.
Keywords: Social inequalities; poverty, industrialization; wealthy, Marxism.

THE PROBLEM OF SPIRITUALITY IN THE INFORMATION SOCIETY

SvitlanaHanaba
Doctor of Philosophical Sciences, Professor, Professor of Pedagogics and social-economic disciplines departfment, National Academy of the State Border Guard Service of Ukraine named after Bohdan Khmelnytskyi
ORCID: 0000-0002-4373-7075

ABSTRACT
Researchers characterize the current stage of society's development as informational. Such a society is connected with the unfolding of the information and technological revolution, which extends to all spheres of social, cultural and economic activity. Knowledge and information are the basis of social progress.
Knowledge generation, information processing, and symbolic communication are considered indicators of the productivity of a society that needs creative workers. The modern era causes a whole series of changes in the inner world of a person. It changes a person's picture of the world, his worldview, life position, lifestyle. The ideal of the pragmatic present is recognized as maximum effectiveness in achieving material benefits, which is manifested in the tacit agreement of the majority of the population with the opinion that "the end justifies the means."
The technocratic distortion of modern civilization leads to the desire to satisfy only human flesh, to create comfortable conditions for his life, to increase luxury, which inevitably leads to the leveling and impoverishment of the moral and spiritual origins of man. Such circumstances produce a cultural and moral catastrophe, the dehumanization of human activity, the decline and destruction of a person's personal spiritual principles, and thus, his true spiritual death. Morality presupposes the presence of a universally recognized ethical minimum, which must be implemented. If a person has formed a certain system of values and moral guidelines, then this creates a certain internal harmony of the individual, his spiritual world. Spirituality gives meaning to life, meaning also to suffering, joys, various efforts, etc. Conclusions. The main condition for the moral development of society and the individual is the creation of objective conditions for expanding the moral freedom of the individual, expanding opportunities for moral choice. The criterion of moral progress is the degree of spiritual maturity of the individual, the ability to make humanistic universal values the meaning of one's own life. Moral values play an important role in the process of spiritual unity with the help of those values that allow a person to navigate in life, educate him as a consciously and spiritually developed personality.
Keywords: morality, values, man, society, ethics, spirituality.

WELL-BEING BEYOND BORDERS: SOCIAL SUPPORT AS A VITAL PREDICTOR FOR INTERNALLY DISPLACED PERSONS

Lecturer Dr. Saıma ARZEEN
Department of psychology, University of Peshawar

Dr. Naeema ARZEEN
Department of psychology, University of Peshawar

Abstract
Background of Study: This study explores social support as a predictor of psychological well-being among Internally Displaced Persons (IDPs) in Pakistan, driven by conflict or development-induced displacement.
Methodology: A cross-sectional comparative design was used, involving 300 IDPs (150 conflict-induced, 150 development-induced), aged 15-50. Instruments included a demographic form, the Multidimensional Scale of Perceived Social Support (MSPSS), and the Warwick-Edinburgh Mental Well-being Scale (WEMWBS).
Results: Development-induced IDPs reported higher social support (Cohen's d = .58) and well-being (Cohen's d = .47) than conflict-induced IDPs. Social support significantly predicted well-being ($R^2 = 0.28$).
Limitations: Limited generalizability, cross-sectional design, and need for cultural adaptation of instruments.
Implications: Findings inform policy development, targeted interventions, and enhanced humanitarian aid for IDPs.
Conclusion: Social support is crucial for IDP well-being, with significant differences between displacement types.
Keywords: Internally Displaced Persons, Social Support, Psychological Well-being, Pakistan

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

SOCIAL MEDIA ADDICTION, COMMUNICATION PATTERN AND RELATIONSHIP SATISFACTION IN MARRIED INDIVIDUALS

Aimen Imran
Department of Applied Psychology, School of Professional Psychology, University of Management and Technology

Abstract
The present study aims to find out the relationship between social media addiction, communication pattern and relation satisfaction in married individuals. A sample of 170 married individuals was collected with an age range of 21 to 53 years old out of which 109 participants were men and 61 participants were women. The Social Networking Addiction Scale (SNAS) (Shahnawaz & Rehman, 2020), Communication Pattern Questionnaire (CPQ) (Shafee, 2019), and A Generic Measure of Relationship Satisfaction (Hendrick, 1988) were administered. The results of the Pearson product moment correlation revealed that communication patterns was positively correlated with relationship satisfaction whereas social media addiction was found to have no relationship with relationship satisfaction in married individuals. The results of the hierarchical regression showed that social media addiction did not predict relationship satisfaction in married individuals whereas communication pattern positively predicted relationship satisfaction in married individuals. Furthermore, there were significant gender differences in terms of social media addiction (salience, mood modification, and relapse). This study is helpful for couples as it will encourage them to focus on the positive outcomes of their relation in order to increase healthy communication with each other which will subsequently enhance their relationship satisfaction.
Keywords: Social Media Addiction, Communication Pattern, Relationship Satisfaction and Married Individuals.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

FAATUMATA BIIDAANI SIMBIRI: THE FEMME FATALE THAT RECOGNIZES THE VALUE OF MEN

Karim MAHAMANE KARIMOU
Abdou Moumouni University—UAM
ORCID : 0000-0001-6297-3754

ABSTRACT
Quite opposed to feminist approaches, this paper tries to show that a femme fatale, a well-to-do, utterly beautiful woman, that could well be totally independent, by virtue of the massive wealth that she has, can nevertheless decide to submit herself to the norms of her traditional culture and Islamic religion, by recognizing the value of men, and by acknowledging that regarding certain state of affairs, it takes a man for a woman to reach certain goals—in this instance, the goal to be attained is retaliatory war, and war is the domain of men. The paper thus analyzes the character of Faatumata Biidaani Simbiri, from the Songhay-Zarma *Epic of Jale Hamma Bode Jale Paate*, performed by the master griot (*Djesseredunka*) Djado Sékou. My hypothesis is that, generally speaking, women are not mistreated in African traditional societies/Islamic societies; rather, there are a number of roles that are attached and assigned to women, and the same goes for men as regards the conduct and attitudes that the society sees as more befitting to them. While this state of affairs could be seen as favorizing discriminatory attitudes towards women, African traditional values/Islamic norms hold that, as men and women are different physically, they are also different in other respects. The debate regarding such matters, is CONSPICUOUSLY and PURPOSEFULLY dominated by ONE discourse, view, opinion—the feminist's one: this unfortunate state of affairs hardly allows for a frank and honest debate, wherein people from different backgrounds engage one another in order for views—other than the feminist/Occidental one—to be openly proposed and, perhaps, further studied, or even adopted, or upheld by some researchers in the various fields of social sciences and humanities. This paper is an attempt to offer such a take on this issue. The unfortunate state of affairs described above, leads to the persecution and ostracization of anyone who dares challenge the feminist/Occidental view, conception, and narrative regarding male/female relations.
Keywords: Faatumata Biidaani Simbiri, Femme Fatale, Djado Sékou, Songhay-Zarma Epic poetry, Male Female Interaction, Gender Issues.

Introduction
It has become fashionable, these days, to push forward, anti-male policies in all walks of life; to raise women above and beyond men; to declare men as inferior to women; to present men as useless beings; to strip men of every authority over their wives and children in their own families—all these are done with the firm conviction that this will offer us a better society, which is more equal, which is fairer to women. This is an illusion; it is, furthermore, an injustice carried out against the male sex. For, this would only lead to a world wherein a strong discrimination is carried out against men. For instance, already, in many countries (including Niger) whenever a man and a woman compete for a job, the woman is preferred over the man. In 2022, when the Abdou Moumouni University of Niamey was celebrating its laureates, the highest prize was reserved to a woman, although a few men had better results than her.

The elevation of women over men, in the society, already has started to have dire consequences therein, with regard to the capacity of men to marry women and found families; for, if women are favored over men while seeking job positions, how will men make money to marry? Unless this is the hidden agenda that is pursued by the republic of Niger (along with the various international institutions to which it is subjected), then this has to stop.

The author of this paper, being a proponent of traditional Islam and traditional African values, believes that a fair world is one wherein men and women fulfill the roles, functions, duties and responsibilities that are more befitting of them. A fair world is not one wherein man are subjugated to women, or harmed by them. A fair world is one wherein men and women fulfill their roles and in such a world, men submit to their mothers and fathers, women submit to their mothers, fathers, and husbands. We do not shy away from clearly stating this. A fair world is one wherein women are protected and treated as princesses and queens by their fathers and husbands. A fair world is one wherein women know the value of men.

In this article, I analyze *The Epic of Jale Hama Bode Jale Paate*, and especially the character of Faatumata Biidaani Simbiri — the Femme Fatale that knows the value of men. We believe that we need not blindly follow Western ideologies. The West has put us into thralldom for five (centuries), then it has colonized us for a little less than two (2) centuries. In these days, where it has become plain and clear for almost everyone, that it has been engaging in neocolonialism since it offered us those bogus independences back in the 1960s—why would we believe in the good faith of the West? Why should we believe that ideologies such as democracy, feminism, or even Marxism, were designed with the traditional and spiritual interest of the African man and woman in mind?

The worst form of domination is intellectual domination and this is what our educated elites suffer from. Subjugated to the Western man and to the concepts of the Western man, they have abandoned all critical thinking. Everything was done, so that their intellectual endeavors remain within certain limits, thereby preventing them from attaining intellectual freedom, so that they could not advance policies beneficial to their peoples (A. Mazrui, 1975; A. A. Mazrui, 1992; A. A. Mazrui & Tandon, 1967; Nasidi, 2001; Osofisan, 2001; wa Thiong'o, 1986a, 1986b; wa Thiongʾo, 1972, 1986). They were trained so that they destroy the cultures of their peoples along with the religion of Islam. In African countries wherein the Western man introduced Christianity, today everything is done to destroy this religion also.

Hence, quite opposed to various Western approaches, this paper tries to show that a femme fatale, a well-to-do, utterly beautiful woman, that could well be totally independent, by virtue of the massive wealth that she has, can nevertheless decide to submit herself to the norms of her traditional culture, and Islamic religion, by recognizing the value of men, and by acknowledging that regarding certain state of affairs, it takes a man for a woman to reach certain goals—in this instance, the goal to be attained is retaliatory war, and war is the domain of men. As students of African oral literature, the authors tend to be slightly annoyed by the perpetuation of the Western white people's *image* as the one who knows better, the one's whose language, system of education, moral values—or the lack thereof—are better than our own. Everything African, is hence vilified or marginalized. Yesterday they brought this system, today they bring that one—we are thus condemned to eternally dance at the tune of their music. Isn't it possible to provide a different reading to the nature of male and female interactions in traditional African societies—one that effectively adopts an Afrocentric view, rather than a Eurocentric one?

1. The Arrogance & Haughtiness of the Western World

Ambe J. Njoh and Fenda A. Akiwumi contend, with regard to the debate on women's status in Africa, that "agents of Western civilization, view [African] … beliefs as obstacles to women empowerment" (2012, p. 2), while "African feminists and radical [African tradition religion] theologians, blame the relatively weak status of African women on […] Islam and Christianity" (2012, p. 2). The two authors point out that, nevertheless, "there has been no attempt to test the foregoing implied hypotheses" (2012, p. 2).

My contention is that, generally speaking, women are not mistreated in African/Islamic societies; rather, there are a number of roles that are attached and assigned to women, and the same goes for men as regards the conduct and attitudes that the society sees as more befitting to them. While this state of affairs could be seen as favorizing discriminatory attitudes towards women, African/Islamic values hold that, as men and women are different physically, they are also different in other respects. What is considered as mistreatment to women in Western cultures, oftentimes is not considered as such in 'verbatim' African/Islamic cultures. Niara Sudarkasa's following statements are of essence here:

> the notion of "women's status" has two conceptual meanings in social science. The first meaning has to do with the collection of rights and duties associated with particular positions. In this regard, the term 'status' connotes a specific position, and is distinct from 'role,' which encapsulates behavior appropriate to a particular status. The second meaning refers to the position of women vis-a-vis men in a hierarchical structure. Thus, imbibed within the folds of this latter definition is the notion of stratification, implying a subordinate-super-ordinate relationship between the sexes. (quoted in Njoh & Akiwumi, 2012, pp. 2–3 emphasis added)

For Njoh and Akiwumi, Sudarkasa's words indicate that a sex-based division of labor was established in Africa by Ancient Africans, so much so that traditional male roles were not valued more than traditional female roles; hence, 'on the farm, the clearing of grass and shrubbery, traditionally a male role, was valued the same as planting, traditionally a female role' (2012, p. 3). What this means is that there always had been a division of labor in African traditional societies albeit that each role was not valued less than the other. It is in the mind of the European that a division of labor is, of necessity, an evil thing, a discriminatory attitude.

The European wants to look at Africa with his own eyes and understand it in his own way, solely in order to project to the Africans an image of their society which they do not know, which they do not perceive, but which they are nonetheless obliged to accept and integrate. *This is nothing but the result of new forms of persecution from the old daemons.*

Yesterday, for the European, Africans had no soul; they had no philosophy[1]; no history[2]; no humanity, feeling, and morality[3]; and had a pre-logical mentality[4]; today they are told that they are making too many babies, that they are oppressing women, and that they are too religious.

And the African so-called intellectuals accept these new assaults on our dignity, culture, and religious beliefs, uncritically and it is those who dare to raise questions (such as the present author) that are vilified. It will take us a century before we realize that, yet again, we had been brainwashed, that colonialism never ceased, that those independences were bogus, and that we are still in the shackles created for us by the European. In the meantime the European would have succeeded into obtaining from us the resources he wanted, and into maintaining us into poverty and intellectual subjugation. Jonathan Okéké Chimakonam contends that the African intellectual is in an intellectual entrapment whence it is difficult for him to break away:

> Realising this entrapment is as difficult as breaking out of it. To the first, how on earth would you, on your own, realise that you have been miseducated? You need proper education to realise that you have been miseducated, but all around you […] are the same structure of education that miseducated you. […] How on earth is the African intellectual going to realise that he has been miseducated? To the second, assuming one is rarely lucky to run into someone who was properly educated or who by some miracle properly educated or re-educated himself, and this fellow opens his eyes to his intellectual entrapment, what is he really going to do in an African world where most of his relations, friends, colleagues, peers and even the strangers that he meets from time to time are victims of miseducation? This is the authentic African predicament. Two things are involved: any careless attempt to demonstrate his new light of reason would pit him against the convention of his society and make him a social outcast. If he does not want this grim reality, he would have to live a life of a lie from then on or find a way to liberate his people. (2019, p. xviii)

We are thus condemned to be deceived by the European/American forever; when we discover his new forms of domination and fight them, he devises other forms which will take us a hundred years before we recognize them (see the leaked ~200-page document outlining France's strategy for the continuation of the exploitation of the African people, *Panafricanisme : Guerre de l'Information contre la France en Afrique*, written by the Club Influence de l'AEGE & Portail de l'IE, 2024).

Njoh and Akiwumi go on to explain that, since Africa is mainly patriarchal, critics are quick to contend that Africa is a "man's world", where women are harmed through practices such as polygyny, and that they cannot own, inherit, or transfer land (2012, p. 4).

---

[1] "There is monumental literature by philosophers like David Hume, George W.F. Hegel, Immanuel Kant, Lucien Levy Bruhl and Diedrich Westermann that describe Africans as 'tabula rasa', a people with no reason/rationality; hence without a history and worse still [without] philosophy." (Mawere, 2011)

[2] "Africa proper, as far as history goes back, has remained for all purposes of connection with the rest of the world shut up: it is the gold land compressed within itself ---- the land of childhood, which, lying beyond the day of self-conscious history, is enveloped in the dark mantle of night" (quoted in Nasidi, 2001, p. 77)

[3] Hegel says "The Negro, as already observed, exhibits the natural man in his completely wild and untamed state. We must lay aside all thought of reverence and ***morality*** — all that we call feeling — if we would rightly comprehend him; there is nothing harmonious with humanity to be found in this type of character. The copious and circumstantial accounts of missionaries completely confirm this" (quoted in Dokman & Cornelli, 2022, p. 111)

[4] Levy-Bruhl, as paraphrased by Chimakonam, stated that "the primitives are 'pre-logical' people who always ascribed to invisible and supernatural forces" (Chimakonam, 2019, p. 44)

In response to these, our two authors argue that:

> Such criticisms are laden with flaws […] the charge that polygyny debilitates the status of women is baseless […] empirical studies … [suggest] that women in polygynous households had significantly fewer children than their counterparts in monogamous households. […] As far as the 'ownership' and 'alienation' of land go, it is important to first appreciate the concept of land in indigenous African ethos. Under this ethos, no one can own land. Rather, land exists to be safeguarded and protected (2012, pp. 4–5)

Accordingly, Western peoples distract us, as they engage us in meaningless struggles. On the one hand, they loot our riches, impose upon us political leaders that we do not want, create ethnic wars, civil wars and maintain us—through the World Bank and the International Monetary Fund—in permanent poverty and destitution[5]. On the other hand, they pretend to provide us with systems that will miraculously solve all our problems, systems such as democracy, communism, feminism and a host of other isms—none of these systems take into account the political, economic, traditional, social and religious histories and realities of African peoples.

Once again, here are some statements from Johnathan Okéké Chimakonam:

> the fate of Africans appear to have been sealed—a sort of "intellectual entrapment"—*they will never, not in a hundred years, not in a thousand years and certainly* ***not in a million years****, make original contribution to* ***world history*** *and* ***civilisation*** *insofar* ***as they continue to use Western-developed approaches and intellectual framework*** *in their research*; anything they create would be another effort in Western intellectual hegemony. (2019, p. xviii)

Thus do we see that it is high time we shifted the paradigm and stopped looking at ourselves, at our societies, and at our cultural realities, through the eyes of the Western man. We are mature enough to analyze our own realities. We are intelligent enough to detect the true causes of our real problems[6]. We are determined enough to succeed into solving our own issues.

2. Feminism is a Heresy in Africa

Feminism is yet another ideology that has been imported in Africa by Westerners and wherein people enter as one would enter religion. The same people who claim that Islam is an 'intrusion' in Africa (notwithstanding that the history of Islam is the history of Africa also, as Africa provided a safe-haven for the first generation of Muslims who were persecuted by the Arabs of Mecca; the prophet, himself, ordered a number of his disciples, including his own daughter and her husband Uthman, the fourth caliph of Islam, to migrate to Abyssinia, for its king is a just ruler) — hence those same persons enter the new religion of feminism wholeheartedly. But feminism is a heresy in Africa; it does not represent African realities. It does not account for the type of male-female relationships that obtains in Africa and in the Muslim world.

As explicated by Joyline Gwara, there exists a number of feminist movements throughout the world, and the vast majority thereof are female-centered, which means "they view men as possible enemies." (Chimakonam & Cordeiro-Rodrigues, 2023, p. 267) The original actors who developed feminism were privileged white women who did not care for, or even sometimes abhorred 'women of colour, poor women or women with disabilities.' (2023, p. 267)

---

[5] Chimakonam & Negedu (2023, p. 276).

[6] The European likes to distract us and occupy our intellectual endeavors and physical efforts with bogus problems, or with false causes to our real problems.

On this account, black women found it hard to identify with them—this led them to establish the 'African feminism' movement which, according to the author of this article, is another heresy. Black women continued to find it difficult to adhere to either of these two movement; hence, some of them created the 'Africana Womanism' movement which sought to differentiate itself from feminism at the very core (2023, p. 267). This 'Africana womanism' is also another heresy because, among other reasons, it advocates lesbianism (2023, p. 270) and equality (which is a fallacy because equality can never exist even between men, or between women, let alone between men and women).

The only improvement brought by Africana Womanism over feminism or black feminism is the following: "… Sometimes loves individual men, sexually and/or non-sexually. Committed to survival and wholeness of entire people, male and female." (Walker quoted in Chimakonam & Cordeiro-Rodrigues, 2023, p. 270) Indeed, what feminism is really about—even though the advocates thereof have done their best to hide it—is the hatred of men, both sexually and non-sexually. Serious feminist sleep with other women; they are not attracted by men, and even from a social standpoint they hate men. Advocates of Africana Womanism say that some of them are lesbian, but most of them love man: both sexually and non-sexually, meaning, they do not hate men. Feminists do not care about men, they but fight for the amelioration of their sole conditions, and they view men as the source of all evil.

Africana Womanists say that their struggle is for both men and women: they want to make the world a better place for both men and women.

3. The Fallacy of Equality

Equality between men and women is a fallacy because, owing to the way in which it is presented to us, it has become something that can never be achieved in this world. When two things are different from the standpoint of their very make up, it is then impossible for them to be equal. Is it mentally sound to seek for equality between a smartphone and a computer? Can smartphones fulfill all the functions of computers? Is the reverse, possible? Is equality the only way to ameliorate the conditions of women? Are women the sole persons that are suffering? What about poor men? What about Muslim minorities that are suffering in a number of countries around the world? Once one comes up with answers to these questions, one understands that there is a hidden agenda undergirding the talks of equality between men and women, and we dare venture to expose this agenda: it is part and parcel of two broader agendas—which are the promotion of LGBTQ+ people, and the reduction of the world's population. Indeed, if women are promoted, are offered careers, few of them get married and those who do, make few babies.

3.1. Is equality Morally charged?

What I mean with this question is the following: the mere fact of achieving equality, is it a moral value? Will the society feel that it has attained moral excellency, when it will realize equality between men and women? Will the women in such a world be happier? It is my contention that this will not be the case. Equality between men and women is not an agenda for normal people. Lesbian women, along with those women who hate men, would feel fulfilled it they attained equality[7], but normal women, who understand the benefits of the division of labor, would not be so inclined. How many successful women live miserable lives because they want to found families, but fail to get husbands, for most men are suspicious of successful women.

[7] But, we contend that the type of equality that is promoted by Westerners is a fallacy that can never be attained.

3.2. Do Power, Responsibility, and Hierarchic Superiority Make a Person Better?

The European goes from the principle that the one who has power is better than the one who does not have it; that the one who has responsibilities is superior to the one who does not have them; that those who have superiority in terms of hierarchy are above their subordinates. It is with this cosmic view of theirs that they judge Africa, Islam, and all other societies. Given the fact that for them, these people who have privileges are better than those who do not have them, they believe that equality between men and women is the sole way to achieve justice in their society. This faulty understanding of theirs has destroyed their society and threatens to destroy ours. In both Islam, and in African traditional societies, power, responsibility, and superiority constitute a burden—it is the burden of doing that which is right, and of avoiding that which is wrong. In these two cosmic conceptions, the leader cannot use his position as an outlet to display his gargantuan appetite; rather, this should be used as an opportunity to act for the betterment of the lot of his subjects. The same holds true for the one who has important responsibilities and then one who holds a form of superiority with regard to fellow members of the community. The Qur'an says:

> And in no wise covet those things in which Allah Hath bestowed His gifts More freely on some of you than on others: To men is allotted what they earn, and to women what they earn: But ask Allah of His bounty. For Allah hath full knowledge of all things. (4:32)

What the Qur'an says is that men have their privileges, and women have theirs—each person should seek Allah's bounty and mercy, but should not covet that which Allah had bestowed upon the other that is not appropriate for them. Some of the privileges bestowed upon women are not appropriate for men, and vice-versa. Equality is, on this account, a fallacy and a sin. In Islamic and African cosmologies, Men and women are equal in responsibility; they are equal before God. A father and a mother are equal with regard to their children, in terms of responsibilities. It is the responsibility of the woman to carry the baby in her womb, and it is the responsibility of the father to provide for both the mother and the baby. Their responsibilities are different, but if each one fulfils it, then God, and afterwards the society, will consider them as having fulfilled their duties. Hence, equality is only in terms of responsibilities; even when these responsibilities are different in nature but if everyone fulfils his/her, then God, and afterwards the society, will judge the person with justice. This is not difficult to understand. In an enterprise, the boss has different responsibilities; so have his subordinates, but each one owes certain duties to the firm. This is the same in the society: men and women owe different responsibilities to the society; if each one fulfils his/her, then they would be considered as having done well. It is these responsibilities that should be acknowledged and upheld, so that each person be useful to the society. Unfortunately, godless people who have hidden agendas have all the reasons to deny these responsibilities in order to destroy the social fabric in their attempt to promote those agendas.

4. Summary of *The Epic of Jale Hamma Bode Jale Paate*[8]:

Jale Hamma Bode Jale Paate is the greatest warrior in the world, but there is a kingdom that is mightier than his: the kingdom of Sa. As his great grandfather, his grandfather, and his father encountered insuperable obstacles during their war to conquer Sa, they were all killed on the battlefield; Sékou does not tell us who specifically killed them, but they were certainly killed by the warriors from the army of Sa.

[8] Original version first appeared in Karimou (2021, pp. 67–69).

Jale Hamma Bode Jale Paate and his people, consequently, lead their lives without attempting anything against Sa, but as fate would have it, war will soon break between these tremendous kingdoms.

One of the main characters of the epic is the most beautiful woman of the world: Faatumata Biidaani Simbiri. Due to her pulchritude and comeliness, the great leaders and warriors of the world court her; besides, she is as rich as Croesus![9] Her mother—seeing the position of her daughter—becomes a hysterical woman, a fight-monger that goes to the marketplace of the kingdom of Sa to provoke the crown prince. This one, thereupon, humiliates her, orders that her hair be shaved off, that scars be made all over her face and head, and that she receives forty lashes.

Fatoumata Biidaani Simbiri, after discovering the humiliation that her mother went through in the hands of the crown prince of that town, decides to pay visits to the five (5) greatest warrior-kings of the world, to inform them that she has decided to accept their marriage proposals on the condition that they launch a war campaign to destroy Sa and enslave its king, as well as its crown prince. Each one of these five had, aforetime, made marriage proposals to her, but she refused, for, given her popularity with men of power, she can afford delaying her marriage in order to carefully decide who she will choose as a husband. These warrior kings are Amala Seyni Gakoy, Buubu Arda Galo, Bakary Dja, Dondo Gorba Dicko, and Jale Hamma Bode Jale Paate.

She travels the land with seven ships and pays visits to these warrior-kings in turn; after announcing the price of her dowry to each one of them (the price being the heads of the king of Sa and his son), each sweats profusely forthwith. Their own perspirations well-nigh drown them: some would have their sweat reach their necks, others their shoulders, yet others their pectoral muscles. Each one would ask her to give him several months of preparation; the requests vary from hero to hero and go from twelve (12) to four (4) months, but she would turn each proposition down and move to the next warrior-king. The last of the list is Jale Hamma Bode Jale Paate, who also sweats profusely, and requests from her a few months of preparation, which she finally accepts, as she does not have any other option, save him. Before he requests the months, however—as the result of the extreme shock he had—he stops breathing for a while. After he releases some air out of his lungs to take a deep breath, a solidified drop of blood comes out of his lungs and it is thrust like a stone thrown with a catapult. It blows away one of the walls of the palace and kills four people outside.

In the end, aided by his four generals—a freed-slave of his, two of his brothers, and his eldest son—Jale Hamma Bode Jale Paate finally shatters the kingdom of Sa, enslaves the king and his son, and marries the ever-beautiful Faatumata Biidaani Simbiri thereafter.

5. The Analysis of the Femme Fatale Faatumata Character

The master griot, or *Djesseredunka*, of the Songhay-Zarma ethnic group, from the Republic of Niger, informs us that it is during the reign of the warrior-king *Jale Paate*, that the ever-beautiful Faatumata Biidaani Simbiri lived:

[9] A wealthy king of ancient Lydia (died 546B.C); an expression commonly used to indicate that a person is very rich.

Songhay-Zarma Transcription	*English Translation*
To sohoŋ Jale Hamma Bode Jale Paate din zamano ra	Now, it is in the times of Jale Hamma Jale Paate
No wondiyo fo te Simbiri kaŋ se i ga ne Faatumata Bidaani	That a girl lives in Simbiri whose name is Faatumata Biidaani
Faatumata Biidaani Simbiri din no Karimou Saga boriyaŋ se	Karimou Saga, Faatumata Biidaani Simbiri is so beautiful
Darayaŋ	So light-skinned
Da mo-hamni bi	Her eyebrows are utterly black
Da boŋ hamni kaŋ ga bi	And her hair is utterly black
Da jinda kaŋ daka boori	And she has a well-proportioned neck
Da bindo patiyaŋo saba	And a perfect waist

Sékou (1974:0447-0454)

In the foregoing lines, Sékou starts by describing some of Faatumata's body traits. Next, he informs us of some negative characteristics that any beautiful woman ought not to have; thus, Faatumata is completely free from them:

Songhay-Zarma Transcription	*English Translation*
[Karimou:] To! [Djado:] Wayboro wo da a di gondi nga no a na a bay kulu waybora sara	[Karimou:] Yes! [Djado:] If a woman sees a snake and recognizes it, then her female nature has been corrupted
Hala day manti a ne kurŋo se hay, hari fo no-ya!	The real woman would say to her husband, "There's something over there!"
To nga ga ti wayboro, amma ni ga gondi bay, ni ga gazama bay, ni ga tamatiri bay	This one is a real woman; but a woman who knows snakes, and gazama (a variety of very venomous snake), and salamander
[Karimou:] Hal alborey ga ka kulu ni ga kar ga wi. [Djado:] Hal i ga ka kulu 'pattu' ni ma gumu a boŋ !	[Karimou:] Before men come, she hits and kills it. [Djado:] Before men come, she throws herself on it !

Sékou (1974:0465-0469)

The above lines show some of the characteristic qualities that a woman should have, according to most African traditional cultures. What is at play here, is somewhat of a division of labor that defines roles assigned to men and women. This division of labor is not necessarily a bad one. Most such divisions of labor are in accord with human nature; contemporary Western societies have engaged in questioning and challenging almost everything and anything that is grounded on human nature, religions, and moral values. If human nature commands that men do such and such and women such and such, Western culture challenges and rejects it. The same goes for anything dictated by religion or traditional moral values. Westerners have the right—regarding the nature of the interaction between males and females—to prefer enterprising women, and us as Africans[10], we also do have the right to prefer bashful and scrupulous women, as dictated by our traditional culture as well as our Islamic religion.

[10] I.e., the authors of this article.

In the following lines, Sékou presents us with a closing description of Faatumata that makes us think that she is perhaps a fairy creature, owing to her ethereal beauty:

Songhay-Zarma Transcription	*English Translation*
Da a go ga dira ga ka ni ga Karimou naŋ kulu kaŋ kuro go ga-hamo ra ni ga a fonnay	When she walks towards you Karimou, wherever blood circulates in her body you will see it
Darayaŋ da kwarayyaŋ	Due to the sheer lightness and whiteness of her skin
Ni bay wayboro ga boori ga to naŋ kaŋ moyzey ra ga te hari fo boogiize fo, kaŋ da a na boro guna kulu da ni mana hagoy ni ga ne 'Aah!!'	You know, a woman may reach such beauty that in her eyes appears something shiny, to the point that when she looks at you, if you are not careful, you may respond, 'Yesss!'
Ni go hal a salaŋ no wiiza a si ba ni ga a si ba ni muraadu ra	Thinking that she has spoken to you, but in fact she does not even mind your presence, she does not care about you

Sékou (1974:0472-0476)

Now, Sékou informs us of Faatumata's financial and matrimonial situations:

Songhay-Zarma Transcription	*English Translation*
To Faatumata Biidaani Simbiri wo arzaka!	Faatumata Biidaani Simbiri is so rich!
Sanda haw nda bari nda koŋŋo nda baŋŋa wo no a wodde kulu mana te	No one dares to compete with her in terms of cows, and horses, and slave boys and girls
Amma a sinda baaba, a sinda arme, a mana hiiji mo, wondiyo nõ. [Karimou:] Baabo bũ	But she does not have a father, and does not have a brother, and does not have a husband. [Karimou:] Rather, her father died

Sékou (1974:0483-0485)

As stated above, in the summary to this epic, Faatumata's mother, seeing how her daughter has become famous to the point that kings and great warriors vie with one another to marry her, turns into a hysterical woman that spends her time provoking others, as she knows that no one will dare to harm her. Consequently, one day Faatumata's mother sets out on a journey to a faraway land called Sa, only in order to provoke Sa's crown prince. This prince has a dog that he releases at the marketplace so that it goes to feed on food that merchants have brought to sell. The dog ends up eating her butter, whereupon she beats it until it faints. Wherefore the prince, who is completely oblivious to Faatumata and to her fame, orders that her mother be beaten up and be utterly humiliated: her hair is completely shaved off, and scars referring to various ethnic groups are made on her face, and on her head. This is the humiliation that pushes Faatumata to travel the earth in search of a King that is capable of taking on the kingdom of Sa. Sa is a mighty kingdom that all the others are afraid of. First, she goes to Dondo Gorba Dicko, another epic hero to whom Sékou has dedicated and entire epic poem. Here, he appears briefly. Sékou informs us that after she reaches his town, they both meet, they greet each other, then:

Songhay-Zarma Transcription	*English Translation*
A ne a se Dondo Gorba Dikko! Dondo Gorba Dikko! A ne a se 'Na-am!'	She calls him, 'Dondo Gorba Dicko, Dondo Gorba Dicko!' And he says, 'Yes!'
A ne ni wo kaŋ ay go iri kwara	When I was at home
Sorro marje ni koy iri do ga ne ni ga ba ay ga hiiji?	How many times didst thou come there to tell me that thou wanted to marry me?
Dondo Gorba Dikko ne ay wo ay si ay cini sorro me bay araŋ kwara sonku zari kaŋ ay moyzey ga di	Dondo Gorba Dicko responds, 'I do not know how many times I went in thy place in the sheer darkness of the night, let alone in daytime that I can see clearly!'
A ne ni di ay ce fo? A ne ba ce fo!	She asks, 'Hast thou ever seen me even once?' He responds, 'Not even once!'
Garasa wo no ay ga di da korboyo wo kaŋ go ni kamba wo ga	It is this thy slave-girl that I see, and this thy ring that is on this thy finger
Da ay di ay muraadey go ga bũ, ya garasa ce ga no kari kaŋ go ay hina ra i ma kond'a ni se; ay wo ni diiyaŋ sintina dey ne hunkuna	When I see that my time is being wasted, I call her so I can give her what I intend to offer thee so she can bring it to thee; today is the very first time that I am seeing thee
A ne to ni ga wongu hijay ay nda nin game wala ay? A ne, ni ga wongu zama nin no ay mana di, boro kaŋ boro mana di mo boro si a anniya bay	She says, 'Was it thee that refused the marriage proposal or was it I?' He says, 'It was thee that refused, for it was thou that I did not meet with, and when thou do not get the chance to meet with the person, thou cannot know her intention'
A ne to a ban!	She says, 'Well, it's over!'
Ay ga ka ni kwara, kaŋ ay ka mo ni ma ay hiji ga kande ay	Today I have come to thy place, and I have not come except for the purpose that thou marry me and bringest me at thy home as thine own wife
Amma ni hanga feeri ga ma fa!	But, do listen very carefully!
Kaŋ ni ga ay hiji wo, ay hija baddo ga ti Sa boŋ-kono da nga ize aro!	The portion of my marriage is the King of Sa and his son!
Da ni si baddi bay mo, a ne nga hijay-nooro	And if you do not know what she means with 'portion', she means her marriage endowment (dowry)
A ne nga hijay-nooro ga ti Sa boŋ-kono da iza aro, hansi-koyo. [Karimou:] To!	She says that the dowry that he should bring her is the king of *Sa* and his son, the dog-owner!
Karimou Saga hala Dondo Gorba Dikko kamba ŋwari hanga ga ma sanno a ma fatta kamba wo wono ra, kala a go ga di nga sungay ra, hari kaŋ funu ga-hamo ra	*Karimou Saga, before her words enter in Dondo Gorba Dicko's right ear, and exit through his left ear, he finds himself in a pool of water—sweat that has come out of his body*
[Karimou:] A humburu Djado! [Djado:] Hari day go ga ba ga a yole, bangu, hari kaŋ funu ga-hamo ra. [Karimou:] Kaŋ bina humburu	[Karimou:] *He was terrorized Djado!* [Djado:] *Mere water that is about to drown him, a pond, water that came out of his body.* [Karimou:] *Due to the fright that seizes him*
A ne a se Faatumata Biidaani Simbiri ni ma ay sola handu way cindi hinka, boro si koy Sa tari boŋ. [Karimou:] Ni ma ay suru! [Djado:] Ma ay suru.	He tells her, 'Faatumata Biidaani Simbiri give me twelve months, for one needs serious preparation before going on war with *Sa*. [Karimou:] Give me some time! [Djado:] Yes, give me some time!
A ne a se Faatumata! Faatumata (Djado daray no, a hima ga ne no 'Dondo Gorba Dikko! Dondo Gorba Dikko!') A ne a se na-am!	She tells him, 'Dondo Gorba Dicko, Dondo Gorba Dicko! He says, 'Yes!'
A ne ni mana ba wayboro, wayboro mana ba ni; wayboro si dukuri ka, ni si dukuri ka; a ne i ma ŋga hiyey taŋa. [Karimou:] Hiyey bisa? [Djado:] Ɲey, hiyey bisa!	She says, 'Thou art not better than a woman, and a woman is not better than thee; a woman cannot withstand the challenge, thou canst withstand the challenge!' and she ordains that her ships get ready to leave. [Karimou:] So the ships are sailing? [Djado:] Yes, the ships are sailing!

Sékou (1974:0693-0711)

Faatumata continues her journey, after parting with all the other warrior-kings. The only one that remains in the world—with whom she has personal acquaintance—is Jale Paate. She is determined, therefore, to convince this one to go on war with Sa. Sékou informs us that when her ships draw nearer to his town:

Songhay-Zarma Transcription	*English Translation*
Zooran hinka fo binde ma laabaro i ne Faatumata Biidaani Simbiri go ga ka ga di Jale Hamma Bode Jale Paate	Two *zooran* (slaves that are used as messengers only) who happened to hear that Faatumata Biidaani Simbiri was coming to Jale Hamma Bode Jale Paate's town, brought the news
Zooraney zuru, 'pat, pat, pat, pat, pat, pat!', ga ka fada ra ga sokom, Allah moociina! IrKoy ma boriyandi ni ga	They run, 'pat, pat, pat, pat, pat, pat!', and enter the king's palace, and kneel down saying, 'Allah moociina! *May thou live forever, oh thy Highness!*
[Karimou:] I ka ga ci a se. [Djado:] Suba wo iri ma ni ga te yaw	[Karimou:] They have come to inform him? [Djado:] 'We have heard that tomorrow thou wilt have a tremendous guest!'
A ne yaw fo dumi?	He says, 'What kind of guest?'
I ne Faatumata Biidaani Simbiri no go ka ga di nin; a ne La ilaha illaahu Muhammadar-rasuulullah	They tell him that Faatumata Biidaani Simbiri is coming to see him; he says, 'There is no god worthy of worship except God, and Muhammad is his final Messenger!'
Sohoŋ nga laabo zooraney no ga ka ga nga waw, i ma hansey din wi, i na zooran hinka boŋ ka da takuba	*'How is it possible that now the zooran of my town dare to insult me? Let these dogs be decapitated!' And thus, were the zooran beheaded with swords*
[Karimou:] I na ngey wo wi? [Djado:] A ne taari no me IrKoy si hini wo-din ga te!	[Karimou:] So these were killed? [Djado:] *He says that they are lying, for God is not capable of doing this (bringing Faatumata in his town)*
Baŋŋa hinka fo ma i ne ngey ga zuru ga ka ga ci ga tukunci ta	Two slaves hear the news, and rush to go and tell him, so as to obtain some gifts
A ne nga laabo baŋŋey no ga fooru nda nga, i ma i wi, i na baŋŋe hinka wi!	*He says that it is the slaves of his town that are playing around with him now; he orders that they be killed, and the two slaves were killed*
Boro taaci no i wi borey kaŋ i ga donton yaŋ mana ka jina, ngey wo mana zumbu hi	Thus, four people were killed, and the official envoys have not yet come, they have not even come out of the ships

Sékou (1974:0811-0820)

If Jale Paate can be stricken by total disbelief, to the point of uttering the words he utters—as we have seen above—what can sheer disbelief make a lay-person do? The word "disbelief" is used in this paragraph in the sense of "utter astonishment" and "total amazement." After the merciless and castigatory chastisement, as well as the useless killing of the above-mentioned four people by Jale Paate, the two envoys sent by Faatumata arrive at his town and inform him of her coming. They produce before his very eyes, Faatumata's golden ring as proof that they have indeed been sent by her.

He orders, however, that they be imprisoned and states that if it was through theft that they obtained the ring, they will die, then, in the prison cell, but if it is true that they are her actual envoys, even their offspring, thereafter, will not experience poverty, let alone them. Jale Paate decrees that the people of the town gather at the river every day, and promises that the first person to inform him of her arrival will become so wealthy that even his unborn offspring will not experience poverty. The people of the town stop all their day-to-day activities, so as to gather at the river; they spend their whole days there, and this goes on for six days. On the seventh, they grow tired and decide to resume their day-to-day activities instead of going to the river in vain:

Songhay-Zarma Transcription	*English Translation*
Kala kwara koŋŋo zeena fo—ay me ga talfi IrKoy Karimou—a sinda ba saafunu	But an old slave-woman Karimou—God is my witness—she does not even have soap
Nga garbay banda no a jabu	She has collected some Balanites barks (Balanites Aegyptiana)
[Karimou:] Nga ti saafuno? [Djado:] Nga ga ti saafuno, a koy ga nga boogu musay, koyne taafa boogu fonloŋ day no a se	[Karimou:] This is what she'll use as soap? [Djado:] This is what she'll use as soap; she goes to the river to wash her clothes, and she has only one lower garment [and does not have an upper garment]
A ka ga sambu isa ra a go ga boogo din musay	She kneels down in the river, to wash her garment
A zara day ga ti isa, da a tunu isa ra kulu '/bisimillah ar-Rahmani ar-Rahim!/' [Karimou:] Yandi a ma koogu no-ya	Currently, it is the river that is her garment, if she raises up then whoever sees her will scream 'Bismillah ar-Rahmani ar-Rahim!' (Oh my God!) [Karimou:] This practice is called, 'Wash, let dry, and wear!'
A go ga musay binde kala a di 'gawwww!', isa kaari, kaŋ	She was in the midst of her washing, and suddenly she sees, 'gawwwww!', the river shines!
Wura hiyo din wayna kar a ga kala a di haro kulu haaga nga cire	When the sun rays hit the golden ship, the waters shimmer and sparkle underneath the old slave woman
[Karimou:] Hiyo kaŋ ra Faatumata go? [Djado:] Hiyo kaŋ ra Faatumata bumbo go	[Karimou:] The ship in which Faatumata is? [Djado:] The ship in which Faatumata is
A bare ga zagu ga wayna-funa guna kala hĩ iyya go ga dake care ga; waybora binde naanu ga tunu a na tafa koli kamba fa ra	She turns around eastwards, and sees the seven ships following one another; the woman briskly gets up, grabbing her only garment in one of her hands
A ga wurru 'leewu, leewu, leewu, leewu, leewu!', a ga kamba cabe isa ga a ga zuru ga ka boŋ-kono do	She cries like a mad-woman, while pointing her finger to the river, as she runs to the king's palace
Ɲa hayyaŋ Karimou, matekaŋ i na waybora hay. [Karimou:] A beebe a lutu? [Djado:] Ah! A beebe a lutu, a ga wurru a ga kambe cabe isa ga, me si kan ga salaŋ	Naked Karimou, completely naked. [Karimou:] She has lost her ear and her tongue? [Djado:] Yes! She can't speak and can't hear; she screams, she points her finger to the river, for she is unable to speak
A ka Jale Hamma Bode Jale Paate fada ra	She reaches the palace of Jale Hama Bode Jale Paate
A ne i ma faba ga waybora din di ga zaara daŋ a ga; hambagar ganji laaley din fattayaŋ no a sabanda wala jinni no a di isa ra; wiiza waybora	He cries out to his men and orders them to bring a blanket to cover the woman with, for it is possible that she has encountered one of the devils that was coming out of the river, or maybe she has met with a daemon in the river; in fact,
Mana di kala Faatumata hiyey, faraha no na a follandi Karimou. [Karimou:] To!	The woman has seen the ships of Faatumata; it was sheer happiness that drove her into madness Karimou. [Karimou:] Yes!

Sékou (1974:0869-0882)

In the following lines, Sékou shows us the extent to which Jale Paate cares for Faatumata, and also, actually, that she is indeed an important guest:

Songhay-Zarma Transcription	*English Translation*
Faatumata Biidaani Simbiri	Faatumata Biidaani Simbiri
A kani no-din; suba kala kala kala kala kala zaari sance	Spends the night there; the following day at noon
Laabo me da a me kaga margu, yaw kaŋ se i ga fuwo wo dumo te	The whole city gathers, as they want to see the kind of guest for whom such a house is built
[Karimou:] A na fuwo cina? [Djado:] I na fuwo cina daala hinza hinza ganda. [Karimou:] To!	[Karimou:] So he built the room? [Djado:] The room was built, using three sections of thatched walls. [Karimou:] Okay
I na baata baata yaŋ taji, i na algundam te za fuwo me kala isa me	They used newly braided millet stalk to build the room; they built a cylindrical hangar from the room to the river
I diri ga kaasa daru za isa me	They spread woolen carpets from the shore of the river
Kala fuwo me; daaro kaŋ boŋ i ga goro ga faakaaray din, bankarey zangu hinza no	To the door of the room; the bed on which the king and Faatumata are to chat, three hundred clothes (most likely sheets, bedlinen)
I dake a boŋ kaŋ afo kulu manci afo. [Karimou:] To!	Have been spread on it, and each one is different from the other. [Karimou:] Okay!

Sékou (1974:0890-0897)

The last excerpt presented in this paper emphasizes the division of labor mentioned above: Faatumata has everything—as far as financial means are concerned—but, owing to her being a woman, she does not have a kingdom, nor does she have an army with which to invade the kingdom of Sa; hence, she has to seek for help with a true warrior-king who is able to muster a formidable army. In the epic, therefore, she is as high as she can be, but there are things that are not appropriate for, or not readily available to, her. The same goes for these warrior-kings who, aforetime, paid visits to her, but she would never receive anyone of them; none of them got the chance to see her, let alone have the opportunity to have and audience with her. She always remained in her palace, upstairs; she would merely send her golden ring to them, as a mark of respect, and they would go back, unsuccessful, after a number of days. As they were not able to convince her, and had no coercive measure to make her accept their marriage proposals, she is not, equally, capable of exacting vengeance on her own. They needed to prove their valor for Faatumata to accept one of them as her husband, and she needed to offer them something utterly special for them to accept to invade the kingdom of Sa on her behalf. Thus, they offer their courage and she offers her hand in marriage. Jale Paate is the one that withstands the challenge, and accomplishes the deed, but before, he requests from her a few months of preparation to which she responds:

Songhay-Zarma Transcription	*English Translation*
... kaŋ ni ne ay ma ni suru wo i fo ga si ni se, kaŋ to hala taray ma funu*?*	… 'Now that you have asked me to wait, what do you need that you do not have?'
A ne guna, iri hangawey si boori	He says, 'See, our arrows are damaged'
Kalanda iri na hangaw taji yaŋ te ga naaji daŋ i ga	We need to produce new arrows and put poison on them
A ne ha-a wo-me manci sanni. [Karimou:] Da ngey yaajey. [Djado:] A ne a se guna	She tells him, 'This is not a valid reason!' [Karimou:] And the spears also are damaged. [Djado:] He tells her, 'See!'
A ne a se guna, 'Jale Hamma Bode Jale Paate!'	She tells him, 'Jale Hamma Bode Jale Paate!'
Guna ay kande yaaji hĩ fo	'See, I have brought a ship full of spears!'
Ay kande takuba hĩ fo	A ship full of swords
Ay kande hangaw hĩ fo	A ship full of arrows
Ay kande biraw hĩ fo	A ship full of bows
Ay kande taba hĩ fo ni se, ay kande goro hĩ fo, da ay bumbo hiyo kaŋ ra ay go	I have brought for you a ship full of tobacco that is chewed, a ship full of cola nuts (Cola acuminata), and my own [golden] ship in which I travel

Sékou (1974:0955-0964)

Faatumata does not question the status quo; nor does she feel that she has been oppressed by her society. She does not seek to recruit mercenaries to invade Sa; she understands the rules of her society and seeks to abide by them. She is neither oppressed, nor maltreated, nor marginalized, nor discriminated against. Her culture allowed for her to be elevated as high as possible, so much so that she has become the most famous and powerful woman on the earth. She accepts the rules of the society that stipulated that if she wanted retaliation for what her mother went through, she needed a man; this could be a father, a brother or a husband. Since her father died and she did not have a brother, she had to marry a warrior-king that is able and willing to destroy Sa and to put its king and crown-prince to the sword.

Conclusion

This article sought to provide insight, from The Epic of Jale Hama Bode Jale Paate, indicating that women are not systematically oppressed and suppressed in traditional African societies. It argues that the feminists' agenda, which seeks to make women men's carbon copies is a ludicrous one; men are physically and physiologically different from women. The fact that they are different does not mean that anything feminine is despicable and anything masculine is admirable. Men and women are meant to complement one-another. Feminist theories that seek to prevent harm and injustice to women could be encouraged, but Africans should not follow these ideologies as well as their proponents blindly. African traditional societies were built upon our moral values which mostly derived from our oral literatures. Western societies have almost abandoned all their moral values—those that derived from their traditional culture, or the ones that came from Christianity or Islam. Africans should tread carefully; a society that does no longer believe in anything moral, ought not be the one providing us with the ethics that should govern our countries and peoples. A.O. Dasylva agrees with this when he says that "it is generally believed that so-called 'modern' Western civilization serves as the apogee of cultures, I must add that a society which handles the affairs of its culture with

levity, or unwittingly leaves its culture unprotected in the hands of uncultured politicians […] risks cultural denigration (and subsequent miscegenation), decay, and imminent extinction" (2007, p. 326).

References

Chimakonam, J. O. (2019). *Ezumezu: A System of Logic for African Philosophy and Studies*. Springer International Publishing. https://doi.org/10.1007/978-3-030-11075-8

Chimakonam, J. O., & Cordeiro-Rodrigues, L. (Eds.). (2023). *African Ethics: A Guide to Key Ideas*. Bloomsbury Academic.

Chimakonam, J. O., & Negedu, I. A. (Eds.). (2023). *African Democracy: Impediments, Promises, and Prospects*. Bloomsbury Academic.

Club Influence de l'AEGE, & Portail de l'IE. (2024). *Panafricanisme: Guerre de l'Information contre la France en Afrique* (p. 191).

Dasylva, A. O. (2007). "Culture Education" and the Challenge of Globalization in Modern Nigeria. *Oral Tradition*, *21*(2), 325–341. https://doi.org/10.1353/ort.2007.0001

Dokman, F., & Cornelli, E. M. (Eds.). (2022). *Beyond Bantu Philosophy: Contextualizing Placide Tempels's Initiative in African Thought* (1st ed.). Routledge. https://doi.org/10.4324/9781003149170

Karimou, K. M. (2021). *Verbal Artistry in Zarma-Songhay Oral Literature: An Analysis of the Fantastic in Djado Sékou's Epic Poems* [Unpublished Master's Thesis, Abdou Moumouni University]. https://bit.ly/3GRpPMJ

Mawere, M. (2011). *Epistemological and moral implications of characterization in African literature: A critique of Patrick Chakaipa's 'Rudo Ibofu' (love is blind)*. 9.

Mazrui, A. (1975). The African University as a Multinational Corporation: Problems of Penetration and Dependency. *Harvard Educational Review*, *45*(2), Article 2. https://doi.org/10.17763/haer.45.2.h62846n66230j150

Mazrui, A. A. (1992). Towards diagnosing and treating cultural dependency: The case of the African university. *International Journal of Educational Development*, *12*(2), Article 2. https://doi.org/10.1016/0738-0593(92)90032-H

Mazrui, A. A., & Tandon, Y. (1967). The university of East Africa as a political institution. *Minerva*, *5*(3), Article 3. https://doi.org/10.1007/BF02388577

Nasidi, Y. A. (2001). Theoretical Postulates: Power, Hegemony, Culture. In *Beyond the Experience of Limits: Theory, Criticism and Power in African Literature* (pp. 68–95). Caltop Publications Limited.

Njoh, A. J., & Akiwumi, F. A. (2012). The Impact of Religion on Women Empowerment as a Millennium Development Goal in Africa. *Social Indicators Research*, *107*(1), 1–18. https://doi.org/10.1007/s11205-011-9827-4

Osofisan, F. (2001). Foreword. In *Beyond the Experience of Limits: Theory, Criticism and Power in African Literature* (pp. vi–x). Caltop Publications Limited.

wa Thiong'o, N. (1986a). The Language of African Fiction. In *Decolonizing the mind: The politics of language in African literature*. J. Currey Heinemann Kenya [etc.].

wa Thiong'o, N. (1986b). The Language of African Literature. In *Decolonizing the mind: The politics of language in African literature*. J. Currey Heinemann Kenya [etc.].

wa Thiongʾo, N. (1972). On the Abolition of the English Department. In *Homecoming: Essays on African and Caribbean literature, culture and politics*. Heinemann.

wa Thiongʾo, N. (1986). Quest for Relevance. In *Decolonizing the mind: The politics of language in African literature*. J. Currey Heinemann Kenya [etc.].

THE THERAPEUTIC EFFECTS OF DENIPLANT NUTRACEUTICALS ON THE GUT MICROBIOME IN PATIENTS WITH PSORIASIS

Major Gheorghe GIURGIU
Deniplant-Aide Sante Medical Center, Biomedicine
ORCID: 0000-0002-5449-2712

Prof dr med Manole COJOCARU
Academy of Romanian Scientists, Titu Maiorescu University, Faculty of Medicine
ORCID: 0000-0002-7192-7490

ABSTRACT

Background A growing body of evidence highlights that intestinal dysbiosis is associated with the development of psoriasis. The gut–skin axis is the novel concept of the interaction between skin diseases and microbiome through inflammatory mediators, metabolites and the intestinal barrier. The gut microbiome affects skin homeostasis through its influence on the signaling pathways that coordinate epidermal differentiation.

The objective of this study was to synthesize current data on the Deniplant natural modulator of the gut microbiome in patients with psoriasis.

Materials and methods All studies confirmed the association of psoriasis and gut microbiota dysbiosis. We describe the recent advances regarding the interplay between gut microbiota and the skin. Thus, the microbiome can be considered an effective therapeutical target for treating this disorder.

Results This presentation provides a detailed and comprehensive systematic study regarding gut microbiome in patients with psoriasis. These results are supported by clinical observations based on a case serie showing improvement in psoriatic skin lesions after Deniplant natural modulator. It is still not clear whether psoriasis is an effect or a cause of the observed disbalance between beneficial and pathogenic microbes. In this context, the study provides very interesting results, showing significantly greater changes in the gut microbiome of patients with psoriasis treated Deniplant natural modulator

Conclusion There is a significant association between alterations in gut microbial composition and psoriasis. Intestinal dysbiosis is a state of imbalanced gut microbiome that eventually has a negative impact on skin function and integrity. Deniplant natural modulator is a potential therapeutic strategy in patients with psoriasis

Keywords: dysbiosis, microbiome, psoriasis, gut-skin axis, gut barrier, Deniplant nutraceuticals

GUT DYSBIOSIS IN DOGS WITH SPINAL CORD INJURY: IMPACT OF POLENOPLASMIN

Major Gheorghe GIURGIU
Deniplant-Aide Sante Medical Center, Biomedicine
ORCID: 0000-0002-5449-2712

Prof dr med Manole COJOCARU
Academy of Romanian Scientists, Titu Maiorescu University, Faculty of Medicine
ORCID: 0000-0002-7192-7490

ABSTRACT

Background Studies have demonstrated the presence of gut dysbiosis (alterations in gut bacterial homeostasis) secondary to spinal cord injury in dogs. The dysbiosis is thought to impair recovery by decreasing the production of short-chain fatty acids which play a role in suppressing inflammation within the central nervous system.

Obiective Therefore, targeting gut dysbiosis could have significant therapeutic value in the management of spinal cord injury. The purpose of this study is to determine if gut dysbiosis occurs in dogs with spinal cord injury. Another area of potential intervention interest is in situations of spinal injury where there is an urgent need to generate new neurons. To arrive at these observations, the authors examined how Polenoplasmin and diet solve paralysis in dogs.

Materials and methods The most common cause of spinal problems in dogs is trauma. We are currently assessing whether indoles can also stimulate formation of neurons in dogs with paralysis.

Results We found that gut microbes that metabolize tryptophan-an essential amino acid-secrete small molecules called indoles, which stimulate the development of new brain cells in dogs, also demonstrated that the indole-mediated signals elicit key regulatory factors known to be important for the formation of new neurons.

Conclusion This study is another intriguing piece of the puzzle highlighting the importance of lifestyle factors and diet.

In conclusion, the link between the health of the microbiome and the health of the brain shows how microorganisms in the gut solve paralysis. Gut microbe secreted molecule linked to formation of new nerve cells in paralysed dogs.

Keywords: intestinal dysbiosis, indoles, paralysed dog, Polenoplasmin.

HYDROGEL-BASED BIODEGRADABLE MEDICALLY VALUABLE BANDAGES MADE FROM DURIAN HUSK

Assistant Professor K.R.Padma
Department of Biotechnology, Sri Padmavati Mahila Visvavidyalayam (Women's) University, Tirupati, AP.
ORCID: 0000-0002-6783-3248

K.R.Don
Department of Oral Pathology and Microbiology, Sree Balaji Dental College and Hospital, Bharath Institute of Higher Education and Research (BIHER) Bharath University
Orcid No: 0000-0003-3110-8076

Abstract
Durio zibethinus, usually called as Durian, is a foreign Southeast Asian tropical fruit. This fruit is good for health, because of the presence of antioxidants and bioactive compounds that has discrete health promoting benefits. Generally for the treatment of blister we put a loose bandage or use padding .In addition to this; these bandages are made from plastic which is more harmful to the environment and takes years to degrade. Our main focus is to create a band-aid from fruit waste. As cellulose is a strong sugar molecule that exists naturally in plants and once extracted it can be molded into everyday products. These eco-friendly bandages can be made with durian husk which creates a soft antibacterial hydrogel. Our current review focuses on the beneficial effects of durian husk and its role in the preparation of eco-friendly bandages which is effective in treatment of various skin blisters.
Keywords: Durian husk, *Durio zibethinus,* Cellulose, Eco-friendly, Fruit Waste

GRADIENT BOOSTING ALGORITHM FOR SUPERVISED MACHINE LEARNING IN CELLULAR PHYSIOLOGY: POTENTIAL APPLICATIONS IN APOPTOSIS DETECTION

Igor Pantić
University of Belgrade, Faculty of Medicine, Department of Medical Physiology,
ORCID ID: https://orcid.org/ 0000-0001-6589-8964

Abstract
Gradient boosting is an artificial intelligence method that uses ensemble learning to make predictions. It employs base estimators, usually in the form of shallow decision trees, organized such that each new one corrects the residual error of the previous one. Training is done sequentially, and the method optimizes a loss function by applying gradient descent to minimize it. In cellular physiology, gradient boosting can utilize a diverse set of signal analysis inputs for training, with outputs that can be a class of the cell or some physiological variable or parameter. This approach may have the potential to detect subtle morphological changes associated with cell damage and death in the future. We discuss potential input data for such a model, including indicators of nuclear texture potentially useful for assessing early stages of apoptosis, as well as the advantages and disadvantages of different model architectures under these conditions. We also present our recent findings on designing novel AI algorithms for detecting cell damage after exposure to various toxins. Finally, we discuss general limitations of gradient boosting models, including computationally intensive protocols, overfitting issues, and reproducibility challenges.
Keywords: Gradient, Nucleus, Decision trees, Machine learning, Cell Death.

Acknowledgements
This research was supported by the Science Fund of the Republic of Serbia, grant No. 7739645 SensoFracTW, and the Ministry of Education and Science of the Republic of Serbia grant No. 451-03-66/2024-03/200110, subgrant "Development of artificial intelligence models based on the random forest algorithm for the detection of discrete structural changes in the cell nucleus".

ARTIFICIAL INTELLIGENCE APPROACHES USING DISCRETE WAVELET TRANSFORM INDICATORS FOR DETECTING PHYSIOLOGICAL PHENOMENA

Igor Pantić
University of Belgrade, Faculty of Medicine, Department of Medical Physiology
ORCID 0000-0001-6589-8964

Jovana Paunović Pantić
University of Belgrade, Faculty of Medicine, Department of Pathophysiology
ORCID: 0000-0003-2232-6485

Svetlana Valjarević
University of Belgrade, Faculty of Medicine, Clinical Hospital Center Zemun
ORCID: 0000-0002-1565-8724

Jelena Čumić
University of Belgrade, Faculty of Medicine, University Clinical Centre of Serbia

Ana Ćosić
Helath Center „Dr. Simo Milosevic“

Abstract
Wavelet analysis is a complex mathematical method commonly applied in signal processing across various scientific fields. In biology and medicine, it is often used for the quantification and evaluation of textural features in two-dimensional signals. Today, a common approach involves using the discrete wavelet transform in microscopy to decompose signals originating from digital micrographs into wavelets and analyze them across different resolutions. Wavelet coefficient energies can then be used to estimate morphological and functional changes in cells and tissues. Here, we propose a novel and innovative concept that utilizes wavelet energies obtained through different combinations of low-pass and high-pass filtering as input data for training various machine learning models. Such models, based mainly on artificial neural network and decision tree architectures, could be used to predict various changes in cell functioning, such as those occurring during the early stages of apoptosis or cell senescence. We also present Python code that can be used for the development and deployment of these models.
Keywords: Wavelet, Cell, Artificial neural network, Machine learning, AI.

Acknowledgements
This research was supported by the Science Fund of the Republic of Serbia, grant No. 7739645 SensoFracTW, and the Ministry of Education and Science of the Republic of Serbia grant No. 451-03-66/2024-03/200110, subgrant "Development of artificial intelligence models based on the random forest algorithm for the detection of discrete structural changes in the cell nucleus".

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

SİYASETTE LİDER İMAJI İNŞA SÜRECİNİN GÖSTERGEBİLİMSEL ANALİZİ: MAHİNUR ÖZDEMİR GÖKTAŞ VE KAMALA HARRİS ÖRNEĞİ

Arş. Gör. Mustafa AKBAYIR
Akdeniz Üniversitesi, İletişim Fakültesi, Gazetecilik Bölümü
ORCID: 0000-0001-9489-3767

Dr. Aslıhan AKBAYIR
ORCID: 0000-0003-0017-5815

ÖZET
Siyaset, toplumsal cinsiyet eşitsizliğinin yansımalarının bulunduğu alanlardan birisidir. Eril hegemonyanın hâkim kılındığı siyasi alanda kadınların lider olarak var olabilmesini çeşitli faktörler belirlemektedir. Bu noktada kadınlar, kimi zaman siyasi alana demokratik katılımını çeşitli sebeplerden dolayı sağlayamamaktadır. Kadının hane içinde üstlendiği sorumluluklar, eğitim hakkı eşitsizliği ve eril dil, kadının siyasal alanda ötekileştirilmesine, siyasetten uzaklaştırılmasına neden olabilmektedir. Dolayısıyla siyasal imaj yönetimlerinde kadın siyasi imajı bir sorunsal olarak var olmaktadır. Çünkü siyasal imaj yönetiminde kadın liderler sahip oldukları siyasi imajlarını yine eril söylemlerle ve kodlarla inşa etmektedir. Bu durumun sonucunda toplumda yer edinen toplumsal cinsiyet rolleri kendini, ötekine göre konumlandırarak yerleşik hâle getirmektedir. Gelişmemiş ya da gelişmekte olan ülkelerde toplumsal cinsiyet eşitsizliğiyle daha sık karşılaşılmaktadır. Bu durum siyasi alanlardaki dinamiklere de sirayet etmektedir. Ancak gelişmiş ülkeler içerisinde gösterilen ABD siyasetinde dâhi kadın liderler, eril hâkimiyet bağlamında siyasi imajlarını şekillendirmektedir. Çalışmada amaçlı örneklem kapsamında Türkiye Cumhuriyeti Cumhurbaşkanlığı Kabinesinin tek kadın üyesi Aile ve Sosyal Hizmetler Bakanı Mahinur Özdemir Göktaş ile Amerika Birleşik Devletlerinin ilk Afroamerika kökenli kadın Başkan Yardımcısı Kamala Harris seçilmiştir. Siyasilerin kamuoyu oluşturmak için başvurduğu yöntemlerden birisi olan imaj yönetimi, günümüzde sosyal medyada daha sık kullanılmaktadır. Kadın siyasi liderlerin kişisel Instagram hesaplarından paylaştıkları Haziran 2024 son 10 gönderileri Roland Barthes'ın literatüre kazandırdığı göstergebilimsel analiz şematiği ile incelenmektedir.
Anahtar kelimeler: Siyaset, İmaj Yönetimi, Lider, Kadın Lider, Sosyal Medya.

SEMIOLOGICAL ANALYSIS OF THE LEADER IMAGE CONSTRUCTION PROCESS IN POLITICS: THE EXAMPLE OF MAHINUR OZDEMIR GOKTAS AND KAMALA HARRIS

ABSTRACT
Politics is one of the areas where gender inequality is reflected. Various factors determine women's ability to exist as leaders in the political field where masculine hegemony prevails. At this point, women's are sometimes unable to participate democratically in the political arena for various reasons. Responsibilities undertaken by women in the household, inequality in education rights and masculine language may cause women to be marginalized in the political arena and to be removed from politics. Therefore, women's political image exists as a problematic in political image management. Because in political image management, female leaders build their political images with masculine discourses and codes.

As a result of this situation, gender roles that have taken place in society become established by positioning themselves relative to the other. Gender inequality is encountered more frequently in underdeveloped or developing countries. This situation also affects the dynamics in political areas. However, even in the US politics, which is among the developed countries, female leaders shape their political images in the context of masculine dominance. Within the scope of purposeful sampling in the study, the only female member of the Presidential Cabinet of the Republic of Türkiye, Mahinur Özdemir Göktaş, Minister of Family and Social Services, and Kamala Harris, the first female Vice President of African American origin of the United States, were selected. Image management, one of the methods used by politicians to create public opinion, is used more frequently on social media today. The last 10 posts of female political leaders from their personal Instagram accounts as of June 2024 are examined with the semiological analysis schematic that Roland Barthes introduced to the literature.
Keywords: Politics, Image Management, Leader, Female Leader, Social Media.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

SİLAHLI TERÖR ÖRGÜTÜNE ÜYELİK SUÇU YÖNÜNDEN TCK 221/4 -2.CÜMLE KAPSAMINDA ETKİN PİŞMANLIK

Ceren CANPOLAT
KTO Karatay Üniversitesi Lisansüstü Eğitim Enstitüsü, Hâkim, Adalet Bakanlığı
ORCID: 0009-0002-8084-0714

ÖZET
Silahlı Terör Örgütünün yöneldiği amaca uygun şekilde, örgüt hiyerarşisi içerisinde yer alan ve bu amaçla örgüt tarafından verilen görevleri, örgüt adına bilerek ve isteyerek yerine getiren kişi silahlı terör örgütü üyesidir. Söz konusu kişilerin TCK 221.madde ifade de edilen ve ayrıca yargı kararları ile şekillenen şartları sağlamaları durumunda etkin pişmanlık hükümlerinden yararlanmaları mümkündür. Etkin pişmanlık başlıklı 221. Madde iki cümleden oluşmaktadır. İlk cümle rızai şekilde teslim olarak bilgi verme temeline dayalı iken çalışmamızın konusunu içeren 2.cümle kişinin yakalanması sonrasında etkin pişmanlık hususunu düzenlemiştir. Burada zamansal nitelikte bir farklılık mevcuttur. Yakalanmadan önce rızai şekilde örgütün yapısı işleyişi faaliyetleri gibi konularda bilgi veren bu şekliyle örgütün çözülmesine yardımcı olduğu anlaşılan kişiler hakkında ilk cümle doğrultusunda ceza verilmesine yer olmadığına hükmolunur. Gerçekleştirilen yakalama sonrasında pişman olduğunu ifade etmek suretiyle aynı nitelikte bilgiler verdiği anlaşılan kişiler hakkında hükmolunacak cezada dörtte birden dörtte üçe kadar etkin pişmanlık indirimi öngörülmüştür. Ancak 2.cümle kapsamında indirim uygulanabilmesi kişinin somut açıklamalarında örgütlü suçlar yönünden gerek mevzuat gerek yargı kararları ile şekillenen kriterlerin bulunmasına bağlıdır. Bu doğrultuda öncelikle; kişinin örgüt üyesi olması; yakalanması sonrasında beyanlarıyla bu hususu ikrar etmesi ve örgütün yapısı, işleyişine ilişkin bilgiler vermesi gerekmektedir. Ancak etkin pişmanlık uygulanıp uygulanamayacağı, veyahut uygulanacak olan etkin pişmanlık hükümlerinin hangi oranda uygulanacağı hususunun değerlendirilmesinde; yalnızca bilgi verilmesi yeterli değildir. Verilen bilgilerin kişilerin örgüt içerisinde kaldıkları süre ve örgütteki konumları ile uygun olup olmadığı, örgütün yapısı ve gerçekleştirilen örgüt faaliyetleri kapsamında vermiş oldukları bilgilerin örgütün çözülmesine katkı sağlayıp sağlamadığı, verilen bilgilerin yararlı bilgiler olup olmadığı da değerlendirilerek mahiyeti önem arz eder. Etkin pişmanlık kapsamında olduğu kanaatine varılan bilgilerin verildiği aşama ve yararlılık derecesi ile orantılı olarak hükmolunan cezada hakkaniyet çerçevesinde yasa belirtilen oranda indirim yapılır. Mevzuat ve içtihatlar uyarınca; samimi olmayan etkin pişmanlık şartlarını sağlamadığı anlaşılan bilgiler dolayısıyla bu madde hükmünün uygulanması mümkün değildir.
Anahtar Kelimeler: Etkin Pişmanlık, Etkin Pişmanlık Şartları, Silahlı Terör Örgütü, Silahlı Terör Örgütü Üyesi.

EFFECTIVE REMORSE UNDER TCK 221/4 - 2nd SENTENCE IN TERMS OF THE CRIME OF MEMBERSHIP IN AN ARMED TERRORIST ORGANIZATION

ABSTRACT
A person who, in line with the goals of an armed terrorist organization, is part of the organization's hierarchy and knowingly and willingly carries out tasks assigned by the organization on its behalf is considered a member of an armed terrorist organization. These individuals may benefit from the provisions of effective remorse if they meet the conditions specified in Article 221 of the Turkish Penal Code (TCK) and shaped by judicial

decisions.Article 221, titled Effective Remorse, consists of two sentences. The first sentence is based on voluntarily surrendering and providing information, while the second sentence, which is the subject of our study, regulates the issue of effective remorse after the person has been apprehended. There is a temporal difference here. Persons who voluntarily provide information about the organization's structure, operations, and activities before being apprehended, and thus help the organization's dissolution, are exempt from punishment according to the first sentence. For those who express remorse and provide similar information after being apprehended, a reduction in the sentence ranging from one-fourth to three-fourths is foreseen. However, for a reduction to be applied under the second sentence, the person's concrete statements must meet criteria shaped by legislation and judicial decisions regarding organized crimes. Accordingly, the person must be a member of the organization, admit this in their statements after being apprehended, and provide information about the organization's structure and operations. However, merely providing information is not sufficient for determining whether effective remorse will be applied or the extent of its application. The nature of the information, whether it corresponds to the duration and position of the person within the organization, and whether it contributes to the dissolution of the organization, is also evaluated. The stage at which the information, considered to fall within the scope of effective remorse, is provided, and its degree of usefulness proportionally affects the reduction in the sentence as specified by law. According to legislation and judicial precedents, it is not possible to apply this article's provisions based on insincere statements that do not meet the conditions of effective remorse.
Keywords: Effective Remorse, Conditions of Effective Remorse, Armed Terrorist Organization, Member of An Armed Terrorist Organization.

GİRİŞ

Ceza kanunumuzda suç tipine göre düzenlenen etkin pişmanlık kurumu örgütlü suçlar yönünden; Ceza kanununda Topluma Karşı Suçları Oluşturan 3. Kısmın; Kamu Barışına Karşı Suçlar başlıklı 5. Bölümünde 221. Maddede kaleme alınmıştır. Madde 5 fıkradan oluşmaktadır. Silahlı terör örgütüne üye olma suçu yönünden 4.fıkranın 2. Cümlesi kapsamında etkin pişmanlığa bakıldığında; ilgili cümleyi içeren fıkranın 2 cümleden oluştuğu anlaşılmaktadır. 1.cümlede Suç işlemek amacıyla örgüt kuran, yöneten veya örgüte üye olan ya da üye olmamakla birlikte örgüt adına suç işleyen veya örgüte bilerek ve isteyerek yardım eden kişilere ilişkin cezasızlık hali düzenlemişken ikinci cümle de verilecek cezada etkin pişmanlığın derecesine göre indirim öngörmüştür. İlk cümle yakalanmadan önce gönüllü olarak bir etkin pişmanlık iradesi göstermeyi gerekli kılarken, diğer cümle için yakalama sonrasında gösterilen etkin pişmanlık gereklidir. Dolayısıyla bu fıkra kapsamında etkin pişmanlık kapsamında bilgi veren kişilerin etkin pişmanlığı yakalandıktan önce mi yoksa yakalandıktan sonra mı gösterdikleri 1. ve 2. Cümleler yönünden hangisinin somut olayda uygulanacağının belirlenmesinde temel teşkil eder. Etkin pişmanlık kapsamında verilen bilgilerin; etkin pişmanlık olarak değerlendirilip değerlendirilemeyeceği hususu etkin pişmanlık kriterlerinin sağlanmasını gerekli kılar. Etkin pişmanlık gösteren kişinin pişmanlığının samimi olması, verdiği bilginin mahiyeti, yararlı bilgi olarak değerlendirilip değerlendirilemeyeceği gibi etkin pişmanlık kriterlerinin bazılarıdır. Bu doğrultuda hakkında etkin pişmanlık hükümlerinin uygulanması kanaatinin hasıl olması durumunda 2. Cümle kapsamında etkin pişmanlık 1/3 ila ¾ oranları arasında uygulama olanağı bulacağından verilen bilginin mahiyeti, önem derecesi, etkin pişmanlıkta bulunulan aşama değerlendirilerek etkin pişmanlık ile orantılı olarak indirim uygulanacaktır. Etkin pişmanlık adı altında verilen her bilginin bu kapsamda değerlendirilme olanağı yoktur.

Kişi hakkında 2. Cümle kapsamında etkin pişmanlık uygulanıp uygulanmayacağı hususunda takdir yetkisi yargılamayı yürüten mahkemeye aittir.

ÖRGÜT ÜYESİ VE ORGANİK BAĞ

Örgütün yöneldiği amaca uygun şekilde, örgüt hiyerarşisi içerisinde yer alan ve bu amaçla örgüt tarafından verilen görevleri, örgüt adına bilerek ve isteyerek yerine getiren kişi örgüt üyesidir. Örgüt üyeliğinin temel taşını üyenin örgütle arasında bulunan organik bağ oluşturur. Bu bağ üyenin örgütte emir alabilmesine yarayan ve suretle üyenin örgüt içerisinde yer aldığı konumun tespitini mümkün kılan bağdır. [1]

SİLAHLI ÖRGÜT SUÇU

3713 sayılı terörle mücadele kanunun 1.maddesi hükmünde sayılan amaçlar doğrultusunda örgüte üye olan kişiler tarafından gerçekleştirilecek faaliyetler terör faaliyetleridir. Aynı kanunun 2. Maddesi kapsamında 1. Madde de sayılan amaçlar doğrultusunda hareket etmek suretiyle suç işleyen örgüt mensuplarının terör suçlusu olduğu anlaşılmaktadır. [2] 3713 sayılı kanunun 3. Maddesi uyarınca TCK 314. Maddesinde düzenlenen Silahlı örgüt suçu mutlak terör suçudur. [3]

TCK 314.maddesinde kendisine yer bulan silahlı örgüt suçunda; silah suçun unsurudur. 314.maddenin 1. Fıkrası kapsamında silahlı örgüt suçunun; millete ve devlete karşı suçların dördüncü bölümünde yer alan devletin Güvenliğine Karşı Suçlar ile beşinci bölümünde yer alan Anayasal Düzene ve Bu Düzenin İşleyişine Karşı Suçları işlemek amacıyla kurulan örgüt kapsamında işlenmesi durumunda faillerin bu kapsamda cezalandırılacağı ifade edilmek tahdidi şekilde bir düzenleme mevcut olduğu anlaşılmaktadır. Farklı bir amaçla kurulan ve fakat silahlı olan örgütün TCK 314 kapsamında değerlendirilmesi mümkün değildir.[4] Terör örgütü amaç ve bu amaçlara erişmek gayesiyle uyguladığı yöntemler dolayısıyla diğer örgütlerden ayrılmaktadır.[5] Silahlı terör örgütü; baskı ve yıldırma yönetimi kullanmak suretiyle; sayılan amaçlar yanında siyasi maksatlı faaliyetler göstermektedir. Bu amaçlar gerçekleştirilirken kullanılan araçlar silahlardır. Bu silahların örgüt tarafından kullanılabilir nitelikte olması örgüt açısından elverişlilik unsurunu ifade etmektedir.[6]

Örgütün silahlı örgüt olarak nitelendirilmesi için bir kısım örgüt üyelerinin silahlı olması yeterlidir. Üyelerin her birinde silah olması gerekmez.[7] Örgüt tarafından sahip olunan silahların ne şekilde elde edildiği ve mülkiyetinin kime olduğuna bakılmaksızın; örgüt elinde bulunan silahları istediği zaman ve durumda kullanabiliyorsa silahlı olduğuna şüphe yoktur.[8]

Sayılan amaç ve saikleri gerçekleştirmek üzere başvurmuş oldukları yöntemlerle, silahla elverişlilik unsurunu sağlayarak faaliyet gösteren topluluğun örgüt olabilmesi için; en az 3 kişinin olması gerekmektedir. [9]

---

[1] Yargıtay 16.CD, 24.04.2017 tarih, 2015/3 Esas, 2017/3 Karar

[2] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=3713&MevzuatTur=1&MevzuatTertip=5 Erişim tarihi 14.07.2024

[3] Murat Balcı, Kerim Çakır, Neşat Başoğlu, Terörizmin Finansmanı Suçu - Silahlı Terör Örgütüne Yardım Suçu Ve Bu Suçların Ayrımı, Adalet Yayınevi, 2022, 1. Baskı, s 21

[4] Ahmet Çağrı Yılmaz, Ceza Hukukunda Örgütlü Suçlar, Seçkin Yayıncılık,2023,1.Baskı, s 323 vd

[5] Faruk Yasin Turinay, Ceza Hukukunda Terör Amaçlı Örgütlenme Suçu, Seçkin Yayıncılık,2018,1. Baskı, s 222

[6] Yargıtay CGK, 26.09.2017 tarih, 2017/16-956 Esas, 2017/370 Karar

[7] Ahmet Çağrı Yılmaz, Ceza Hukukunda Örgütlü Suçlar, Seçkin Yayıncılık,2023,1.Baskı, s 323

[8] Yargıtay CGK, 26.09.2017 tarih, 2017/16-956 Esas, 2017/370 Karar

[9] Faruk Yasin Turinay, Ceza Hukukunda Terör Amaçlı Örgütlenme Suçu, Seçkin Yayıncılık,2018,1. Baskı, s 219

Silahlı terör örgütüne üye olmak suçu, örgüt üyesinin başkaca bir suç işlemesine gerek olmaksızın yalnızca örgüt üyesi olmasıyla işlendiğinden dolayı tehlike suçudur.[10] İlgili suçun tehlike suçu olduğu yönünde herhangi bir ihtilaf bulunmuyor ise de; somut/soyut tehlike suçu olup olmadığı yönünde değerlendirmede; örgüt üyesi olarak suçun tamamlanması gerekçesiyle soyut tehlike suçu olduğunu kabul eden görüş yanında, yöntem ve elverişlilik unsuru değerlendirilmek suretiyle somut tehlike suçu olduğu da kabul edilmektedir.[11]

SİLAHLI ÖRGÜTE ÜYELİK SUÇU YÖNÜNDEN TCK 221/4. FIKRASI 1. VE 2. CÜMLE AYRIMINDA ETKİN PİŞMANLIK

Örgüte koşulsuz itaat etmek suretiyle; Örgüt hiyerarşisine belirli bir görev üstlenerek dahil olan örgüt üyelerinin etkin pişmanlık göstermeleri mümkündür. Bu husus TCK 221.maddesinde hüküm altına alınmıştır.

Örgütlü suçlar yönünden uygulanmak üzere kanunda düzenlenen etkin pişmanlık kurumunun birden fazla amacı olmakla birlikte; örgütlerin eylemlerini ve faaliyetlerini önlemek bu doğrultuda suç işlemelerinin önüne geçmek üzere gerçekleştirilecek her türlü eylemde öncelikli olarak ilgili örgüt çatısı altında yer alan mensupların vermiş oldukları bilgileri kullanarak örgüt üyelerini bu noktada örgüte karşı mücadele de kullanmak bu amaçlardan biridir. Diğer amaç; örgüt üyesi olan ancak örgütün işlemeyi hedeflediği suçları işlemesinin önüne geçmek suretiyle etkin pişmanlık gösteren kişilerin geri kazandırılmasıdır. Bu suretle örgüt mensuplarına kimi durumlarda ceza verilmezken kimi durumlar için cezalarında indirim öngörülmüştür.[12]

Ancak dikkat edilmesi gereken husus TCK 221/4.cümle kapsamında gerek 1.cümlede yer alan ceza verilmesine yer olmadığı kararı gerek 2. Cümle uyarınca hükmolunan etkin pişmanlık indirimi yalnızca 4. Fıkra kapsamında sayılan suçlar yönünden uygulanabilir olduğudur. Örgüt üyelerinin fıkrada sayılan suçlar dışında örgüt kapsamında işledikleri başka suçların bulunması halinde, işledikleri söz konusu suçlardan ayrıca cezalandırılacaklardır .[13]

Etkin pişmanlık kurumunun temelde nihai amacı; örgüte mensup kazandırılmasına engel olmak, örgütün yok edilmesini sağlamak ve örgüt gerçekleştirilen faaliyetlerin su yüzüne çıkarılmasının sağlanması, gelecekte gerçekleşmesi muhtemel olan faaliyetlere engel olunmasıdır.[14]

Kişi şahsi cezasızlık kapsamında değerlendirilen etkin pişmanlık halinde suç işlediği halde etkin pişmanlığın getirisi olarak 1. Cümle kapsamında cezalandırılmaz ya da 2. Cümle kapsamında cezasında indirim yapılır. [15]

Örgüt üyesinin zamansal olarak, yakalanmadan önce; gönüllü şekilde; göstermiş olduğu etkin pişmanlık iradesi 1.cümle ve 2.cümleyi birbirinden ayırır. İlk cümle de kişi kendi iradesi ile dışarıdan herhangi bir zorlamadan teslim olmak suretiyle mensup olduğu örgüte ilişkin bilgiler ermek suretiyle pişmanlık göstermektedir. Burada teslimiyet gerekçesi bir önem arz etmez. Temel gereklilik iradi teslimiyettir.[16]

---

[10]Tülay Kitapçıoğlu Yüksel, Silahlı Örgütlenme Suçu, Ankara Üniversitesi Hukuk Fakültesi Dergisi, 2023, 72 (1), s 315

[11] Ceren Sedef Eren, İfade Özgürlüğü Bağlamında Terör Örgütü Üyeliği Suçu, Seçkin Yayıncılık,2020,1.Baskı, s 103

[12] Yargıtay CGK, 08.04.2008 tarih, 2008/9-18 Esas, 2008/78 Karar

[13] Cihan Kavlak, Suç İşlemek Amacıyla Örgüt Kurma Suçu, Seçkin Yayınları, Eylül 2017, 3. Baskı, s 460

[14] Yargıtay CGK, 08.04.2008 tarih, 2008/9-18 esas, 2008/78 karar

[15] Eshat Özkul, Nurullah Bodur, Uygulamada Terör Örgütü Ve Terör Suçları, Seçkin Yayınları, Ocak 2022,6. Baskı, s 286

[16] Yargıtay CGK ,12.07.2023 tarih, 2023/138 Esas, 2023/401 Karar

Silahlı Örgüt üyeliği suçu temadi eden bir suçtur. Kişinin yakalanması ile temadi kesilir. Aynı doğrultuda kişinin kendi rızasıyla kolluk kuvvetlerine teslim olması da temadiyi keser.
Usulüne uygun olarak çıkartılan yakalama kararı sonrasında ilgili kararı öğrenen sanığın beyan vermek üzere kendisinin gönüllü olarak kolluk kuvvetlerine gitmiş olduğu durumda; kişi etkin pişmanlığının şartları sağlayacak düzeyde bilgi vermek suretiyle beyanda bulunmuş ise pişmanlığı TCK 221/4-1. Cümle kapsamında değerlendirilir.[17]
Hakkında silahlı terör örgütüne üye olma suçundan yürütülmekte olan bir soruşturma olduğunu bilen, hakkında yakalama kararı çıkartılan; bu suretle evinde arama gerçekleştirilmesi sonrasında yakalama kararını öğrenen; kendiliğinden kolluk birimlerine başvurarak beyanda bulunan kişinin beyanları mahiyeti itibari ile TCK 221/4-2.cümle kapsamında tartışılmalıdır. [18]
Sanık çıkartılan yakalama kararına binaen fiili bir yakalama sonrasında beyanda bulunmuş ve yine etkin pişmanlık şartlarını sağlandığı kanaatine varılmış ise sanığın pişmanlığı 2. Cümle kapsamında değerlendirilir.
Dolayısıyla kişi hakkında uygulanacak olan kanun maddesinin belirlenmesi açısından tereddüt hasıl olduğu durumda; kişinin kendisinin mi teslim olduğu yahut yakalanmak suretiyle mi beyan verdiği hususunun netleştirilmesi sonrasında verilen bilgilerin mahiyeti itibari ile etkin pişmanlık hususu tartışılmalıdır.[19]

SİLAHLI ÖRGÜTE ÜYELİK SUÇU YÖNÜNDEN TCK 221/4-2.CÜMLE KAPSAMINDA ETKİN PİŞMANLIK UYGULAMASI

Etkin pişmanlık iradesi yalnızca pişmanlığın sözlü olarak dile getirilmesi şeklinde gerçekleşmeyip pişman olduğunu ifade etmek suretiyle beyanda bulunan kişi bunu aynı doğrultudaki davranışları ile de göstermelidir.[20] Örgütün yapısı işleyişi ve faaliyetlerinden bahsetmeyerek yalnızca diğer örgüt mensuplarının kimler olduğunun beyan edilmesi etkin pişmanlık için yeterli değildir.[21]
Örgüt üyesi tarafından verilen bilgilerin örgüt içerisinde kaldığı süre ve konumu ile uyumlu olması beklenir. Ancak kişinin etkin pişmanlık kapsamında vermiş olduğu bilgilerin niteliği değerlendirilirken örgüt yapısının dikkate alınması gerekmektedir. Şöyle ki hücre tipi yapılanmaya sahip olan örgütler hakkında etkin pişmanlıkta bulunan kişilerin bu hücre yapılanması dolayısıyla verebilecekleri bilgilerin kapsamının kendi konumu ile orantılı olacağı değerlendirilerek etkin pişmanlığının bu noktadaki samimiyeti mahkemece takdir edilerek TCK 221 /4.maddenin uygulama olanağı bulup bulamayacağı tartışılır.[22]
Silahlı terör örgütüne üye olmak suçundan yargılanan sanığın etkin pişmanlık kapsamında vermiş olduğu bilgiler doğrultusunda ilgili maddeden yararlanması için gerekli olan kriterlerden birisini verilen bilgilerin yararlı mahiyette olup olmadığı hususu oluşturmaktadır. Örgüt hiyerarşi içerisinde farklı kademelerde yer alan kişilerin üstlendikleri görevin niteliği ile alakalı olarak örgüt adına sahip oldukları bilgiler farklılık göstereceği gibi, her bir kademenin yürüttüğü faaliyet ve görev kişilere farklı kademedekilerle iletişim içerisinde olma ve ortak hareket etme, emir talimat verme yetkisi verir.

[17] Yargıtay 3.CD, 02.03.2022 tarih, 2021/3742 Esas, 2022/1025 Karar
[18] Yargıtay 3.CD, 27.01.2022 tarih, 2021/8412 Esas, 2022/275 Karar
[19] Yargıtay 16.CD, 26.03.2018 tarih, 2017/3063 Esas, 2018/858 Karar
[20] Yargıtay 16.CD, 26.10.2015 tarih, 2015/1565 Esas, 2015/3464 Karar
[21] Eshat Özkul, Nurullah Bodur, Uygulamada Terör Örgütü Ve Terör Suçları, Seçkin Yayınları, Ocak 2022, 6. Baskı, s 293
[22] Yargıtay CGK, 12.07.2023 tarih, 2023/138 Esas, 2023/401 Karar

Bu doğrultuda örgüt adına üstlenilen görevin getirisi ile kişiler örgüt içerisinde konumlarına göre farklı sayı ve görevdeki kişiyi teşhis edebilir, faaliyetler hakkında bilgi sahibi olabilir.
İlgili doğrultuda etkin pişmanlık kapsamında beyanda bulunduğu anlaşılan sanık beyanlarının yararlı bilgi olup olmadıkları hususu kolluk birimlerinden sorulur. Kolluk kuvvetlerince hiyerarşi içerisinde bulunan sanığın beyanlarının konumu ile uyumlu olup olmadığı, beyanlarında geçen şahıslar hakkında adli tahkikat yürütülüp yürütülmediği, ilgili beyanların başka adli tahkikatlerin gidişatına etkili olup olmadığı hususu araştırılmak suretiyle mahkemesine gönderilir. Mahkemece ilgili hususlar doğrultusunda yapılacak değerlendirme ile etkin pişmanlık koşullarının somut olayda var olup olmadığı yönünde değerlendirme yapar.[23]
Örgüt içerisindeki hiyerarşide yer alan kişi etkin pişmanlıktan yararlanmak istediği takdirde kendisinin örgüt bağlantısı başta olmak üzere; örgüt adına bildiği her şeyi samimi olarak ikrar etmelidir. Hiyerarşiye ne şekilde ve kim tarafından nasıl dahil olduğu veyahut dahil edildiği, örgüt içerisindeki konumu, konumu ve verilen görev itibari ile ilişkili olduğu kimseler, hiyerarşi içerisinde yer aldığı dönemde örgüt tarafından gerçekleştirdiği faaliyetler örgüt tarafından gerçekleştirildiğinden haberdar olduğu eylemler ve söz konusu eylemleri gerçekleştirenler hakkında bilgi verilmelidir.
Örgüt üyesi tarafından verilen bilginin mahiyeti hükmolunacak olan cezanın belirlenmesinde esas alınır.[24] Keza burada örgüt üyesinin etkin pişmanlıktan yararlanmasını mümkün kılacak mahiyetteki bilgi 3. Fıkra hükümlerinden ayrıdır. 3 fıkrada verilmesi beklenen şekilde örgütü sona erdirecek mahiyette bilgi verilmesi aranmaz.[25]
Örgüt üyesi tarafından; diğer örgüt üyeleri, örgüt faaliyetleri kapsamında bilgi verildiğinin anlaşılmış olduğu durumlarda örgüt üyesinin ; fiili durumlara ilişkin hukuku vasıflandırılmaları kabul etmemiş olması durumu; yararlı ve yeterli bilgi verdiği durumda; sanık hakkında etkin pişmanlık uygulanmasına engel değildir.[26]
Atılı silahlı terör örgütüne üye olma suçu yönünden yürütülen soruşma/kovuşturma aşamasında etkin pişmanlık hükümlerinden yararlanmak istediğini beyan ve bu kapsamda bilgi veren şüpheli/sanık hakkında; vermiş olduğu beyanlar doğrultusunda TCK 221/4-2.cümle kapsamında etkin pişmanlık hükümlerinin uygulanıp uygulanmayacağı hususunun mahkemece değerlendirilmesi gerekmektedir.[27]
Yine örgüt üyesi tarafından etkin pişmanlık kapsamında verilmiş olduğu anlaşılan bilgilerin; kolluk kuvvetlerince daha önce biliniyor olması hususu sanığa etkin pişmanlık hükümlerinin uygulanmasına engel değildir.[28]
Etkin pişmanlık uygulanması yönündeki şartların 1. Cümle kapsamında somut olay yönünden tümüyle sağlandığı kanaatine varılmış olması durumunda; Cumhuriyet Savcıları tarafından kamu davasının açılmasına yer olmadığı kararı verilebileceği görüşü hakim olmakla; uygulama da bu yöndedir. İlgili kanunun dayanağını CMK 171.maddesinin 1.fıkrası oluşturur.[29] Cumhuriyet Savcısına cezayı kaldıran şahsi sebep olarak etkin pişmanlık hükümlerinin varlığı halinde Kamu davasının açılmasına yer olmadığı kararını verebilmesi hususunda takdir yetkisi tanınmıştır. Ancak cumhuriyet savcısı söz konusu yetkiyi kullanmayarak iddianame tanzim edebilir.

[23] Yargıtay 16.CD, 08.02.2016 tarih, 2015/8775 Esas, 2016/568 Karar
[24] Yargıtay 16.CD, 12.05.2015 tarih, 2015/1426 Esas, 2015/1292 Karar
[25] Yargıtay 16.CD, 08.06.2020 tarih, 2019/12181 Esas, 2020/2904 Karar
[26] Yargıtay 3.CD, 30.11.2022 tarih, 2021/17590 Esas, 2022/8730 Karar
[27] Yargıtay 9.CD, 05.03.2011 tarih, 2012/450 Esas, 2012/2884 Karar
[28] Yargıtay 16.CD, 12.05.2015 tarih, 2015/1426 Esas, 2015/1292 Karar
[29] Cihan Kavlak, Suç İşlemek Amacıyla Örgüt Kurma Suçu, Seçkin Yayınları, Eylül 2017, 3. Baskı, s 461

Bu durumda açılan davada mahkemece şartların sağlandığına kanaat getirilirse mahkemece ceza verilmesine yer olmadığı kararına hükmedilir. Ancak 2. cümle yönünden iddianame düzenlenmesi zorunludur. Açılan dava üzerine yapılan yargılamada mahkemece 2. Cümle yönünden etkin pişmanlık hükümlerinin somut olayda mevcut olduğu kanaatine varırsa; 2. cümle kapsamında etkin pişmanlık indiriminin hangi oranda yapılacağı hususuna karar verilmelidir. Bu oran belirlenirken; örgüt çatısında yer alan diğer üyeler ve suçların tespit edilmesi noktasında verilen bilgilerin yararlılık derecesi [30], soruşturma ve kovuşturma aşamasında beyan edilen bilgilerin mahiyeti ve etkin pişmanlık iradesinin hangi aşamada gerçekleştiği hususu önem arz etmektedir.[31]

Bu doğrultuda Sanığın üzerine atılı silahlı terör örgütüne üye olma suçunu işlediğinin sabit olduğu kanaatine varılması üzerine; mahkeme silahlı terör örgütüne üye olma suçu yönünden TCK 314/2. Fıkra kapsamında TCK 61.madde de belirtilen durumları da esas almak suretiyle temel cezayı belirler. 3713 sayılı TMK'nın 3. maddesinde belirtili silahlı terör örgütüne üye olma suçunun mutlak terör suçlarından olması dolayısıyla sanığın cezasında TMK'nın 5/1 maddesi gereğince yarı oranında artırım yapılır. Sanığın beyanlarının etkin pişmanlık kapsamında değerlendirilmek suretiyle hakkında TCK 221/4-2.cümle hükümlerinin uygulanması gerektiği kanaatine varılmış olması durumunda bu aşamada cezasında 1/3 ile 3/4 oranları arasında indirim yapılır. Olası takdiri indirim sebeplerinin bulunması durumunda etkin pişmanlık indirimi sonrasında takdiri indirim uygulanması mümkündür.

Hakkında etkin pişmanlık hükümleri uygulanan kişiler yönünden adaptasyon sürecinin zorluğu ve emniyet sorunu dolayısıyla denetim hükümleri öngörülmüştür. TCK 221/4. Madde 1. Cümle ile 2. Cümle hükümleri arasında denetim hükümlerinin uygulanmasında herhangi bir farklılık bulunmamaktadır.[32]

Kişiler hakkında uygulanacak olan etkin pişmanlık hükümleri TCK 221/6. Madde uyarınca yalnızca 1 kez uygulanabilir. Birden fazla kez uygulanması mümkün değildir.

Sanık tarafından verilen her türü bilginin etkin pişmanlık kapsamında değerlendirilmesi mümkün değildir. Sanık etkin pişmanlıktan yararlanacağını ifade etmiş olması karşısında üyesi bulunduğuna kanaat getirilen örgütün yapısı ve faaliyetleri kapsamında kanunda yer alan etkin pişmanlık hükümlerinin gerektirdiği ölçüde yeterli sayılacak düzeyde bilgi vermediğinin anlaşılması durumunda etkin pişmanlık hükümlerinden yararlanması mümkün değildir.[33]

Sanığın kendisi ile örgüt arasında; bağlantının kurularak hiyerarşiye katılma sürecine ve bu sürece katkı sağlayanlara ilişkin olarak samimi beyanlarda bulunulmaması durumunda sanık hakkında etkin pişmanlık hükümleri uygulanmaz.[34]

Etkin pişmanlık kapsamında vermiş oldukları önceki beyanlarından dönen sanıklar hakkında etkin pişmanlık hükümleri uygulanması olanağı yoktur.[35] İnkar yollu beyanlarda bulunan örgüt üyesi beyanları dışında; etkin pişmanlık adı altında yararlı ve yeterli bilgi vermeyerek etkin pişmanlık şartlarını sağlamayanlara da yasada bulunan etkin pişmanlık hükümleri uygulanmaz.[36]

---

[30] Yargıtay 3.CD, 29.12.2022 tarih, 2021/10522 Esas, 2022/10233 Karar
[31] Yargıtay 3.CD, 29.12.2022 tarih, 2021/10451 Esas, 2022/10355 Karar
[32] Erdener Yurtcan, Yargıtay Kararları Işığında Kamu Barışına Karşı Suçlar ,Seçkin Yayınları,Haziran 2020,2. Baskı, S 451
[33] Yargıtay 9.CD, 14.05.2007 tarih, 2006/7296 Esas, 2007/4161 Karar
[34] Yargıtay 16. CD, 10.05.2017 tarih, 2017/1219 Esas, 2017/3938 Karar
[35] Yargıtay CGK, 12.07.2023 tarih, 2023/138 Esas, 2023/401 Karar
[36] Yargıtay 9.CD, 23.06.2016 tarih, 2006/201 Esas, 2006/1821 Karar

Ancak kanunun amaç kapsam ve gerekçesine aykırı şekilde etkin pişmanlık hükümleri uygulanmaması gerektiği halde hatalı uygulama ile lehine etkin pişmanlık hükümleri uygulanan sanık hakkında aleyhe istinaf/temyiz bulunmaması durumunda bu durum bozma nedeni yapılamaz.[37]

SONUÇ

Etkin pişmanlık kurumu söz konusu silahlı örgüte üye olmuş ancak bundan samimi olarak pişmanlık duymak suretiyle örgüt yapısı faaliyetleri gibi bilgileri anlatmak suretiyle örgütün sona erdirilmesine katkı sağlanması, etkin pişmanlıkta bulunan bireylerin yaşadıkları pişmanlık gözetilerek topluma geri kazandırılması gibi farklı açılardan önem arz eden bir kurumdur. Her türlü bilginin bu kapsamda değerlendirilmesi mümkün değil ise de tamamen rızaya dayalı olarak verilen önemli ve yararlı bilgiler kişinin örgüt ile organik bağı bulunduğu süreçte hiyerarşi içerisinde yer aldığı konuma uygun şekilde anlatıldığı takdirde; TCK 221/4 kapsamında değerlendirmesi yapılmalıdır. Ancak burada kişinin etkin pişmanlık iradesinin yakalanmadan önce mi yoksa sonra mı gerçekleştirilmiş olduğu hususu verilecek olan hükme doğrudan etkili olduğundan söz konusu hususun tereddüte mahal vermeyecek düzeyde tespit edilmesi gerekmektedir. Yakalanmadan önce söz konusu şekilde etkin pişmanlıkta bulunulmuş olması durumunda 1.cümle kapsamında bir cezasızlık hali karşımıza çıkmaktayken, yakalanmadan sonraki etkin pişmanlık iradesinde cezada indirim yapılması gerekmektedir. İndirim kişinin etkin pişmanlığı ile orantılı düzeyde olmalıdır. Söz konusu husus hakkaniyet ilkesinin bir gereğidir. Ancak etkin pişmanlık iradesinden dönenler hakkında etkin pişmanlık uygulanmaz.

KAYNAKÇA

Ahmet Çağrı Yılmaz, Ceza Hukukunda Örgütlü Suçlar, Seçkin Yayıncılık, 2023, 1.Baskı

Ceren Sedef Eren, İfade Özgürlüğü Bağlamında Terör Örgütü Üyeliği Suçu, Seçkin Yayıncılık,2020,1.Baskı

Cihan Kavlak, Suç İşlemek Amacıyla Örgüt Kurma Suçu, Seçkin Yayınları, Eylül 2017, 3. Baskı, s 460

Erdener Yurtcan, Yargıtay Kararları Işığında Kamu Barışına Karşı Suçlar ,Seçkin Yayınları, Haziran 2020,2. Baskı

Eshat Özkul, Nurullah Bodur, Uygulamada Terör Örgütü Ve Terör Suçları, Seçkin Yayınları, Ocak 2022,6. Baskı

Faruk Yasin Turinay, Ceza Hukukunda Terör Amaçlı Örgütlenme Suçu, Seçkin Yayıncılık,2018,1. Baskı

Murat Balcı, Kerim Çakır, Neşat Başoğlu, Terörizmin Finansmanı Suçu - Silahlı Terör Örgütüne Yardım Suçu Ve Bu Suçların Ayrımı, Adalet Yayınevi, 2022, 1. Baskı

Tülay Kitapçıoğlu Yüksel, Silahlı Örgütlenme Suçu, Ankara Üniversitesi Hukuk Fakültesi Dergisi, 2023, 72 (1)

https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=3713&MevzuatTur=1&MevzuatTertip=5 Erişim tarihi 14.07.2024

Yargıtay CGK, 26.09.2017 tarih, 2017/16-956 Esas, 2017/370 Karar

Yargıtay CGK, 08.04.2008 tarih, 2008/9-18 Esas, 2008/78 Karar

Yargıtay CGK, 12.07.2023 tarih, 2023/138 Esas, 2023/401 Karar

Yargıtay 3.CD, 02.03.2022 tarih, 2021/3742 Esas, 2022/1025 Karar

[37] Erdener Yurtcan, Yargıtay Kararları Işığında Kamu Barışına Karşı Suçlar , Seçkin Yayınları, Haziran 2020, 2. Bası, s 451

Yargıtay 3.CD, 27.01.2022 tarih, 2021/8412 Esas, 2022/275 Karar
Yargıtay 3.CD, 30.11.2022 tarih, 2021/17590 Esas, 2022/8730 Karar
Yargıtay 3.CD, 29.12.2022 tarih, 2021/10522 Esas, 2022/10233 Karar
Yargıtay 3.CD, 29.12.2022 tarih, 2021/10451 Esas, 2022/10355 Karar
Yargıtay 9.CD, 05.03.2011 tarih, 2012/450 Esas,2012/2884 Karar
Yargıtay 9.CD, 14.05.2007 tarih, 2006/7296 Esas, 2007/4161 Karar
Yargıtay 9.CD, 23.06.2016 tarih, 2006/201 Esas, 2006/1821 Karar
Yargıtay 16.CD, 24.04.2017 tarih, 2015/3 Esas, 2017/3 Karar
Yargıtay 16.CD, 26.03.2018 tarih, 2017/3063 Esas, 2018/858 Karar
Yargıtay 16.CD, 26.10.2015 tarih, 2015/1565 Esas, 2015/3464 Karar
Yargıtay 16.CD, 08.02.2016 tarih, 2015/8775 Esas, 2016/568 Karar
Yargıtay 16.CD, 12.05.2015 tarih, 2015/1426 Esas, 2015/1292 Karar
Yargıtay 16.CD, 08.06.2020 tarih, 2019/12181 Esas,2020/2904 Karar
Yargıtay 16.CD, 10.05.2017 tarih, 2017/1219 Esas, 2017/3938 Karar

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

TÜRK CEZA MUHAKEMESİ HUKUKUNDA HÂKİMİN YASAKLILIĞI, REDDİ VE ÇEKİNMESİ

Dr. Ülkem Cansu AYGÜN KARAKOYUNLU
Yeditepe Üniversitesi Hukuk Fakültesi
ORCID: 0000-0001-6728-5993

ÖZET
Türk ceza muhakemesi hukukunda hâkimin yasaklılığı, reddi ve çekinmesi kurumu adil yargılama yapmak suretiyle maddi gerçeğe ulaşılabilmesinde önemli bir rol oynamaktadır. Nitekim adil yargılama yükümlülüğü olan hâkimin tarafsız olması gerekir. Tarafsızlık hâkimin önüne gelen davada taraflara eşit mesafede durabilmesi ve bunu görüntü olarak sergileyebilmesidir. Hâkimin tarafsızlığının güvence altına alınması gerekmekte olup, bu doğrultuda Ceza Muhakemesi Kanunu'nun (CMK) 22- 31. maddelerinde hâkimin yasaklılığı, reddi ve çekinmesi kurumu düzenlenmektedir. Yasaklılık, CMK'da tahdidi olarak sayılan hallerin varlığı durumunda, hâkimin hiçbir şekilde davaya bakamaması veya yargılamaya katılamamasıdır. Ret ise, davada yasaklılık halleri veya tarafsızlığı şüpheye düşürecek sebepler söz konusu olduğunda, tarafların hâkimin davadan çekilmesini talep etmesidir. Yasaklılık hallerinin aksine tarafsızlığı şüpheye düşürecek sebepler somut olaya göre belirlenmektedir. Çekinme, yasaklılık halleri veya tarafsızlığı şüpheye düşürecek sebepler var olduğunda hâkimin davadan bizzat kendisinin çekilmesidir. Diğer yandan zabıt kâtibi ve Cumhuriyet savcısının tarafsız olup olmaması hâkimin tarafsızlığı açısından önem arz etmektedir. Nitekim zabıt kâtibi ve Cumhuriyet savcısı hâkimle aynı adlî teşkilat bünyesinde çalışmaktadır. Hâkimin adil yargılama yapmak suretiyle maddi gerçeğe ulaşmasında kendisine yardım eden zabıt kâtibi ile Cumhuriyet savcısının tarafsız bir şekilde görevlerini icra etmeleri gerek soruşturma gerekse kovuşturma sürecinin adil bir şekilde ilerleyebilmesi açısından büyük rol oynamaktadır. Bu doğrultuda CMK'nın 32. maddesinde konumu itibariyle tarafsız olması gereken zabıt kâtibinin yasaklılığı ve reddi düzenlenmektedir. Cumhuriyet savcısı açısından ise, tarafsız olup olmadığının sonucuna göre değerlendirilebilecek olan yasaklılık, ret ve çekinme kurumu, CMK'da yer almamaktadır. Ancak hâkim ve zabıt kâtibinde olduğu gibi şahıs itibariyle tarafsız olması gereken Cumhuriyet savcısının da yasaklılığı, reddi ve çekinmesine ilişkin hükümlere CMK'da yer verilmelidir. Nitekim gerek zabıt kâtibinin gerekse Cumhuriyet savcısının tarafsızlığı doğrudan olmasa da dolaylı olarak hâkimin bağımsızlığını ve tarafsızlığını desteklemektedir.
Anahtar Kelimeler: Hâkimin Tarafsızlığı, Hâkimin Yasaklılığı, Reddi ve Çekinmesi, Cumhuriyet Savcısının Tarafsızlığı.

IN TURKISH CRIMINAL PROCEDURE LAW PROHIBITION, REFUSAL AND RECUSAL OF THE JUDGE

ABSTRACT
In Turkish criminal procedure law, the institution of prohibition, refusal and recusal of the judge plays an important role in reaching the material truth by conducting a fair trial. As a matter of fact, the judge who has the obligation of fair trial must be impartial. Impartiality is the judge's ability to stand at an equal distance to the parties in the case before him or her and to display this publicly. The impartiality of the judge must be guaranteed, and to this end, Articles 22-31 of the Code of Criminal Procedure (CPC) regulate the prohibition, refusal and recusal of judges.

Prohibition is the inability of the judge to hear the case or participate in the proceedings in any way in the presence of the circumstances listed in the Criminal Procedure Code. Refusal is the personal withdrawal of the judge from the case when there are prohibited circumstances or reasons that may cast doubt on impartiality. On the other hand, the impartiality of the minutes clerk and the public prosecutor is important for the impartiality of the judge. As a matter of fact, the minutes clerk and the public prosecutor work within the same judicial organization as the judge. The impartial performance of the duties of the minutes clerk and the public prosecutor, who assist the judge in reaching the material truth by conducting a fair trial, plays a major role in terms of the fair progress of both the investigation and the prosecution process. In this regard, Article 32 of the CMK regulates the prohibition and recusal of the minutes clerk, who must be impartial due to his/her position. For the public prosecutor, the institution of prohibition, rejection and recusal, which can be evaluated according to the result of whether he/she is impartial or not, is not included in the CMK. However, provisions regarding the prohibition, rejection and recusal of the public prosecutor, who must be impartial as a person, should be included in the CMK, just like the judge and the minutes clerk. Indeed, the impartiality of both the minutes clerk and the public prosecutor indirectly, if not directly, supports the independence and impartiality of the judge.

Keywords: Impartiality of the Judge, Prohibition of the Judge, Refusal and Recusal of the Judge, Neutrality of the Public Prosecutor

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

UZMAN GÖRÜŞÜ VE SWARA AĞIRLIKLANDIRMASI İLE TEDARİKÇİ SEÇİMİ: TOPSIS ANALİZİ

Simge EŞSİZ
Osmaniye Korkut Ata Üniversitesi, Endüstri mühendisliği Bölümü
ORCID: 0009-0007-1717-7063

Dr. Öğretim Üyesi Yusuf FEDAİ
Osmaniye Korkut Ata Üniversitesi, Endüstri mühendisliği Bölümü
ORCID: 0000-0003-4546-8830

ÖZET
Tedarikçi seçimi, işletmenin rekabet gücünü artırarak, maliyetleri düşürmek, kaliteyi yükseltmek ve müşteri memnuniyetini sağlamak gibi hedeflere katkıda bulunabilir. Bu nedenle, iyi bir tedarikçi seçim süreci, işletmenin uzun vadeli başarısı için hayati öneme sahiptir. Tedarikçi seçiminin yapılmasında kullanılan birçok, çok kriterli karar verme yöntemleri bulunmaktadır. Bu çalışma, bir mobilya işletmesinin tedarikçi seçim sürecini çok kriterli karar verme yöntemleri olan TOPSIS ve SWARA kullanarak değerlendirmeyi amaçlamaktadır. Tedarikçi seçim süreci, işletmelerin verimliliği ve rekabet gücü açısından kritik öneme sahiptir. Bu bağlamda, TOPSIS yöntemi ile tedarikçiler çeşitli kriterler doğrultusunda sıralanmış ve en uygun tedarikçi belirlenmiştir. Ancak, kriterlerin ağırlıklandırılmasında iki farklı yaklaşım benimsenmiştir: uzman görüşü ve SWARA yöntemi. Uzman görüşü ile kriterler ağırlıklandırılarak TOPSIS analizi yapılmış ve ardından SWARA yöntemi ile ağırlıklandırılmış kriterler kullanılarak TOPSIS analizi tekrarlanmıştır. Sonuç olarak, iki farklı ağırlıklandırma yöntemi ile elde edilen sonuçlar karşılaştırılmış ve aralarındaki farklar tartışılmıştır. Çalışmada iki farklı ağırlık seti kullanılmış olup aralarındaki benzerlik oranı korelasyon katsayısı hesaplanarak %90 bulunmuştur. Samsa Orman Ürünleri en iyi alternatif olarak seçilmiştir. Onu takip eder şekilde Ender Orman Ürünleri ikinci sırada alternatif olarak seçilmiştir. Bu karşılaştırma, tedarikçi seçiminde hangi ağırlıklandırma yönteminin daha tutarlı ve güvenilir sonuçlar verdiğini ortaya koymayı hedeflemektedir. Çalışma, mobilya işletmeleri için tedarikçi seçimi sürecinde kullanılabilecek etkili bir rehber sunmaktadır.
Anahtar Kelimeler: Çok Kriterli Karar Verme, TOPSIS, SWARA, Tedarikçi Seçimi, Mobilya

SUPPLIER SELECTION WITH EXPERT OPINION AND SWARA WEIGHTING METHOD: TOPSIS ANALYSIS

ABSTRACT
Supplier selection can contribute to increasing a company's competitiveness, reducing costs, improving quality, and ensuring customer satisfaction. Therefore, a good supplier selection process is vital for the long-term success of a business. There are many multi-criteria decision-making methods used for supplier selection. This study aims to evaluate the supplier selection process of a furniture company using the multi-criteria decision-making methods TOPSIS and SWARA. The supplier selection process is critical for the efficiency and competitiveness of businesses. In this context, suppliers are ranked according to various criteria using the TOPSIS method, and the most suitable supplier is determined.

However, two different approaches have been adopted for weighting the criteria: expert opinion and the SWARA method. Criteria were weighted using expert opinion and a TOPSIS analysis was performed, followed by another TOPSIS analysis using criteria weighted by the SWARA method. As a result, the outcomes obtained with the two different weighting methods were compared and the differences were discussed. Two different weight sets were used in the study, and the similarity rate between them was found to be 90% by calculating the correlation coefficient. Samsa Forest Products has been chosen as the best alternative. Following this, Ender Orman Ürünleri was chosen as the second alternative.This comparison aims to reveal which weighting method provides more consistent and reliable results in supplier selection. The study provides an effective guide for the supplier selection process for furniture companies.
Keywords: Multi-Criteria Decision Making, TOPSIS, SWARA, Supplier Selection, Furniture

GİRİŞ

Günümüz rekabetçi iş dünyasında, mobilya işletmeleri için tedarikçi seçimi, operasyonel verimlilik ve müşteri memnuniyeti açısından kritik bir öneme sahiptir. Doğru tedarikçiyi seçmek, sadece maliyet avantajı sağlamakla kalmaz, aynı zamanda kalite, esneklik ve zamanında teslimat gibi faktörlerde de işletmenin rekabet gücünü artırır. Tedarikçi seçimi, işletmelerin başarısında kritik bir rol oynayan stratejik bir karardır. Doğru tedarikçilerin seçilmesi, işletmelerin rekabet edebilirliğini önemli ölçüde artırır. Tedarikçi seçim süreci, aday tedarikçi seçimi, tedarikçi ön seçimi ve tedarikçi son seçimi olmak üzere üç aşamada gerçekleştirilir. Bu süreçte kullanılan başlıca kriterler arasında kalite, maliyet, teslimat performansı, teknoloji, tedarikçi ilişkileri, finansal durum, üretim kapasitesi ve esneklik yer alır. Tedarikçi seçimi, birbirleriyle çatışan sayısal ve sayısal olmayan birçok kriteri içeren çok kriterli bir karar verme problemidir[1].

Tedarikçi seçimi, işletmeler için stratejik öneme sahip bir karardır ve bu sürecin analitik bir şekilde yönetilmesi için çok kriterli karar verme yöntemleri kullanılmalıdır. Bu yöntemlerden biri olan TOPSIS (Technique for Order Preference by Similarity to Ideal Solution), tedarikçi seçiminde yaygın olarak kullanılan etkili bir yöntemdir. TOPSIS yöntemi, alternatifleri ideal çözüme en yakın ve negatif ideal çözüme en uzak olacak şekilde değerlendirir[2].

TOPSIS yönteminin tedarikçi seçiminde izlediği adımlar şunlardır: İlk olarak, tedarikçi adayları ve değerlendirme kriterleri belirlenerek karar matrisi oluşturulur. Daha sonra, farklı ölçü birimlerine sahip kriterlerin karşılaştırılabilir hale gelmesi için normalize edilmiş karar matrisi oluşturulur. Kriterlerin önem ağırlıkları belirlenerek normalize edilmiş karar matrisi ağırlıklandırılır. İdeal ve negatif ideal çözümler belirlenerek, her alternatifin bu çözümlerden uzaklıkları hesaplanır. Son olarak, her alternatifin ideal çözüme göreli yakınlığı hesaplanır ve bu yakınlıklara göre alternatifler sıralanır. TOPSIS yöntemi, kriterlerin önem derecelerini dikkate alarak en uygun tedarikçiyi belirlemede oldukça etkili olup, tedarikçi seçiminde başarılı sonuçlar vermektedir[3].

Bu çalışmada, mobilya sektöründe faaliyet gösteren bir işletme için en uygun tedarikçinin belirlenmesi amacıyla mobilya işletmesinin ustasından alınan bilgiler doğrultusunda ağırlıklar da belirlenmiş oldu. Ayrıca çalışmanın ikinci aşamasında kullanılmak üzere SWARA (Step-wise Weight Assessment Ratio Analysis) yöntemi ile doğru adımlar izlenerek yeni ağırlıklar belirlenmiştir. Belirlenmiş farklı ağırlıklar, TOPSIS yöntemi ile tedarikçiler değerlendirilmiştir. Yapılan analizler, işletmenin gereksinimlerini en iyi şekilde karşılayabilecek tedarikçinin objektif ve sistematik bir yaklaşımla seçilmesine olanak sağlamaktadır.

Bu makale, mobilya sektöründe tedarikçi seçiminin stratejik önemini vurgularken, SWARA ve TOPSIS yöntemlerinin birlikte kullanımının sağladığı avantajları da ortaya koymaktadır.
Çok kriterli karar verme yöntemleri, karmaşık problemlerde birden fazla kriteri dikkate alarak dengeli ve kapsamlı kararlar alınmasını sağlar. Çok kriterli karar verme yöntemleri ile yapılan bazı çalışmalar aşağıdaki gibi ifade edilmiştir.
Çalık, bu çalışmada, bulanık AHP (Analitik Hiyerarşi Süreci) ve bulanık ARAS yöntemlerini kullanarak otomobil lastikleri sektöründe en uygun tedarikçi seçimi yapmayı amaçlamaktadır. Çalışmada öncelikle tedarikçi seçimi kriterleri belirlenmiştir. Daha sonra bulanık AHP yöntemiyle kriter ağırlıkları hesaplanmış ve bulanık ARAS yöntemiyle en uygun tedarikçi seçimi yapılmıştır. Çalışma sonucunda, otomobil lastikleri sektöründe en uygun tedarikçi seçiminde en önemli kriterlerin kalite, teslimat zamanı ve maliyet olduğu belirlenmiştir. Bulanık ARAS yöntemiyle yapılan analiz sonucunda ise en uygun tedarikçi olarak T3 tedarikçisi seçilmiştir[4].
Akdeniz, bu çalışmada, Türkiye'de bireysel otomobil tercihlerini etkileyen faktörleri analiz etmeyi amaçlamaktadır. Çalışmada Analitik Hiyerarşi Süreci (AHP) yöntemi kullanılmıştır. Öncelikle otomobil tercihini etkileyen kriterler belirlenmiş, daha sonra bu kriterlerin önem ağırlıkları hesaplanmıştır. Çalışma sonucunda, Türkiye'de bireysel otomobil tercihlerini etkileyen en önemli kriterlerin yakıt ekonomisi, güvenlik, marka imajı ve görünüm olduğu belirlenmiştir[5].
Akyüz, bu çalışmada, VIKOR çok kriterli karar verme yöntemi kullanılarak bir işletmenin faaliyetleri için en uygun strateji seçilmiştir. İşletme stratejisini etkileyen kriterler belirlenmiş ve karşılaştırmalı analizler yapılmıştır. VIKOR yöntemi uygulanmıştır. İlk olarak karar matrisi oluşturulmuş, kriter ağırlıkları belirlenmiş, ideal ve negatif ideal çözümler hesaplanmıştır. Daha sonra her alternatifin ideal çözüme yakınlığı ve uzaklığı bulunarak sıralama yapılmıştır. VIKOR yönteminin işletme stratejisi seçiminde etkin bir şekilde kullanılabileceği görülmüştür. Yöntemin, çok sayıda kriter dikkate alınarak yapılan karmaşık karar problemlerinde faydalı sonuçlar verdiği sonucuna ulaşılmıştır[6].
Başar ve Yavuzyılmaz, bu çalışmada, AHP, TOPSIS ve VIKOR yöntemlerini kullanarak yazılım ürünlerinin değerlendirilmesi ve seçimi problemini çözmeyi amaçlamaktadırlar. Çalışmada öncelikle yazılım ürünü seçiminde dikkate alınan kriterler belirlenmiştir. Daha sonra AHP yöntemiyle kriter ağırlıkları, TOPSIS ve VIKOR yöntemleriyle de yazılım ürünlerinin sıralaması yapılmıştır. Çalışma sonucunda, yazılım ürünü seçiminde en önemli kriterlerin kullanılabilirlik, güvenilirlik ve sistem gereksinimleri olduğu belirlenmiştir. TOPSIS ve VIKOR yöntemleriyle yapılan analizler sonucunda da en iyi yazılım ürünü olarak X yazılımı seçilmiştir[7].

Mobilya sektöründe, çok kriterli karar verme yöntemleri kullanılarak yapılan bazı çalışmalar:
Kurt Tekez ve Bark, bu çalışmada, Türkiye'de faaliyet gösteren bir mobilya fabrikasının tedarikçi seçimi, bulanık TOPSIS yöntemi kullanılarak incelenmiştir. Bulanık TOPSIS yöntemi, karar vericilerin tercihlerindeki belirsizliği ortaya koyup birçok kriteri aynı anda değerlendirebildiği için etkin bir yöntem olarak kullanılmıştır. Çalışma, bulanık TOPSIS yönteminin tedarikçi seçiminde etkin bir yöntem olarak kullanılabileceğini göstermiştir. Bulgular, bulanık TOPSIS yönteminin karar vericilerin tercihlerindeki belirsizliği dikkate alarak tedarikçi seçimi probleminin çözümünde etkili bir şekilde kullanılabileceğini ortaya koymuştur[8].

Yılmaz ve arkadaşları , bu çalışmanın amacı olarak, hedef pazar seçiminin, işletmeler için hayati önem taşıdığını ifade etmektedirler. İşletmeler, ürünlerini uygun rekabet ortamında tüketicilerle buluşturmak için hedef pazar stratejilerini belirlemektedirler. Hedef pazar seçiminde farklı kriterler bulunmakta ve bu kriterlerin etkisi de farklı stratejilere göre değişmektedir. Karar problemi üzerindeki etkenlerin ağırlıklarının tespiti için Analitik Hiyerarşi Prosesi (AHP) kullanılmış, en iyi alternatifin seçimi için ise VIKOR yöntemi uygulanmıştır. Çalışmada, mobilya sektörü için hedef pazar seçimi problemi çok kriterli karar verme yaklaşımı ile ele alınmıştır. AHP ve VIKOR yöntemleri kullanılarak, mobilya sektörü için hedef pazar potansiyelinin göstergesi olan şehir seçimi gerçekleştirilmiştir. Elde edilen sonuçlar, mobilya işletmeleri için faydalı bilgiler sunmaktadır[9].

TOPSIS ile yapılan bazı çalışmalar:

Erdemir ve arkadaşları, bu çalışmanın amacı olarak, AHP ve TOPSIS yöntemlerini kullanarak yenilenebilir enerji kaynaklarının değerlendirilmesini ve sıralanmasını belirlemişlerdir. Çalışmada öncelikle yenilenebilir enerji kaynaklarının değerlendirilmesinde kullanılacak kriterler belirlenmiştir. Ardından AHP yöntemiyle kriter ağırlıkları hesaplanmış ve TOPSIS yöntemiyle de yenilenebilir enerji kaynaklarının sıralaması yapılmıştır. Çalışma sonucunda, yenilenebilir enerji kaynaklarının değerlendirilmesinde en önemli kriterlerin maliyet, verimlilik ve çevresel etkiler olduğu belirlenmiştir. TOPSIS yöntemiyle yapılan analiz sonucunda ise en uygun yenilenebilir enerji kaynağı olarak güneş enerjisi seçilmiştir[10].

Demirkol, bu çalışmanın amacını, AHP ve TOPSIS yöntemlerini kullanarak sürdürülebilir tedarikçi seçimi yapmak olarak belirlemiştir. Çalışmada öncelikle sürdürülebilir tedarikçi seçim kriterleri belirlenmiştir. Daha sonra AHP yöntemiyle kriter ağırlıkları hesaplanmış ve TOPSIS yöntemiyle de en uygun sürdürülebilir tedarikçi seçimi yapılmıştır. Çalışma sonucunda, sürdürülebilir tedarikçi seçiminde en önemli kriterlerin kalite, insan hakları ve yeşil üretim olduğu belirlenmiştir. TOPSIS yöntemiyle yapılan analiz sonucunda ise en yüksek puana sahip tedarikçi, Tedarikçi 4 olarak seçilmiştir[11].

Kurt Tekez ve Bark, bu çalışmada, Türkiye'de faaliyet gösteren bir mobilya fabrikasının tedarikçi seçimi, bulanık TOPSIS yöntemi kullanılarak incelenmiştir. Bulanık TOPSIS yöntemi, karar vericilerin tercihlerindeki belirsizliği ortaya koyup birçok kriteri aynı anda değerlendirebildiği için etkin bir yöntem olarak kullanılmıştır. Çalışma, bulanık TOPSIS yönteminin tedarikçi seçiminde etkin bir yöntem olarak kullanılabileceğini göstermiştir. Bulgular, bulanık TOPSIS yönteminin karar vericilerin tercihlerindeki belirsizliği dikkate alarak tedarikçi seçimi probleminin çözümünde etkili bir şekilde kullanılabileceğini ortaya koymuştur[8].

Supçiller ve Çapraz, bu çalışmanın amacı olarak, AHP ve TOPSIS yöntemlerini kullanarak banka şubelerinin performanslarının değerlendirilmesini belirlemişlerdir. Çalışmada öncelikle banka şubelerinin performans değerlendirmesinde kullanılacak kriterler belirlenmiştir. Daha sonra AHP yöntemiyle kriter ağırlıkları hesaplanmış ve TOPSIS yöntemiyle de banka şubelerinin performans sıralaması yapılmıştır. Çalışma sonucunda, banka şubelerinin performans değerlendirmesinde en önemli kriterlerin müşteri memnuniyeti, verimlilik ve karlılık olduğu belirlenmiştir. TOPSIS yöntemiyle yapılan analiz sonucunda ise en yüksek performansa sahip şube olarak A şubesi seçilmiştir[12].

Küçük ve Ecer, bu çalışmada, bulanık TOPSIS yöntemi kullanılarak tedarikçi seçim problemini ele almışlardır. Bulanık TOPSIS yöntemi, tedarikçi seçiminde etkili olan kriterlerin belirsizlik altında değerlendirilmesine olanak tanımaktadır. Bulanık TOPSIS yöntemi kullanılarak tedarikçi alternatifleri değerlendirilmiştir. Analiz sonucunda en uygun tedarikçi alternatifi belirlenmiştir[13].

Korkmaz, bu çalışmada, kişi seçimi için TOPSIS çok kriterli karar verme yöntemini kullanmıştır. Çok sayıda kriter dikkate alınarak objektif bir değerlendirme yapılmıştır. Yöntem adımları ve uygulama örneği sunulmuştur. TOPSIS yöntemi kullanılmıştır. Karar matrisi oluşturulmuş, kriter ağırlıkları belirlenmiş, ideal ve negatif ideal çözümler hesaplanmış, her alternatifin ideal çözüme yakınlık derecesi bulunmuş ve son olarak alternatifler sıralanmıştır. Çok kriterli karar verme yöntemlerinden TOPSIS'in kişi seçiminde kullanılabileceği gösterilmiştir. Yöntemin objektif ve sistematik olması sayesinde, kişi seçim sürecini kolaylaştırdığı ve daha güvenilir sonuçlar verdiği sonucuna varılmıştır[14].

SWARA ile yapılan bazı çalışmalar:

Ulutaş, bu çalışmada, biyogaz enerji üretimi sektöründe faaliyet gösteren bir işletmenin tedarikçi seçim süreci, SWARA ve Bulanık COPRAS yöntemleri kullanılarak incelemiştir. Öncelikle tedarikçi seçimi sürecinde kullanılan kriterler belirlenmiş ve SWARA yöntemi ile bu kriterlerin önem dereceleri tespit edilmiştir. Daha sonra tedarikçi alternatiflerin değerlendirilmesinde Bulanık COPRAS yöntemi kullanılmıştır. SWARA yöntemi kullanılarak kriterlerin önem dereceleri hesaplanmıştır. Bulanık COPRAS yöntemi ile tedarikçi alternatifleri değerlendirilmiştir. Analizler sonucunda, gazlaşma oranı kriteri en önemli kriter, vade kriteri ise en az önemli kriter olarak belirlenmiştir. Tedarikçi alternatifleri değerlendirildiğinde, en iyi tedarikçi alternatifi A3 olarak bulunmuştur[15].

Durmaz ve Temel Gencer, bu çalışmada, SWARA ve SMAA yöntemleri kullanılarak bir işletmenin enerji tedarikçisi seçim problemini incelemişlerdir. SWARA yöntemi ile kriterlerin önem dereceleri belirlenirken, SMAA yöntemi ile tedarikçi alternatifleri değerlendirilmiştir. SWARA yöntemi ile kriterlerin önem dereceleri hesaplanmıştır. SMAA yöntemi ile tedarikçi alternatifleri değerlendirilmiştir. Analiz sonucunda en uygun enerji tedarikçisi alternatifi belirlenmiştir[16].

Ay Türkmen ve Demirel, bu çalışmada, biyogaz enerji üretimi sektöründe faaliyet gösteren bir işletmenin tedarikçi seçim süreci, SWARA ve Bulanık COPRAS yöntemleri kullanılarak incelenmiştir. SWARA yöntemi ile tedarikçi seçim kriterlerinin önem dereceleri belirlenmiş, Bulanık COPRAS yöntemi ile de tedarikçi alternatifleri değerlendirilmiştir. SWARA yöntemi ile kriterlerin önem dereceleri hesaplanmıştır. Bulanık COPRAS yöntemi ile tedarikçi alternatifleri değerlendirilmiştir. Analiz sonucuna göre en önemli kriter gazlaşma oranı, en az önemli kriter ise vade olarak belirlenmiştir. En iyi tedarikçi alternatifi ise A3 olarak bulunmuştur[17].

Toklu ve arkadaşları, bu çalışmalarında, basketbol ve voleybol eğitimi veren spor kulüplerinin sayısında önemli ölçüde artış olduğunu görmüşlerdir. Çok Kriterli Karar Verme (ÇKKV) stratejileri kullanılmıştır. Uzmanlarla yapılan görüşmeler sonucu belirlenen kriterler için göreceli önem ağırlıkları Bulanık SWARA yöntemiyle hesaplanmıştır. Ardından Bulanık WASPAS yöntemi ile en uygun spor okulu seçimi yapılmıştır. Spor okulu seçimi yaparken bakılacak kriterler ve en uygun spor okulu önerisi sunulmuştur[18].

SWARA ve TOPSIS yöntemlerinin birlikte kullanıldığı bazı çalışmalar:

Ayyıldız ve Demirci, bu çalışmada, SWARA ve TOPSIS yöntemleri kullanılarak lojistik sektöründe faaliyet gösteren bir işletmenin tedarikçi seçimi problemini incelemişlerdir. Öncelikle SWARA yöntemi ile tedarikçi seçim kriterlerinin önem dereceleri belirlenmiş, daha sonra TOPSIS yöntemi ile en uygun tedarikçi alternatifi seçilmiştir. SWARA yöntemi ile kriterlerin önem dereceleri hesaplanmıştır. TOPSIS yöntemi ile tedarikçi alternatifleri değerlendirilmiştir. Analiz sonucunda en uygun tedarikçi alternatifi belirlenmiştir[19].

Abdulvahitoğlu ve Kılıc, bu çalışmanın giriş bölümünde, teknolojinin ilerlemesi ve şehirlerde azalan oyun alanları, evlerine kapanmış yeni bir neslin ortaya çıkmasına neden olmasından bahsetmişlerdir. Velilerin eğitim kalitesi, aylık ücret, spor okulunun konumu gibi birçok faktörü göz önünde bulundurmaları gerekmektedir. Çok Kriterli Karar Verme (ÇKKV) stratejileri kullanılmıştır. Uzmanlarla yapılan görüşmeler sonucu belirlenen dört kriter için göreceli önem ağırlıkları Bulanık SWARA yöntemiyle hesaplanmıştır. Ardından Bulanık TOPSIS yöntemi ile en uygun spor okulu seçimi yapılmıştır. Spor okulu seçimi yaparken bakılacak kriterler önem sırasına göre okulun kalitesi, konumu, aylık ücreti ve bilinirliği olarak belirlenmiştir. Örnek bir vaka incelemesiyle en uygun spor okulu önerisi sunulmuştur[20].

Derse ve Yontar, bu çalışmadaki gibi, SWARA ve TOPSIS yöntemlerinin bütünleşik olarak kullanıldığı çalışmalar mevcuttur. Bu yaklaşımda, SWARA ile kriter ağırlıkları hesaplanmakta, daha sonra TOPSIS ile alternatiflerin sıralaması yapılmaktadır. Bu bütünleşik yöntem, kriterlerin göreli önem derecelerinin dikkate alınmasına olanak sağlamakta ve karar vericilere kapsamlı bir değerlendirme imkânı sunmaktadır. Mevcut çalışmalar, SWARA-TOPSIS yaklaşımının çeşitli alanlardaki uygulamalarını ve avantajlarını göstermektedir. Bu yöntemin, başta işletme yönetimi olmak üzere lojistik, enerji, eğitim gibi farklı sektörlerdeki karar verme süreçlerinde kullanımı yaygınlaşmaktadır. Bütünleşik SWARA-TOPSIS yaklaşımı, kriterlerin ağırlıklandırılması ve alternatiflerin sıralanması konusunda etkin ve tutarlı sonuçlar üretmektedir. Gelecekte, SWARA-TOPSIS yönteminin farklı karar verme problemlerine uygulanması ve yöntemin geliştirilmesi yönünde çalışmalar yapılması beklenmektedir. Ayrıca, bulanık mantık, gri sistem teorisi gibi diğer tekniklerle entegrasyonu üzerine araştırmalar yürütülebilir. Böylece, çok kriterli karar verme alanındaki bilgi birikimi ve çözüm yöntemleri genişletilebilir[21].

Orhan ve arkadaşları, bu çalışmada, bir işletmenin yatırım planlaması sürecinde, MOORA ve TOPSIS çok kriterli karar verme yöntemlerinin kullanılması ve sonuçlarının karşılaştırılmasını amaçlamışlardır. Beş farklı üretim tesisi arasından en uygun tesisin seçilmesi problemi ele alınmıştır. MOORA önem katsayısı ve TOPSIS yöntemleri uygulanmıştır. Kriter ağırlıkları SWARA yöntemi ile belirlenmiştir. MOORA yöntemlerinin sonuçları, TOPSIS yöntemi ile elde edilen sonuçlarla karşılaştırılmıştır. MOORA yöntemlerinin, sıralama problemlerinde güvenilir sonuçlar verdiği görülmüştür. TOPSIS yöntemi ile uyumlu sonuçlar elde edilmiştir. Özellikle MOORA önem katsayısı yönteminin, çok kriterli karar verme problemlerinde etkili bir şekilde kullanılabileceği sonucuna varılmıştır[22].

MATERYAL VE METOT

Çalışma iki aşamadan oluşmaktadır. İlk aşama uzman görüşü ile ağırlıklandırılıp TOPSIS yöntemi ile tedarikçi seçiminde kullanılmak üzere kullanılacak kriterlerin önem düzeylerinin belirlenmesi, ikinci aşama ise SWARA yöntemi ile kriterlerin önem düzeylerinin belirlenip TOPSIS yöntemin tekrarlanmasından oluşmaktadır.

TOPSIS Yöntemi

TOPSIS yöntemi, Hwang ve Yoon (1981) tarafından geliştirilmiştir. Bu yöntem, çok kriterli karar verme problemlerinde kullanılan önemli tekniklerden biridir. TOPSIS yöntemi, seçilen en iyi alternatifin pozitif ideal çözüme en yakın ve negatif ideal çözüme en uzak olması fikrine dayanmaktadır[21].

Diğer bir ifadeyle, TOPSIS yöntemi, problemdeki tüm kriterler için en iyi (pozitif ideal) ve en kötü (negatif ideal) değerleri tespit eder. Daha sonra her alternatifin bu ideal çözümlere olan uzaklığını hesaplar. Nihai olarak, en iyi alternatif, pozitif ideal çözüme en yakın ve negatif ideal çözüme en uzak olan alternatif olarak belirlenir. Bu sayede, TOPSIS yöntemi, çok kriterli karar verme problemlerinde etkili bir şekilde kullanılabilmektedir. Alternatifler arasından en uygun olanın seçilmesine yardımcı olmaktadır[21].

TOPSIS yöntemi, diğer çok kriterli karar verme teknikleri gibi belirli uygulama aşamalarına sahiptir. Bu aşamalar sırasıyla, karar matrislerinin oluşturulması, normalize matrisin elde edilmesi, ağırlıklandırılmış normalize matrisin oluşturulması, ideal ve negatif ideal çözüm değerlerinin belirlenmesi, ideal ve negatif ideal noktalara olan uzaklıkların hesaplanması ve son olarak ideal çözüme göreli yakınlığın hesaplanması şeklindedir[23].

Adım 1: Karar Matrislerinin Oluşturulması

Karar matrislerinin oluşturulmasında, kullanmış olduğumuz kriterler ve alternatifler satır ve sütunlarda olacak şekilde (mxn) matrisinde oluşturulur. Çalışmamızda kullanmış olduğumuz işletme bir mobilya atölyesine aittir. Adana'da faaliyet gösteren bu işletme, Çizelge (1)'de gösterildiği gibi beş farklı kriter üzerinden değerlendirilmiştir. Beş farklı alternatif ve altı farklı kriter ile değerlendirecek olursak Çizelge (2)'deki gibi görünecektir. SWARA yöntemi kullanarak ağırlıklandırıp tekrar TOPSIS yöntemi ile çözümlenecek olursa Çizelge (10)'daki gibi görünecektir.

Adım 2: Normalize Karar Matrisinin Oluşturulması

Normalize matrisin elde edilmesi aşamasında, Denklem (1)'de gösterilen formül kullanılarak karar matrisi normalize edilir. Bu aşamada, öncelikle her bir a_{ij} değerinin karesi alınır ve bu değerlerin toplamı ile oluşan sütun değeri hesaplanır. Ardından, her bir a_{ij} değeri, bu sütun değerinin karekökü ne bölünerek normalizasyon işlemi tamamlanır ve Çizelge (3)'de belirtilen matris elde edilir. SWARA yöntemi kullanarak ağırlıklandırıp tekrar TOPSIS yöntemi ile çözümlenecek olursa Çizelge (11)'deki gibi görünecektir.

$$x_{ij} = \frac{a_{ij}}{\sqrt{\sum_{i=1}^{m} a_{ij}^2}} \qquad (1)$$

Adım 3: Ağırlıklı Karar Matrisinin Oluşturulması

Ağırlıklandırılmış normalize matrisin elde edilmesi aşamasında, normalize edilmiş olan A_{ij} matrisinin elemanları, w_i gibi bir değerle ağırlıklandırılarak Çizelge (4)'de ki gibi oluşturulur. SWARA yöntemi kullanarak ağırlıklandırıp tekrar TOPSIS yöntemi ile çözümlenecek olursa Çizelge (12)'deki gibi görünecektir. Faktörlerin önem derecelerine göre yapılan bu ağırlıklandırma işlemi, yöntemin tek subjektif aşamasıdır. Ağırlıklandırma işlemi için uzman görüşü kullanılabileceği gibi, bu konuda önemli sonuçlar üreten bazı çok kriterli karar verme tekniklerinden de yararlanılabilir. Çalışmamızda her ikisini de kullandık ama ilk önce uzman görüşü kullanıldı. Bu aşamada dikkate alınması gereken en önemli husus, verilen ağırlıkların toplamının $\sum_{i=1}^{n} w_i = 1$ olacak şekilde 1'e eşit olması gerekliliğidir.

Adım 4: Pozitif ve Negatif İdeal Çözümlerin Oluşturulması

İdeal ve negatif ideal çözüm değerlerinin elde edilmesi aşamasında, eğer kararın amaç fonksiyonu maksimizasyon ise her sütundaki en büyük değer ideal çözüm değeri, en küçük değer ise negatif ideal çözüm değeri olarak belirlenir. Amaç fonksiyonu minimizasyon ise, bu işlemler tersine yapılır. Bu işlem Denklem (2-3)'de gösterilmiş olup Çizelge (5)'de tablo haline getirilmiştir[23]. SWARA yöntemi kullanarak ağırlıklandırıp tekrar TOPSIS yöntemi ile çözümlenecek olursa Çizelge (13)'deki gibi görünecektir.

Her bir sütuna ait maksimum değerler;

$$A^* = \left\{ \max_j v_{ij} \middle| j = 1, \dots, m; i = 1, \dots, n \right\} = \{v_1^*, v_2^*, \dots, v_n^*\} \quad (2)$$

Her bir sütuna ait minimum değerler;

$$A^* = \left\{ \min_j v_{ij} \; olmak \;\; üzere \right\} = \{v_1^-, v_2^-, \dots, v_n^-\} \quad (3)$$

Adım 5: Uzaklık Ölçülerinin Hesaplanması

İdeal ve negatif ideal noktalara olan uzaklık değerlerinin elde edilmesi aşamasında, Öklidyen uzaklık formülü kullanılarak, koordinat düzleminde x ve y koordinatları bilinen iki nokta arasındaki mesafe hesaplanır. Bu yöntemle ideal noktaya olan uzaklık ve negatif ideal noktaya olan uzaklık belirlenir.

Öklidyen formülü,

p: değişken sayısı,

x_{ik}: i. gözlemin k. değişken değeri

x_{jk}: j. gözlemin k. değişken değeri olmak üzere, Denklem (4)'de belirtildiği şekilde hesaplanır.

$$d_{ij} = \sqrt{\sum_{k=1}^{p} \left(x_{ik} - x_{jk}\right)^2} \quad (4)$$

Buna göre karar noktası sayısınca S_i^* ve S_i^- değerleri belirlenir. Burada pozitif ideal uzaklık Denklem (5) yardımıyla; aynı şekilde negatif ideal uzaklık da Denklem (6) yardımıyla hesaplanır[23]. Pozitif ideal uzaklık hesaplandığında Çizelge (6)'daki gibi görünecektir. SWARA yöntemi kullanarak ağırlıklandırıp tekrar TOPSIS yöntemi ile çözümlenecek olursa Çizelge (14)'deki gibi görünecektir. Aynı şekilde negatif ideal uzaklık da hesaplandığında Çizelge (7)'deki gibi görünecektir. SWARA yöntemi kullanarak ağırlıklandırıp tekrar TOPSIS yöntemi ile çözümlenecek olursa Çizelge (15)'deki gibi görünecektir.

$$S_i^* = \sqrt{\sum_{j=1}^{n} \left(v_{ij} - v_j^*\right)^2} \quad (5)$$

$$S_i^- = \sqrt{\sum_{j=1}^{n} \left(v_{ij} - v_j^-\right)^2} \quad (6)$$

Adım 6: İdeal Çözüme Göreli Yakınlığın Hesaplanması

Her bir karar noktasının ideal çözüme göreli yakınlığının hesaplanması aşamasında, ideal ve negatif ideal noktalara olan uzaklıklardan yararlanılır. İdeal çözüme göreli yakınlık, C_i^* ile sembolize edilir ve Denklem (7) yardımıyla hesaplanır[23]. Hesaplanan sıralama Çizelge (8)'de tablo haline getirilmiştir. SWARA yöntemi kullanarak ağırlıklandırıp tekrar TOPSIS yöntemi ile çözümlenecek olursa Çizelge (16)'daki gibi görünecektir.

$$C_i^* = \frac{S_i^*}{S_i^- + S_i^*} \quad (7)$$

Uzman görüşü ile ağırlıklandırma yaptığımız TOPSIS yönteminde Samsa Orman Ürünleri ilk tercih edilebilecek tedarikçi iken Ender Orman Ürünleri ikinci sırada onu takip etmektedir. Çalışmamızın ikinci aşamasında ağırlıklandırma yöntemi olarak SWARA yöntemini kullanıp sonuçları karşılaştıracağız.

SWARA Yöntemi

SWARA (Step-wise Weight Assessment Ratio Analysis) yöntemi, 2010 yılında Kersuliene, Zavadskas ve Turskis tarafından geliştirilmiş olan "Adım Adım Ağırlık Değerlendirme Oran Analizi" olarak bilinmektedir. Bu yöntem, uzman görüşlerinin kolaylıkla sürece dahil edilebileceği ve basit göreli karşılaştırmanın kullanılabileceği bir yöntemdir[21].

SWARA yöntemi, öncelikle uzman görüşlerine dayanarak kriterlerin önem derecelerinin belirlenmesi, kriterlerin önem derecelerine göre sıralanması, her kriterin bir öncekine göre ağırlık katsayısının belirlenmesi, bu katsayılarla kriter ağırlıklarının hesaplanması ve nihayetinde ağırlıklandırılmış kriterlerin kullanılması adımlarından oluşur[21].

Adım 1: Kriterler, uzman görüşü doğrultusunda önem sırasına göre azalan şekilde sıralanır. Birden fazla karar verici olduğunda, genel bir sıralama elde etmek için bu işlemlerin geometrik ortalaması alınır.

Adım 2: Her bir kriterin göreceli önem düzeyi belirlenir. Bu aşamada, j. kriter ile bir sonraki (j+1). kriter karşılaştırılarak, j. kriterin (j+1). kriterden ne kadar daha önemli olduğu tespit edilir. Bu değer s_j (ortalama değerin karşılaştırılmalı önemi) olarak gösterilmiştir[21].

Adım 3: k_j katsayısı Denklem (8) yardımıyla hesaplanır;

$$k_j = \begin{cases} 1, j = 0 \\ s_j + 1, j > 1 \end{cases} \quad (8)$$

Adım 4: q_j katsayısı Denklem (9) yardımıyla hesaplanır;

$$q_j = \begin{cases} 1, j = 0 \\ \frac{(q_j - 1)}{k_j} + 1, j > 1 \end{cases} \quad (9)$$

Adım 5: w_j katsayısı Denklem (10) yardımıyla hesaplanır;

$$w_j = \frac{q_j}{\sum_{k=1}^{n} q_k} \quad (10)$$

Verilen adımlar uygulandığında Çizelge (9) ortaya çıkmaktadır.

BULGULAR

Adana'da faaliyet gösteren bu işletme, Çizelge (1)'de gösterildiği gibi altı farklı kriter üzerinden değerlendirilmiştir. Çalışmada, kriter olarak bir mobilya işletmesi için önemli olarak görülen, fiyat (TL), müşteri memnuniyeti, işletmeye uzaklık (km), ödeme kolaylığı, nakliye opsiyonu ve teslim süresi alınmıştır. Kriterler arasından en önemli sayılan kriter, 0,27 ağırlık katsayısı ile fiyattır. İkinci olarak, 0,23 ağırlık katsayısı ile ödeme kolaylığı gelmektedir. Daha sonra sırasıyla müşteri memnuniyeti, teslim süresi, nakliye opsiyonu ve işletmeye uzaklık (km) gelmektedir.

Çizelge 1. Araştırmada Belirtilen Değerlendirme Kriterleri

Fiyat (TL)	Tedarikçilerin satın alınan hammadde için belirledikleri harcamalar toplamıdır.
Müşteri Memnuniyeti	Tedarikçilerin müşterilere sunduğu güleryüz, hoşgörü ve memnuniyetin 1-10 arasında değerlendirilmesidir.
İşletmeye Uzaklık (km)	Tedarikçilerin atölyeye olan uzaklığıdır.
Ödeme Kolaylığı	Tedarikçilerin müşteriye sunduğu ekonomik ödeme kolaylığıdır.
Nakliye Opsiyonu	Tedarikçi firmaların satın alınan ürünlerin taşınmasını üstlenmeleridir.
Teslim Süresi	Müşterinin sipariş verdiği zamandan en kısa sürede teslim edilmesine kadar geçen sürenin1-10 arasında değerlendirilmesidir.

UYGULAMA

Karar matrislerinin oluşturulmasında, kullanmış olduğumuz kriterler ve alternatifler satır ve sütunlarda olacak şekilde (mxn) matrisinde oluşturulur. Çalışmamızda kullanmış olduğumuz işletme bir mobilya atölyesine aittir. Adana'da faaliyet gösteren bu işletme, Çizelge (1)'de gösterildiği gibi beş farklı kriter üzerinden değerlendirilmiştir. Beş farklı alternatif ve altı farklı kriter ile değerlendirecek olursak Çizelge (2)'deki gibi görünecektir.

Çizelge 2. Başlangıç Matrisi

ADIM 1: BAŞLANGIÇ MATRİSİ						
Tedarikçi Markası	**Fiyat (TL)**	**Müşteri Memnuniyeti**	**İşletmeye Uzaklık (km)**	**Ödeme Kolaylığı**	**Nakliye Opsiyonu**	**Teslim Süresi**
SAMSA ORMAN ÜRÜNLERİ	1500	9	3,9	10	8	8
ENDER ORMAN ÜRÜNLERİ	1400	10	9,8	9	10	9
ZEKİ ORMAN ÜRÜNLERİ	1700	6	9,1	8	8	6
YÜKSELLER	1800	8	24,2	8	9	7
YONPAŞ	1600	5	22,4	7	8	6

Normalize matrisin elde edilmesi aşamasında, Denklem (1)'de gösterilen formül kullanılarak karar matrisi normalize edilir. Bu aşamada, öncelikle her bir a_{ij} değerinin karesi alınır ve bu değerlerin toplamı ile oluşan sütun değeri hesaplanır. Ardından, her bir a_{ij} değeri, bu sütun değerinin kareköküne bölünerek normalizasyon işlemi tamamlanır ve Çizelge (3)'de belirtilen matris elde edilir.

Çizelge 3. Normalize Edilmiş Karar Matrisi

ADIM 2: NORMALİZE EDİLMİŞ KARAR MATRİSİ						
Tedarikçi Markası	**Fiyat (TL)**	**Müşteri Memnuniyeti**	**İşletmeye Uzaklık (km)**	**Ödeme Kolaylığı**	**Nakliye Opsiyonu**	**Teslim Süresi**
Ağırlık Yönü	**min**	**max**	**min**	**max**	**max**	**min**
Ağırlıklar	0,27	0,20	0,05	0,23	0,10	0,15
SAMSA ORMAN ÜRÜNLERİ	0,4176	0,5145	0,1089	0,5285	0,4142	0,4905
ENDER ORMAN ÜRÜNLERİ	0,3898	0,5717	0,2738	0,4757	0,5178	0,5518
ZEKİ ORMAN ÜRÜNLERİ	0,4733	0,3430	0,2542	0,4228	0,4142	0,3679
YÜKSELLER	0,5012	0,4573	0,6760	0,4228	0,4660	0,4292
YONPAŞ	0,4455	0,2858	0,6257	0,3700	0,4142	0,3679

Ağırlıklandırılmış normalize matrisin elde edilmesi aşamasında, normalize edilmiş olan A_{ij} matrisinin elemanları, w_i gibi bir değerle ağırlıklandırılarak Çizelge (4)'de ki gibi oluşturulur.

Çizelge 4. Ağırlıklandırılmış Standart Karar Matrisi

ADIM 3: AĞIRLIKLANDIRILMIŞ STANDART KARAR MATRİSİ						
TEDARİKÇİ MARKASI	**Fiyat (TL)**	**Müşteri Memnuniyeti**	**İşletmeye Uzaklık (km)**	**Ödeme Kolaylığı**	**Nakliye Opsiyonu**	**Teslim Süresi**
SAMSA ORMAN ÜRÜNLERİ	0,1128	0,1029	0,0054	0,1216	0,0414	0,0736
ENDER ORMAN ÜRÜNLERİ	0,1052	0,1143	0,0137	0,1094	0,0518	0,0828
ZEKİ ORMAN ÜRÜNLERİ	0,1278	0,0686	0,0127	0,0972	0,0414	0,0552
YÜKSELLER	0,1353	0,0915	0,0338	0,0972	0,0466	0,0644
YONPAŞ	0,1203	0,0572	0,0313	0,0851	0,0414	0,0552

İdeal ve negatif ideal çözüm değerlerinin elde edilmesi aşamasında, eğer kararın amaç fonksiyonu maksimizasyon ise her sütundaki en büyük değer ideal çözüm değeri, en küçük değer ise negatif ideal çözüm değeri olarak belirlenir. Amaç fonksiyonu minimizasyon ise, bu işlemler tersine yapılır. Bu işlem Denklem (2-3)'de gösterilmiş olup Çizelge (5)'de tablo haline getirilmiştir.

Çizelge 5. Pozitif İdeal ve Negatif İdeal Çözüm Değerleri (dij)

ADIM 4: Pozitif İdeal ve Negatif İdeal Çözüm Değerleri (dij)						
	Fiyat (TL)	**Müşteri Memnuniyeti**	**İşletmeye Uzaklık (km)**	**Ödeme Kolaylığı**	**Nakliye Opsiyonu**	**Teslim Süresi**
Pozitif İdeal Çözüm Değerleri	0,1052	0,1143	0,0054	0,1216	0,0518	0,0552
Negatif İdeal Çözüm Değerleri	0,1353	0,0572	0,0338	0,0851	0,0414	0,0828

Burada pozitif ideal uzaklık Denklem (5) yardımıyla; aynı şekilde negatif ideal uzaklık da Denklem (6) yardımıyla hesaplanır. Pozitif ideal uzaklık hesaplandığında Çizelge (6)'daki gibi görünecektir.

Çizelge 6. Pozitif İdeal Noktalara Olan Uzaklıklar(Si*)

ADIM 5: Pozitif İdeal Noktalara Olan Uzaklıklar(Si*)							
Tedarikçi Markası	**Fiyat (TL)**	**Müşteri Memnuniyeti**	**İşletmeye Uzaklık (km)**	**Ödeme Kolaylığı**	**Nakliye Opsiyonu**	**Teslim Süresi**	Si*
SAMSA ORMAN ÜRÜNLERİ	0,00006	0,00013	0,00000	0,00000	0,00011	0,00034	0,00063
ENDER ORMAN ÜRÜNLERİ	0,00000	0,00000	0,00007	0,00015	0,00000	0,00076	0,00098
ZEKİ ORMAN ÜRÜNLERİ	0,00051	0,00209	0,00005	0,00059	0,00011	0,00000	0,00335
YÜKSELLER	0,00090	0,00052	0,00080	0,00059	0,00003	0,00008	0,00293
YONPAŞ	0,00023	0,00327	0,00067	0,00133	0,00011	0,00000	0,00560

Negatif ideal uzaklık da hesaplandığında Çizelge (7)'deki gibi görünecektir.

Çizelge 7. Negatif İdeal Noktalara Olan Uzaklıklar(Si-)

ADIM 5 : Negatif İdeal Noktalara Olan Uzaklıklar(Si-)							
Tedarikçi Markası	**Fiyat (TL)**	**Müşteri Memnuniyeti**	**İşletmeye Uzaklık (km)**	**Ödeme Kolaylığı**	**Nakliye Opsiyonu**	**Teslim Süresi**	Si-
SAMSA ORMAN ÜRÜNLERİ	0,00051	0,00209	0,00080	0,00133	0,00000	0,00008	0,00482
ENDER ORMAN ÜRÜNLERİ	0,00090	0,00327	0,00040	0,00059	0,00011	0,00000	0,00527
ZEKİ ORMAN ÜRÜNLERİ	0,00006	0,00013	0,00044	0,00015	0,00000	0,00076	0,00154
YÜKSELLER	0,00000	0,00118	0,00000	0,00015	0,00003	0,00034	0,00169
YONPAŞ	0,00023	0,00000	0,00001	0,00000	0,00000	0,00076	0,00099

Her bir karar noktasının ideal çözüme göreli yakınlığının hesaplanması aşamasında, ideal ve negatif ideal noktalara olan uzaklıklardan yararlanılır. İdeal çözüme göreli yakınlık, C_i^* ile sembolize edilir ve Denklem (7) yardımıyla hesaplanır. Hesaplanan sıralama Çizelge (8)'de tablo haline getirilmiştir.

Çizelge 8. İdeal Çözüme Göreli Yakınlık Değerleri ($Ci*$) ve Sıralama

ADIM 6: İdeal Çözüme Göreli Yakınlık Değerleri ($Ci*$) ve Sıralama		
Tedarikçi Markası	**Ci***	**Sıralama**
SAMSA ORMAN ÜRÜNLERİ	0,88392	1
ENDER ORMAN ÜRÜNLERİ	0,84374	2
ZEKİ ORMAN ÜRÜNLERİ	0,31501	4
YÜKSELLER	0,36544	3
YONPAŞ	0,15072	5

SWARA yöntemi, öncelikle uzman görüşlerine dayanarak kriterlerin önem derecelerinin belirlenmesi, kriterlerin önem derecelerine göre sıralanması, her kriterin bir öncekine göre ağırlık katsayısının belirlenmesi, bu katsayılarla kriter ağırlıklarının hesaplanması ve nihayetinde ağırlıklandırılmış kriterlerin kullanılması adımlarından oluşur. Verilen adımlar uygulandığında Çizelge (9) ortaya çıkmaktadır.

Çizelge 9. SWARA Yönteminin Ağırlıklandırılması

Kriter Adı	**Önem Sırası**	**Sıralı Ölçütler**		**Ortalama Değerin Karşılaştırmalı Önemi S_j**	**k_j**	**q_j**	**w_j**
Fiyat (TL) (K1)	1	K1	1		1,00	1,00	0,257
Müşteri Memnuniyeti (K2)	2	K4	2	0,15	1,15	0,870	0,224
İşletmeye Uzaklık (km) (K3)	5	K2	3	0,20	1,20	0,725	0,186
Ödeme Kolaylığı (K4)	4	K6	4	0,25	1,25	0,580	0,149
Nakliye Opsiyonu (K5)	3	K5	5	0,35	1,35	0,429	0,110
Teslim Süresi(K6)	6	K3	6	0,50	1,50	0,286	0,074

SWARA yöntemi ile bulduğumuz yeni ağırlıklar ile TOPSIS yöntemini tekrarlıyoruz. Karar matrisinin oluşturulması, SWARA yöntemi kullanılarak ağırlıklandırıp tekrar TOPSIS yöntemi ile çözümlenecek olursa Çizelge (10)'daki gibi görünecektir.

Çizelge 10. Başlangıç Matrisi

ADIM 1: BAŞLANGIÇ MATRİSİ						
Tedarikçi Markası	**Fiyat (TL)**	**Müşteri Memnuniyeti**	**İşletmeye Uzaklık (km)**	**Ödeme Kolaylığı**	**Nakliye Opsiyonu**	**Teslim Süresi**
Ağırlık yönü	min	max	min	max	max	min
Ağırlıklar	0,257	0,224	0,186	0,149	0,110	0,074
SAMSA ORMAN ÜRÜNLERİ	1500	9	3,9	10	8	8
ENDER ORMAN ÜRÜNLERİ	1400	10	9,8	9	10	9
ZEKİ ORMAN ÜRÜNLERİ	1700	6	9,1	8	8	6
YÜKSELLER	1800	8	24,2	8	9	7
YONPAŞ	1600	5	22,4	7	8	6

Normalize matrisin elde edilmesi aşamasında, SWARA yöntemi kullanılarak ağırlıklandırıp tekrar TOPSIS yöntemi ile çözümlenecek olursa Çizelge (11)'deki gibi görünecektir.

Çizelge 11. Normalize Edilmiş Karar Matrisi

ADIM 2: NORMALİZE EDİLMİŞ KARAR MATRİSİ						
Tedarikçi Markası	**Fiyat (TL)**	**Müşteri Memnuniyeti**	**İşletmeye Uzaklık (km)**	**Ödeme Kolaylığı**	**Nakliye Opsiyonu**	**Teslim Süresi**
Ağırlık Yönü	min	max	min	max	max	min
Ağırlıklar	0,257	0,224	0,186	0,149	0,110	0,074
SAMSA ORMAN ÜRÜNLERİ	0,4176	0,5145	0,1089	0,5285	0,4142	0,4905
ENDER ORMAN ÜRÜNLERİ	0,3898	0,5717	0,2738	0,4757	0,5178	0,5518
ZEKİ ORMAN ÜRÜNLERİ	0,4733	0,3430	0,2542	0,4228	0,4142	0,3679
YÜKSELLER	0,5012	0,4573	0,6760	0,4228	0,4660	0,4292
YONPAŞ	0,4455	0,2858	0,6257	0,3700	0,4142	0,3679

Ağırlıklandırılmış normalize matrisin elde edilmesi aşamasında, SWARA yöntemi kullanılarak ağırlıklandırıp tekrar TOPSIS yöntemi ile çözümlenecek olursa Çizelge (12)'deki gibi görünecektir.

Çizelge 12. Ağırlıklandırılmış Standart Karar Matrisi

ADIM 3: AĞIRLIKLANDIRILMIŞ STANDART KARAR MATRİSİ						
Tedarikçi Markası	**Fiyat (TL)**	**Müşteri Memnuniyeti**	**İşletmeye Uzaklık (km)**	**Ödeme Kolaylığı**	**Nakliye Opsiyonu**	**Teslim Süresi**
SAMSA ORMAN ÜRÜNLERİ	0,1073	0,1152	0,0203	0,0787	0,0456	0,0363
ENDER ORMAN ÜRÜNLERİ	0,1002	0,1281	0,0509	0,0709	0,0570	0,0408
ZEKİ ORMAN ÜRÜNLERİ	0,1216	0,0768	0,0473	0,0630	0,0456	0,0272
YÜKSELLER	0,1288	0,1024	0,1257	0,0630	0,0513	0,0318
YONPAŞ	0,1145	0,0640	0,1164	0,0551	0,0456	0,0272

İdeal ve negatif ideal çözüm değerlerinin elde edilmesi aşamasında, SWARA yöntemi kullanılarak ağırlıklandırıp tekrar TOPSIS yöntemi ile çözümlenecek olursa Çizelge (13)'deki gibi görünecektir.

Çizelge 13. Pozitif İdeal ve Negatif İdeal Çözüm Değerleri (dij)

ADIM 4: Pozitif İdeal ve Negatif İdeal Çözüm Değerleri (dij)						
	Fiyat (TL)	**Müşteri Memnuniyeti**	**İşletmeye Uzaklık (km)**	**Ödeme Kolaylığı**	**Nakliye Opsiyonu**	**Teslim Süresi**
Pozitif İdeal Çözüm Değerleri	0,1002	0,1281	0,0203	0,0787	0,0570	0,0272
Negatif İdeal Çözüm Değerleri	0,1288	0,0640	0,1257	0,0551	0,0456	0,0408

Burada pozitif ideal uzaklık Denklem (5) yardımıyla; aynı şekilde negatif ideal uzaklık da Denklem (6) yardımıyla hesaplanır. Pozitif ideal uzaklık hesaplandığında Çizelge (14)'deki gibi görünecektir.

Çizelge 14. Pozitif İdeal Noktalara Olan Uzaklıklar(Si*)

ADIM 5: Pozitif İdeal Noktalara Olan Uzaklıklar(Si*)							
Tedarikçi Markası	**Fiyat (TL)**	**Müşteri Memnuniyeti**	**İşletmeye Uzaklık (km)**	**Ödeme Kolaylığı**	**Nakliye Opsiyonu**	**Teslim Süresi**	Si*
SAMSA ORMAN ÜRÜNLERİ	0,00005	0,00016	0,00000	0,00000	0,00013	0,00008	0,00043
ENDER ORMAN ÜRÜNLERİ	0,00000	0,00000	0,00094	0,00006	0,00000	0,00019	0,00119
ZEKİ ORMAN ÜRÜNLERİ	0,00046	0,00262	0,00073	0,00025	0,00013	0,00000	0,00419
YÜKSELLER	0,00082	0,00066	0,01113	0,00025	0,00003	0,00002	0,01290
YONPAŞ	0,00020	0,00410	0,00924	0,00056	0,00013	0,00000	0,01423

Negatif ideal uzaklık da hesaplandığında Çizelge (15)'deki gibi görünecektir.

Çizelge 15. Negatif İdeal Noktalara Olan Uzaklıklar(Si-)

ADIM 5 : Negatif İdeal Noktalara Olan Uzaklıklar(Si-)							
Tedarikçi Markası	**Fiyat (TL)**	**Müşteri Memnuniyeti**	**İşletmeye Uzaklık (km)**	**Ödeme Kolaylığı**	**Nakliye Opsiyonu**	**Teslim Süresi**	Si-
SAMSA ORMAN ÜRÜNLERİ	0,00046	0,00262	0,01113	0,00056	0,00000	0,00002	0,01479
ENDER ORMAN ÜRÜNLERİ	0,00082	0,00410	0,00560	0,00025	0,00013	0,00000	0,01089
ZEKİ ORMAN ÜRÜNLERİ	0,00005	0,00016	0,00616	0,00006	0,00000	0,00019	0,00662
YÜKSELLER	0,00000	0,00148	0,00000	0,00006	0,00003	0,00008	0,00165
YONPAŞ	0,00020	0,00000	0,00009	0,00000	0,00000	0,00019	0,00048

İdeal çözüme göreli yakınlık, C_i^* ile sembolize edilir ve Denklem (7) yardımıyla hesaplanır. Hesaplanan sıralama Çizelge (16)'da tablo haline getirilmiştir.

Çizelge 16. İdeal Çözüme Göreli Yakınlık Değerleri ($Ci*$) ve Sıralama

ADIM 6: İdeal Çözüme Göreli Yakınlık Değerleri ($Ci*$) ve Sıralama		
Tedarikçi Markası	**Ci***	**Sıralama**
SAMSA ORMAN ÜRÜNLERİ	0,97192	1
ENDER ORMAN ÜRÜNLERİ	0,90175	2
ZEKİ ORMAN ÜRÜNLERİ	0,61220	3
YÜKSELLER	0,11355	4
YONPAŞ	0,03247	5

SONUÇ

İşletmeler için doğru tedarikçinin seçimi, rekabet güçlerini olumlu yönde etkileyebilecek stratejik bir karardır. Bu nedenle firmalar, kendilerine en kaliteli hizmeti sunabilecek, talep değişikliklerine karşı esneklik gösterebilecek ve maliyet avantajı sağlayabilecek tedarikçileri bulmak için yoğun çaba sarf ederler. En iyi tedarikçiyi bulmak için, işletme gereksinimlerinin net bir şekilde belirlenmesi ve bu gereksinimleri karşılayabilecek uygun tedarikçilerin titizlikle seçilmesi önemlidir[8].

Çalışmada, kriter olarak bir mobilya işletmesi için önemli olarak görülen, fiyat (TL), müşteri memnuniyeti, işletmeye uzaklık (km), ödeme kolaylığı, nakliye opsiyonu ve teslim süresi alınmıştır. Kriterlerin önem derecelerine bakıldığında en önemli kriter 0,27 ağırlık katsayısı ile fiyat olarak belirlenmiştir. İkinci sırada ise 0,23 ağırlık katsayısı ile ödeme kolaylığı gelmektedir. Daha sonra sırasıyla müşteri memnuniyeti, teslim süresi, nakliye opsiyonu ve işletmeye uzaklık (km) gelmektedir. Bu kriterlerin değerlendirileceği beş tane alternatif tedarikçi seçilmiştir. Bunlar, Samsa Orman Ürünleri, Ender Orman Ürünleri, Zeki Orman Ürünleri, Yükseller ve YONPAŞ'tır. Kriterler ve alternatifler belirlendikten sonra mobilya işletmesinin ustasından alınan bilgiler doğrultusunda ağırlıklar da belirlenmiş oldu. Ayrıca çalışmanın ikinci aşamasında kullanılmak üzere SWARA yöntemi ile doğru adımlar izlenerek yeni ağırlıklar belirlenmiştir. Belirlenmiş farklı ağırlıklar, TOPSIS yöntemi kullanılarak çözülmüştür.

Sonuç olarak, çalışmada iki farklı ağırlık seti kullanılmış olup aralarındaki benzerlik oranı korelasyon katsayısı hesaplanarak %90 bulunmuştur. Samsa Orman Ürünleri en iyi alternatif olarak seçilmiştir. Onu takip eder şekilde Ender Orman Ürünleri ikinci sırada alternatif olarak seçilmiştir. Yapılacak olan diğer çalışmalar için daha farklı çok kriterli karar verme yöntemleri de kullanılarak farklı sektörlerde çalışmalar yapılabilir.

KAYNAKLAR

Günal, S., *Tedarikçi seçim stratejileri ve bir uygulama*. 2010, Bursa Uludag University (Turkey).

Kabadayı, N. and B.K. Çırpın, *Gri ilişkisel temelli TOPSIS yöntemi ile tedarikçi seçimi ve tedarikçi risk değerlendirmesi.* Uludağ Üniversitesi Mühendislik Fakültesi Dergisi, 2020. **25**(2): p. 767-788.

Öztürk, D., *AHP ve TOPSIS yöntemleri ile tedarikçi seçimi: hazır giyim sektöründe bir uygulama.* Tekstil ve Mühendis, 2019. **26**(115): p. 299-308.

Çalık, A., *Bulanık AHP-Bulanık ARAS yöntemlerine dayalı dayanıklı tedarikçi seçimi.* İstanbul Gelişim Üniversitesi Sosyal Bilimler Dergisi, 2022. **9**(2): p. 275-296.

Akdeniz, E., *Bireysel otomobil satın alma problemi için AHP yöntemi ile karar verme: Bir otomobil firması bazında inceleme.* Yaşar Üniversitesi E-Dergisi, 2021. **16**(64): p. 1551-1574.

Akyüz, G.A., *Bulanik VIKOR yöntemi ile tedarikçi seçimi.* Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi, 2012. **26**(1): p. 197-215.

Başar, R. and O. Yavuzyılmaz, *Küçük ve orta ölçekli üretim işletmeleri için tedarikçi seçim probleminin nötrosofik ahp, topsıs ve vıkor yöntemiyle değerlendirilmesi.* Akademik Yaklaşımlar Dergisi, 2023. **14**(1): p. 259-294.

Tekez, E. and N. Bark, *Mobilya sektöründe bulanık TOPSIS yöntemi ile tedarikçi seçimi.* Sakarya University Journal of Science, 2016. **20**(1): p. 55-63.

Yılmaz, K., Y. Öztürk, and E. Burdurlu, *Çok Ölçütlü Karar Verme Yaklaşimi Ile Mobilya İşletmeleri İçin Hedef Pazar Seçimi.* İleri Teknoloji Bilimleri Dergisi, 2017. **6**(3): p. 744-756.

Erdemir, N., F. Öztürk, and G.K. Kaya, *Integrated decision support model for performance evaluation of public staff: using AHP and fuzzy TOPSIS.* Journal of the Faculty of Engineering and Architecture of Gazi University, 2022. **37**(4): p. 1809-1822.

Demirkol, İ., *Sustainable Supply Chain: A Gradation Model That Based on AHP-TOPSIS Method.* Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi, 2021. **35**(2): p. 595-618.

Supçiller, A. and O. Çapraz, *AHP-TOPSIS yöntemine dayali tedarikçi seçimi uygulamasi.* Istanbul University Econometrics and Statistics e-Journal, 2011(13): p. 1-22.

Küçük, O. and F. Ecer, *Bulanık TOPSIS kullanılarak tedarikçilerin değerlendirilmesi ve Erzurum'da bir uygulama.* Ekonomik ve Sosyal Araştırmalar Dergisi, 2007: p. 45-65.

Korkmaz, O., *Personnel selection method based on TOPSIS multi-criteria decision making method.* Uluslararası İktisadi ve İdari İncelemeler Dergisi, 2019(23): p. 1-16.

Ulutaş, A., *SWARA tabanlı CODAS yöntemi ile kargo şirketi seçimi.* MANAS Sosyal Araştırmalar Dergisi, 2020. **9**(3): p. 1640-1647.

Durmaz, K.İ. and C.T. gencer, *Tedarikçi seçiminde entegre lojistik destek yaklaşımı ve işletme uygulaması: SWARA-SMAA-2.* Niğde Ömer Halisdemir Üniversitesi Mühendislik Bilimleri Dergisi, 2019. **8**(2): p. 828-841.

Türkmen, M. and A. Demirel, *SWARA ağırlıklı bulanık COPRAS yöntemi ile tedarikçi seçimi.* Alanya Akademik Bakış, 2022. **6**(1): p. 1739-1756.

Toklu, M.C., et al., *SWARA-WASPAS metodolojisine dayalı tedarikçi seçimi: türkiye'de demir-çelik endüstrisi örneği.* Academic Platform-Journal of Engineering and Science, 2018. **6**(3): p. 113-120.

Ayyıldız, E. and E. Demirci, *Türkiye'de yer alan şehirlerin yaşam kalitelerinin SWARA entegreli TOPSIS yöntemi ile belirlenmesi.* Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 2018(30): p. 67-87.

Abdulvahitoğlu, A., A. Abdulvahitoğlu, and M. Kılıç, *Elektrikli Araç Bataryalarının Bütünleşik Swara-Topsis Metodu ile Değerlendirilmesi.* Çukurova Üniversitesi Mühendislik Fakültesi Dergisi, 2022. **37**(4): p. 1061-1076.

Derse, O. and E. Yontar, *SWARA-TOPSIS Yöntemi ile En Uygun Yenilenebilir Enerji Kaynağinin Belirlenmesi.* Endüstri Mühendisliği, 2020. **31**(3): p. 389-419.

Orhan, S., S.A. azkeskin, and Z. Aladağ, *MOORA yöntemleri ve TOPSIS arasındaki ilişkinin bir yatırım önceliği belirleme probleminde incelenmesi.* Niğde Ömer Halisdemir Üniversitesi Mühendislik Bilimleri Dergisi, 2023. **12**(4): p. 1-1.

Demirci, A., *Nakliye aracı seçimi: çok kriterli karar verme modeli önerisi.* Antalya Bilim Üniversitesi Uluslararası Sosyal Bilimler Dergisi, 2020. **1**(1): p. 17-34.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

PARA POLİTİKALARININ UYGULANMASINDA VE FİNANSAL İSTİKRARIN SAĞLANMASINDA MERKEZ BANKALARININ ROLÜ BANKACILIK SEKTÖRÜ İLİŞKİSİ: BİR UYGULAMA

Faruk Gürsel KOÇAK
Marmara Üniversitesi Bankacılık ve Sigortacılık Enstitüsü, Bankacılık
ORCID: 0009-0003-2589-6368

Prof. Dr.Erişah ARICAN
Marmara Üniversitesi Bankacılık ve Sigortacılık Enstitüsü, Bankacılık
ORCID: 0000-0003-3487-3486

ÖZET
Son dönemde küresel makro ekonomik dengesizliklerin artmasıyla birlikte, merkez bankalarının para politikası uygulamaları yeni bir boyut kazanmıştır. Artan finansal istikrarsızlık riskleri, merkez bankalarını sadece fiyat istikrarını sağlamakla kalmayıp aynı zamanda finansal istikrarı da sağlamaya yönlendirmiştir. Bu bağlamda yapılan çalışmalar, merkez bankalarının politika uygulamalarının finansal istikrar üzerindeki etkisini ve bu süreçteki rolünü anlamaya yönelik önemli bir çaba ortaya koymuştur.
Öncelikle, para politikası ve merkez bankacılığının teorik temelleri üzerinde durulmuş ve bu politikalar ile finansal istikrar arasındaki ilişki detaylı bir şekilde incelenmiştir. Finansal istikrarın, ekonomik büyüme ve genel refah için kritik bir unsur olduğu kabul edilmiştir. Ancak, finansal piyasalardaki istikrarsızlıkların makroekonomik dengelere zarar verebileceği ve bu nedenle merkez bankalarının bu konuda etkin rol oynaması gerektiği vurgulanmıştır.
Bu amaçla Türkiye'de finansal istikrarın ölçümüne yönelik bir endeks oluşturulmuştur. Gerçekleşen test sonuçlarına göre Türkiye Cumhuriyet Merkez Bankası finansal istikrarın tesisinde kayda değer gelişim kat etmiştir. Ancak finansal istikrarın tesisi, tek başına merkez bankalarının politika uygulama kapasitelerinin üzerinde olan bir olgu olduğu model sonuçlarından ortaya çıkmaktadır.
Sonuç olarak, finansal istikrarın tesis edilmesi sürecinin karmaşıklığı ve çok boyutluluğu vurgulanmıştır. Merkez bankalarının politika araçlarıyla sağlanabilecek finansal istikrarın sürdürülebilirliği için ekonomik ve finansal sistemdeki diğer aktörlerle iş birliği ve koordinasyonun önemi üzerinde durulmuştur. Bu bağlamda, merkez bankalarının rolü, ekonomik istikrarın korunması ve sürdürülebilir bir büyümenin sağlanması açısından hayati önem taşımaktadır.
Anahtar Kelimeler: Merkez Bankacılığı, finansal istikrar endeksi, finansal istikrarın tesisi, para politikaları uygulamaları

THE ROLE OF THE CENTRAL BANKS IN FINANCIAL STABILITY AND MONETARY POLICY APPLICATIONS AND ITS IMPACTS ON BANKING SECTOR: TURKEY CASE

SUMMARY
While the global macro imbalances have been exacerbating the central banks have turned their focus to financial stability in addition to price stability objective. This article tries to shed light on the role of central banks how to satisfy aforementioned objective and its implications on monetary policy.

Within this context the article emphasizes the theoretical framework on central banking and financial stability and tries to build a financial stability barometer index to check the success of the Central Bank of Turkey. In response, the index showed that Central Bank of Turkey has made significant success sustaining financial stability. Nevertheless, central banks are not the only and one actor to cope with financial stability. Thus, they need other relative constitutions support.

Keywords: Central Banking, financial stability index, monetary policy tools and application

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

INVESTIGATING BARRIERS AND DRIVERS TO ARTIFICIAL INTELLIGENCE ADAPTION IN SUSTAINABLE SUPPLY CHAIN MANAGEMENT

Bahar TAŞAR
Izmir Bakircay University
ORCID: 0000-0001-8004-852X

ABSTRACT
Artificial Intelligence (AI) integration into sustainable supply chain management (SSCM) presents opportunities and challenges for organizations aiming to improve environmental, social, and economic sustainability. AI contributes to SSCM performance by optimizing resource allocation, reducing environmental impacts, and improving operational efficiency. AI techniques such as machine learning, optimization algorithms, and predictive analytics are instrumental in the context of sustainability goals, including carbon footprint reduction, ethical sourcing, and circular economy practices. However, some barriers such as investment cost, lack of skilled labor, and lack of policy conflict with factors such as increased efficiency, improved collaboration, and competitive advantage make it difficult for businesses to adopt these technologies. This paper explores the barriers and drivers affecting the adoption of AI technologies in SSCM. Through a systematic review of existing literature key factors shaping AI adoption are identified and categorized. The results shed light on the needs of the industry by revealing the barriers to sustainable supply chain applications of AI. This study provides insights for practitioners seeking to navigate and leverage AI to promote sustainable practices.

INTRODUCTION
The term AI was first coined to investigate the ability of machines to use language and solve human problems (McCarthy et al., 1955). AI is a technology that depends on a set of tools, techniques and algorithms to mimic human practices, perform complex tasks and manage cognitive utilities (Dhamija and Bag, 2020; Belhadi et al., 2021; Grover et al., 2022). AI technologies, which include a wide range of heterogeneous tools and techniques ranging from artificial neural networks, fuzzy logic, genetic algorithms, machine learning, and deep learning, are now at the center of Industry 4.0 (Jarrahi, 2018; Papadopoulos et al., 2021). Cognitive technologies allow machines to process large amounts of data and make decisions in complex situations through the ability to learn (Duan et al., 2019). The use of AI as a cognitive technology contributes to improving complex supply chain process decisions.
AI applications, which have started to change today's production and consumption habits, are spreading across sectors at an exponential growth rate. Business models and supply chain systems need to adapt to these new dynamics (Queiroz et al. 2020; Hennelly et al. 2020). Businesses are pursuing AI technologies to optimize their supply chains and improve their capabilities. They try to reduce demand uncertainties, disruptions and financial risks with the help of these technologies to maintain their competitiveness (Riahi et al., 2021). In recent years, AI applications related to supplier selection, sales and demand forecasting, product design, production and logistics optimization processes in the supply chain have become prominent research and application areas (Fernando et al., 2018; Mandal, 2019; Toorajipour et al., 2021). AI algorithms enable managers to better understand how the supply chain process works and discover areas for improvement (Ni et al., 2020). In addition, it enables the implementation of predictive approaches that enable effective minimization of risks that may arise in the supply chain (Riahi et al., 2021).

The learning process and decision-making mechanism obtained through big data processing can be used to improve both operational and financial performance in the supply chain (Gupta et al., 2020; Kar and Dwivedi, 2020; Dubey et al., 2021).

With the processing of big data and digitalization, the social and environmental impacts of the supply chain have become better understood (Sanders et al., 2019). By tracking, measuring and simulating all inputs and outputs in the linear supply chain, all negative repercussions have begun to be revealed. AI has revolutionized the way of doing business and has become a tool for SSCM by making the supply chain more efficient and transparent (Schneider and Leyer, 2019; Sanders et al., 2019). SSCM can be defined as the cooperation of chain members by taking into account the financial, environmental and social impacts of all processes in the supply chain (Sharma et al., 2018; Bandar, 2019). From a product lifecycle perspective, it includes the perception of sustainability in all stages of the supply chain: raw materials, product design and production, product sales and transportation, product use and product recycling (Ghahremani Nahr et al., 2021). AI technologies can contribute to sustainability goals in each supply chain process. For example, with high-tech decision-making in product design, products with high recyclability capacity and harmless to humans and nature can be developed. Through intelligent transportation systems, different parts can communicate with each other, increasing transportation network safety and solving traffic problems, reducing carbon emissions and ensuring energy efficiency (Ghahremani Nahr et al., 2021). It can be used as a management mechanism to maximize the benefit of recycling products with its strong data processing and decision-making mechanism.

Although there are studies in the literature that address the role of AI in supply chains, studies on the role of AI in SSCM are quite limited (AlNuaimi et al., 2021; Rashid et al., 2024). This study examines the barriers faced in the application of AI in SSCM and the factors that drive the use of this technology.

ANALYSIS AND RESULTS

A bibliometric analysis was conducted to investigate the barriers and triggers for the use of AI in SSCM. Bibliometric analysis is one of the most widely used research methods to examine a broad topic and analyze its change over time (Donthu et al., 2021). Web of Science (WoS), one of the most effective databases for bibliometric analysis (Zhu & Lu, 2020), was used in the study. In the database, ("artificial intelligence" AND "sustainable supply chain" OR ("artificial intelligence" AND "green supply chain" OR ("artificial intelligence" AND "supply chain" AND "sustainability") were searched as queries.

According to the results, 898 publications were found between 2005 and 2024. The distribution of these publications by year is shown in Figure 1.

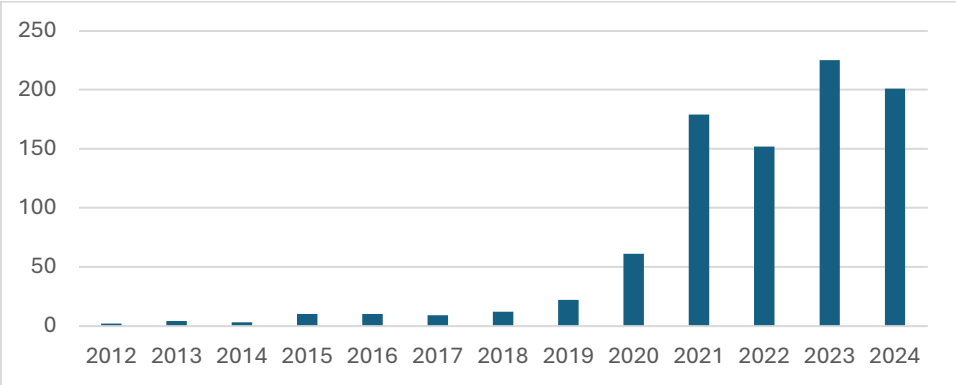


Figure 1. Number of Publications Between 2005-2024

As can be seen in Figure 1, the number of studies in which artificial intelligence and sustainable supply chains are found together is increasing rapidly. According to this analysis conducted in July 2024, the number of studies is expected to increase further until the end of 2024. Among these studies, open-access ones were filtered first and 438 publications were found. "Supply Chain & Logistics", "Design and Manufacturing", "Management", "Sustainable Science" and "Artificial Intelligence & Machine Learning" were selected in the medium-level screening of citation topics and 241 publications were found. The distribution of these publications according to WoS categories is given in Figure 2. It is seen that the studies conducted with these filters in recent years are mostly on engineering, computer science, management, and environmental studies.

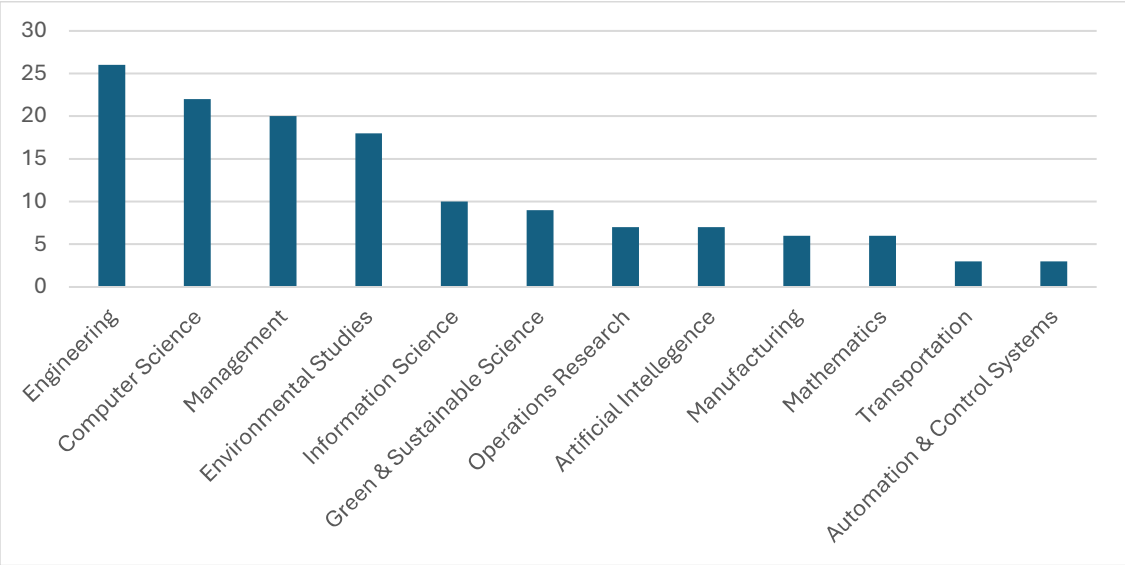


Figure 2. Wos Categories of the Papers

The selected studies in the WoS database are analyzed and the barriers and drivers were identified and are given in Table 1.

Table 1. Barriers and Drivers of AI Adaptation on SSCM

Barriers	***Drivers***
Lack of Awareness and Knowledge (Kosasih vd., 2024; Baryannis vd., 2019; Madanaguli vd., 2024; Torbacki, 2021; Osuna-Velarde vd., 2024)	**Financial Performance** (Cannas vd., 2024; Lampropoulos vd., 2024; Akbari ve Hopkins, 2022; Nuerk ve Darena, 2023)
Lack of Specific Skills and Technical Infrastructure (Cannas vd., 2024; Cataldo vd., 2022; Madanaguli vd., 2024)	**Increasing Service Level and Quality** (Kosasih vd., 2022; Cannas vd., 2024; Zhang vd, 2023)
Investment Cost (Cannas vd., 2024; Cataldo vd., 2022; Alshahrani, 2023)	**Gaining Competitiveness** (Yaqub ve Alsabban, 2023; Cannas vd., 2024)
Lack of Data Quality (Cannas vd., 2024; Alshahrani, 2023; Cataldo vd., 2022)	**Social Responsibility and Environmental Awareness** (Osuna-Velarde vd., 2024; Chen ve Jin,
Data Security Concern (Althabatah vd., 2023; Madanaguli vd., 2024; Alshahrani, 2023; Hao ve Demir, 2024)	**Ensuring Transparency, Traceability and Coordination** (Olan vd., 2022; Kazancoglu vd., 2023; Ebinger ve Omondi, 2020)
Lack of Policy (Osuna-Velarde vd., 2024; Alshahrani, 2023)	**Increasing Collaboration** (Olan vd., 2022; Nuerk ve Darena, 2023; Yaqub ve Alsabban, 2023)
Lack of Managerial Support (Sharma vd., 2023; Benabdellah vd., 2021)	**Risk Management** (Dey vd., 2024; Tsao vd., 2021; Lampropoulos vd., 2024)

CONCLUSION

Supply chain networks are complex and risky, with many uncertainties and relationships (Baloch and Rashid, 2022). Lack of coordination leads to delays in deliveries, increased fuel costs and negative environmental impacts. Sustainable Development Goals includes in the strategic plans of almost all sectors to reduce these negative impacts and establish a sustainable system. The fact that supply chains contain many interactive organizations creates a comprehensive structure for the implementation of sustainability goals along the entire chain. The use of AI technologies to efficiently meet the environmental requirements in supply chains is a tool to realize the goals more effectively. The use of AI helps to improve supply chain adaptability and strengthen resilience and sustainability. AI can optimize resource use, reduce waste and improve energy efficiency in manufacturing processes.

This study aims to investigate the drivers and barriers to the adoption of AI technologies by businesses within the scope of sustainability in the literature and to reveal the advantages and drawbacks of these technologies. Through bibliometric analysis, studies linking AI with SSCM were examined through WoS. The driving forces for businesses to adopt AI technologies are financial performance, increasing service level and quality, gaining competitiveness, social responsibility and environmental awareness, transparency, traceability and coordination, increasing collaboration, and risk management.

However, barriers to the implementation of these technologies are identified as lack of awareness and knowledge, lack of specific skills and technical infrastructure, investment cost, inability to ensure data quality, data security concerns, lack of policy, and managerial barriers. Although AI is still approached with reservations by businesses as a new technology, the driving forces can be encouraged and disseminated with managerial information. When the barriers to the adoption of AI technologies by businesses are removed, competitive advantage can be gained by optimizing the economic, social and environmental dimensions of sustainability. The academic know-how and collaborations for sectoral applications can eliminate the barriers of lack of explainability, lack of data quality, lack of specific skills, technical infrastructure, lack of awareness and data security concerns.

REFERENCES

Akbari, M., & Hopkins, J.L. (2022). Digital technologies as enablers of supply chain sustainability in an emerging economy. Oper Manag Res 15, 689–710.

AlNuaimi, B.K., Khan, M., & Ajmal, M.M. (2021). The role of big data analytics capabilities in greening e-procurement: a higher order PLS-SEM analysis. Technological Forecasting and Social Change, 169, 1-13.

Althabatah, A., Yaqot, M., Menezes, B., & Kerbache, L. (2023). Transformative Procurement Trends: Integrating Industry 4.0 Technologies for Enhanced Procurement Processes. Logistics, 7(3), 63.

Akundi, A., Euresti, D., Luna, S., Ankobiah, W., Lopes, A., & Edinbarough, I. (2022). State of Industry 5.0—Analysis and Identification of Current Research Trends. *Applied System Innovation*, 5(1):27.

Baloch, N., & Rashid, A. (2022). Supply chain networks, complexity, and optimization in developing economies: a systematic literature review and Meta-Analysis. South Asian Journal of Operations and Logistics, 1(1), 1-13.

Baryannis, G., Validi, S., Dani, S., & Antoniou, G. (2019). Supply chain risk management and artificial intelligence: state of the art and future research directions Int. J. Prod. Res., 57, 2179-2202

Bandar, K.A. (2019). Impact of service quality on customer trust, purchase intention and store loyalty, with mediating role of customers' satisfaction on customer trust and purchase intention: Study of grocery shopping. Br. J. Mark. Stud. BJMS, 7, 40–61.

Belhadi, A., Kamble, S., Fosso Wamba, S., & Queiroz, M. M. (2021). Building supply-chain resilience: an artificial intelligence-based technique and decision-making framework. International Journal of Production Research, 60(14), 4487–4507.

Benabdellah, A.C., Zekhnini, K., Cherrafi, A., Garza-Reyes, J.A., & Kumar, A. (2021). Design for the environment: An ontology-based knowledge management model for green product development. Business Strategy and the Environment, Wiley Blackwell, 30(8), 4037-4053.

Cannas, V. G., Ciano, M. P., Saltalamacchia, M., & Secchi, R. (2023). Artificial intelligence in supply chain and operations management: a multiple case study research. International Journal of Production Research, 62(9), 3333–3360.

Cataldo, I., Banaitis, A., Samadhiya, A., Banaitienė, N., Kumar, A., & Luthra, S. (2022). Sustainable supply chain management in construction: an exploratory review for future research. Journal of Civil Engineering and Management, 28(7), 536–553.

Chen, Y., & Jin, S. (2023). Artificial Intelligence and Carbon Emissions in Manufacturing Firms: The Moderating Role of Green Innovation. *Processes*, 11(9):2705.

Dey, P. K., Chowdhury, S., Abadie, A., Vann Yaroson, E., & Sarkar, S. (2023). Artificial intelligence-driven supply chain resilience in Vietnamese manufacturing small- and medium-sized enterprises. International Journal of Production Research, 62(15), 5417–5456.

Dhamija, P., & Bag, S., (2020). Role of Artificial Intelligence in Operations Environment: A Review and Bibliometric Analysis. The TQM Journal 32 (4): 869–896.

Donthu, N. Kumar, S. Mukherjee, D., Pandey, N. & Lim, W.M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. J. Bus. Res., 133, 285–296.

Duan, Y., Edwards, J.S., & Dwivedi, Y.K. (2019). Artificial intelligence for decision making in the era of big data–evolution, challenges and research agenda International Journal of Information Management, 48, 63-71.

Dubey, R., Bryde, D. J., Blome, C., Roubaud, D., & Giannakis, M. (2021). Facilitating artificial intelligence powered supply chain analytics through alliance management during the pandemic crises in the B2B context. Industrial Marketing Management, 96, 135-146.

Ebinger, F., & Omondi, B. (2020). Leveraging Digital Approaches for Transparency in Sustainable Supply Chains: A Conceptual Paper. Sustainability, 12(15):6129.

Fernando, Y., Chidambaram, R.R., & Wahyuni-Td, I.S. (2018). The impact of big data analytics and data security practices on service supply chain performance. Benchmarking: An International Journal, 25(9), 4009-4034.

Ghahremani Nahr, J., Nozari, H., & Sadeghi, M. E. (2021). Green supply chain based on artificial intelligence of things (AIoT). International Journal of Innovation in Management, Economics and Social Sciences, 1(2), 56–63.

Grover, P., Kar, A.K. & Dwivedi, Y.K. (2022). Understanding artificial intelligence adoption in operations management: insights from the review of academic literature and social media discussions. Ann Oper Res 308, 177–213.

Hao, X., & Demir, E. (2024). Artificial intelligence in supply chain decision-making: an environmental, social, and governance triggering and technological inhibiting protocol. Journal of Modelling in Management, 19(2), 605-629.

Hartmann, J., & Moeller, S. (2014). Chain liability in multitier supply chains? Responsibility attributions for unsustainable supplier behavior J. Oper. Manag., 32, 281-294.

Hennelly, P.A., Srai, J.S., Graham, G., & FossoWamba, S. (2020). Rethinking Supply Chains in the Age of Digitalization. Production Planning & Control, 31 (2–3), 93-95.

Ivanov, D., Dolgui, A. and Sokolov, B. (2019). The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics. International Journal of Production Research, 57(3), 829-846.

Jarrahi, M. H. (2018). Artificial Intelligence and the Future of Work: Human-AI Symbiosis in Organizational Decision Making. Business Horizons 61(4): 577–586.

Kazancoglu, I., Ozbiltekin-Pala, M., Mangla, S.K. et al. (2023). Using emerging technologies to improve the sustainability and resilience of supply chains in a fuzzy environment in the context of COVID-19. Ann Oper Res 322, 217–240.

Kosasih, E. E., Papadakis, E., Baryannis, G., & Brintrup, A. (2023). A review of explainable artificial intelligence in supply chain management using neurosymbolic approaches. International Journal of Production Research, 62(4), 1510–1540.

Lampropoulos G, Garzón J, Misra S, & Siakas K. (2024). The Role of Artificial Intelligence of Things in Achieving Sustainable Development Goals: State of the Art. Sensors, 24(4):1091.

Madanaguli, A., Sjödin, D., Parida, V., & Mikalef, P. (2024). Artificial intelligence capabilities for circular business models: Research synthesis and future agenda. Technological Forecasting and Social Change, Elsevier, 200(C).

Mandal, S. (2019). The influence of big data analytics management capabilities on supply chain preparedness, alertness and agility: an empirical investigation. Information Technology and People, 32(2), 297-318,

McCarthy, J., Minsky, M., Rochester, N., Shannon, C. (1955). A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence. AI Magazine, 27(4), 12.

Ni, D., Xiao, Z., & Lim, M.K. (2020). A systematic review of the research trends of machine learning in supply chain management. International Journal of Machine Learning and Cybernetics, 11, 1463-1482.

Nuerk, J. & Darena, F. (2023). Activating supply chain business models' value potentials through Systems Engineering. Systems Engineering 26(1):1-15.

Olan, F., Liu, S., Suklan, J., Jayawickrama, U., & Arakpogun, E. O. (2021). The role of Artificial Intelligence networks in sustainable supply chain finance for food and drink industry. International Journal of Production Research, 60(14), 4418–4433.

Osuna-Velarde DV, Salazar-Echeagaray JE, Bueno-Fernández MM, et al. (2024). The confluence of logistics 4.0 and agribusiness: A systematic review and future directions. Journal of Infrastructure, Policy and Development. 8(2): 2871.

Papadopoulos, T., Singh S., Spanaki K., Gunasekaran, A., & Dubey R. (2021). Towards Next Generation of Manufacturing: Implications of Big Data and Digitalization in theContext of Industry 4.0. Production Planning and Control: 1–5.

Rashid, A., Baloch, N., Rasheed, R., & Ngah, A.H. (2024), Big data analytics-artificial intelligence and sustainable performance through green supply chain practices in manufacturing firms of a developing country. Journal of Science and Technology Policy Management. doi: 10.1108/JSTPM-04-2023-0050.

Riahi, Y., Saikouk, T., Gunasekaran, A., & Badraoui, I. (2021). Artificial intelligence applications in supply chain: A descriptive bibliometric analysis and future research directions. Expert Systems with Applications, 173, 114702.

Sanders, N. R., Boone, T., Ganeshan, R., & Wood, J. D. (2019). Sustainable supply chains in the age of AI and digitization: research challenges and opportunities. Journal of Business Logistics, 40(3), 229–240.

Sharma, V.; Poulose, J.; Mohanta, S., & Antony, L.E. (2018). Influence of the dimensions of CSR activities on consumer purchase intention. Innov. Mark. 14, 23–32.

Sharma, M., Joshi, S., & Govindan, K. (2023). Overcoming barriers to implement digital technologies to achieve sustainable production and consumption in the food sector: A circular economy perspective. Sustainable Production and Consumption, 39, 203-215.

Schneider, S., & Leyer, M. (2019). Me or information technology? Adoption of AI in the delegation of personal strategic decisions. Managerial and Decision Economics, 40(3), 223–231.

Toorajipour, R., Sohrabpour, V., Nazarpour, A., Oghazi, P. & Fischl, M. (2021). Artificial intelligence in supply chain management: a systematic literature review. Journal of Business Research, 122, 502-517.

Torbacki W. A (2021). Hybrid MCDM Model Combining DANP and PROMETHEE II Methods for the Assessment of Cybersecurity in Industry 4.0. Sustainability. 13(16):8833.

Tsao, Y.C., Thanh, V.V., Lu, Y.J. & Wei, H.H. (2021). A risk-sharing-based resilient renewable energy supply network model under the COVID-19 pandemic. Sustainable Production and Consumption, 25, 484-498.

Queiroz, M. M., D. Ivanov, A. Dolgui, & S. Fosso Wamba. (2020). Impacts of Epidemic Outbreaks on Supply Chains: Mapping aResearch Agenda amid the COVID-19 Pandemic through a Structured Literature Review. Annals of Operations Research: 1–38.

Yaqub, M.Z., & Alsabban, A. (2023). Industry-4.0-Enabled Digital Transformation: Prospects, Instruments, Challenges, and Implications for Business Strategies. *Sustainability*. 15(11):8553.

Zhang, M., Xu, H., Ma, N., & Pan, X. (2022). Intelligent Vehicle Sales Prediction Based on Online Public Opinion and Online Search Index. *Sustainability*, 14(16):10344.

Zhu, J., & Liu, W.A (2020). A tale of two databases: The use of web of science and scopus in academic papers. Scientometrics, 123, 321–335.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

LUHMANN'DA ADALET KAVRAMI

Z. Gönül BALKIR
Prof. Dr., İstanbul Aydın Üniversitesi Hukuk Fakültesi, İstanbul, Türkiye.
ORCID NO:0000-0003-0710-8375
gonulbalkir@yahoo.com, 0532 324 89 00

ÖZET
Niklas Luhmann, sosyolojik sistem teorisinden yola çıkarak, kendi toplumsal sistem teorisini kurmuş, bu system içinde hukuku, bir alt sistem olarak ele almıştır. Luhmann'ın sistem teorisi, hukukun toplum sistemi içersinde başka hiç bir sistemin yerine getiremeyeceği temel bir işlevi, normatif davranış beklentisini düzenli bir hale getirme işlevini yerine getirdiğini gösterir.Luhmann, hukukun adalete yönelmiş bir toplumsal yaşama düzeni, şeklindeki klasik tanımını, özellikle hukuku amaçsal olmayan bir şekilde tanımlayan sistem teorisiyle bağdaştırmaz. Zira autopoietik bir tanımlama ile bir bütünlük içinde düzenlenmiş olan hukuksal modelin, amacın gerçekleşmemesi halinde, yeniden nasıl tanımlanabileceği sorunu, halen belirsizliğini korumaktadır.Luhmann'ın sistem teorisinde temel ilgi, normatif çerçeve kadar iletişime de yönelmiş olup, hukukun kod ve programı, hukuka uygun- hukuka aykırı dikotomisi üzerinden anlaşılmaktadır. Bu değerlendirmenin dışında, ortaya çıkan muhakeme sonucunun, ayrıca adil olan- adil olmayan biçiminde üçücü bir kod ile ilişkisini kurmak gerekir. Adalet, sadece bir sosyal ilkedir. Sistem teorisinde, hukukun adaletle olan bağı kadar, hukukun ahlakla olan bağının da dışlandığını görmekteyiz. Sistem teorisinin olumsal anlayışı içinde, dinamik bir tutumla adalet ve ahlak ilkelerine ilişkin sorunu çözmeye çalışasıyla, adalet, paranteze alınmış görünmektedir.Herhangi bir hukuksal olgunun, hukuksal mahkeme de karşılaşacağı kriter, hukuka aykırı ya da hukuka uygun biçiminde olacaktır. Neyin hukuka uygun ya da neyin hukuka aykırı olduğu ise, çevre olarak siyasal kodlar ve programlar aracılığıyla belirlenecek, uygun olmayan içerikler de değiştirilebilecektir. Bu yolla sistemin değiştirilmesi de sağlanmış olur.Adalet, ancak sistem teorisinde üçüncü bir dışsal kod olarak, sistemin bütünü üzerinden, bütüne sirayet edebilir. Adalet bu yapısıyla, öncelikle eşitlik olarak, sonra sürekli tekrarlanarak, olumsallıkla sisteme nüfuz ederken, sabit değildir, değişen şartlarla adalet de değişir. Luhmann, adaleti, yeterli karmaşıklık olarak tanımlarken, aslında hukuk sisteminin kaldırabileceği kadar iletişim ilişkisini kastetmektedir. Yine de bu adalet tanımının, biçimsel ve içeriği bulunmayan bir tanım olduğunu göz ardı etmemek gerekir.
Anahtar Sözcükler: Sistem Teorisi, Adalet Kavramı, Autopoietik Tanımlama, Autopoiesis.

THE CONCEPT OF JUSTICE IN LUHMANN

ABSTRACT
Niklas Luhmann established his own social system theory based on sociological system theory and considered law as a subsystem within this system. Luhmann's systems theory shows that law performs a basic function within the social system that no other system can perform, the function of regularizing the expectation of normative behavior.Luhmann does not reconcile the classical definition of law as an order of social life oriented towards justice, especially with the theory of the system that defines law in a non-objective way. Because the problem of how the legal model, which is arranged in integrity with an autopoietic definition, can be redefined if the purpose is not realized, still remains unclear.In Luhmann's system theory, the main interest is in communication as well as the normative framework, and the code and program of law are understood through the lawful-unlawful dichotomy.

Apart from this evaluation, it is necessary to establish the relationship of the resulting reasoning result with a third code in its fair-unfair form. Justice is just a social principle. In systems theory, we see that the connection of law with morality is excluded as much as the connection of law with justice. Within the contingent understanding of systems theory, justice seems to be bracketed as it attempts to solve the problem of the principles of justice and morality with a dynamic attitude.The criterion that any legal fact will face in a legal court will be unlawful or in accordance with the law. What is legal or unlawful will be determined through political codes and programs, and inappropriate content can also be changed. In this way, it is ensured that the system is changed.Justice can only spread to the whole through the whole system, as a third external code in system theory. With this structure of justice, first as equality, then constantly repeated, while it penetrates the system with contingency, it is not fixed, justice also changes with changing conditions. While Luhmann defines justice as sufficient complexity, he actually refers to the communication relationship as much as the legal system can handle. However, it should not be ignored that this definition of justice is a formal and contentless definition.
Keywords: System Theory, Concept of Justice, Autopoietic Definition, Autopoiesis.

GİRİŞ

Niklas Luhmann, 1926-1998 yılları arasında yaşamış, sosyolojik sistem teorisinin önde gelen hukuk sosyolojisi düşünürlerindendir. Luhman'a göre toplum, bütün iletişimleri ve bütün iletişimleri yeniden üreten sosyal sistemleri kapsar (Cankurtaran Öntaş ve akçay, 2014:102). Hukuk sistemini de önemli bir alt sistem olarak kurgular. Çalışmamızda, Luhmann'ın hukuksal sistemdeki adalet kavramına odaklanmak istedik.

LUHMANN'DA SOSYOLOJİK SİSTEM TEORİSİ

Niklas Luhmann, sosyolojik sistem teorisinden yola çıkarak, kendi toplumsal sistem teorisini kurmuş ve kurduğu sistemde öncelikle iletişim teorisine ağırlık vermiş, 1970' lerden sonra kurguladığı bu sisteme evrim teorisini eklemiştir (Işıktaç ve Koloş, 2022: 130).

Luhmann'a göre, sistemin çevreyle ilişkisi, ona olan ihtiyacına göre, allopoietik ve autopoietik olarak ikiye ayrılır. Kendini devam ettirmek ve uyumlaştırabilmek için, çevreye bağlı olan sistemler, allopoietik sistemler olarak tanımlanırken, kendini, kendi öğelerinden hareketle sürekli olarak yeniden üretebilen sistemler, autopoietik sistemler olarak adlandırılır (Işıktaç ve Koloş, 2022: 131). Sistemler eylemsel kapanım yaşarlar, sadece kendi etkin kodları, programları ve hafızası ile çalışırlar (Luhmann, 1986:174).

Luhmann'ın sistem teorisiyle yaptığı en büyük katkılardan biri, sistemlerin kendi kendilerini ürettiğini söylemesidir. Bunu autopoiesis kavramıyla saptayan Luhmann, sistemlerin kendi öğelerini ürettiğini, kendi iç sınırlarını çizerek, kendi iç yapılarını düzenlediklerini savunur. Böylece autopoiesis sistemler, hem kendilerini ve hem de çevreyi değiştirme özelliklerine sahiptirler (Cankurtaran Öntaş ve akçay, 2014:109).

Luhmann'ın işlevsel analizinde, sistemle alt-sistemler arasındaki sınır cizgisini belirleme işi, kodlama ve programlama sayesinde mümkün olmaktadır (Sarıbay, 2005:6). Sosyal sistemler, böylelikle hem kendi bağımsız kimliklerini geliştirmekte, hem de geleceklerini garantiye alacak değişim kurallarını yorumlamaktadırlar (Çelik, 2007:61).

Toplum, en kapsamlı sosyal sistem olduğundan, toplumun üyeleri, tüm sosyal sistemlere katılırken tamamen bağımsız hareket ederler (Luhmann, 2002: 20).Luhmann sisteminin özgül yapısı, toplumun temel birimini iletişim olarak görmesidir. Luhmann'ın sistem teorisinde işlev sistemlerinin kendini var edebilmesi, iletişim kurabilmelerine bağlıdır (Cankurtaran Öntaş ve akçay, 2014:104).

Alt Sistem Olarak Hukuk Sistemi

Luhmann, klasik sosyoloji geleneğinin, toplumu bütünsel algılayan sistemsel algısını yenileyerek geliştirmiştir (Habermas, 1998: 381). Niklas Luhmann, sosyolojik sistem teorisinden yola çıkarak, kendi toplumsal sistem teorisini kurmuş, bu sistem içinde hukuku, bir alt sistem olarak ele almıştır. Luhmann'ın sistem teorisi, hukukun toplum sistemi içersinde başka hiç bir sistemin yerine getiremeyeceği temel bir işlevi, normatif davranış beklentisini düzenli bir hale getirme işlevini yerine getirdiğini gösterir (Işıktaç ve Koloş, 2022: 134).

Pozitivist hukuk yaklaşımında, toplumdan önce toplu yaşama dışında hak diye bir kavram düşünülemez. Hiç kimse toplum kurulmadan önce kazanılmış bir takım haklar adına toplumun hukuk kurallarına karşı gelemez. Hak ve özgürlükleri, toplumun koyduğu yasalar yaratır. Haklar ve özgürlükler, ancak yasaların uygun gördüğü oranda vardır (Akın, 1993: 386).

Hukukun pratik alanı, toplumsal gerçekliği ortaya çıkarır (Aral,1979:159). Hak ve özgürlükleri, toplum ve toplumun koyduğu yasalar yaratır. Haklar ve özgürlükler, ancak yasaların uygun gördüğü oranda vardır (Akın, 1993: 386). Öte yandan topluluklar durağan değildir. Özellikle toplumsal düzeni sağlayan sosyal karakter araçları olarak din, ahlak, örf ve adetle birlikte, hukukun yetersiz ve güçsüz kaldığı durumlarda değişme kaçınılmazdır. Bu değişmeden sosyal kontrolün en etkin aracı olan hukuk kuralları da nasibini alır. Hukuk kuralları bazen ortadan kalkar, bazen de yerlerine yenileri getirilir (Gürkan, 2021:66).

Hukukal düzlem, adaletin somutlaşmasıdır (Aral, 1979:158). Bu biçimiyle hukuk, autopoietik bir sistemdir (Işıktaç ve Koloş, 2022: 131). Kendini hem var edebilir, hem de değiştirebilir. Öte yandan siyaset, hukukun uygulanabileceği bir ortam yaratmalıdır. Hukuk yoksa kaos var demektir. Tüm kurumlar gibi hukukunda, tarihsel evrimle birlikte, daha nitelikli ama daha karmaşık bir hale geldiğini görmekteyiz. Karmaşıklığın, alternatif çözüm yöntemleri olarak bir olanak yarattığını görmekteyiz. Tahkim arabulucu sözleşme imkanlarını artırılması gibi çözümlerle ortaya çıkan karmaşıklığın azaltılmasında fayda sağlasa da, hukuktaki bu karmaşıklığın toplumdaki farklılaşma ile olan bağlantısı göz önünde bulundurulduğunda karmaşıklığın azaldığı sonucuna varmak, çok da kolay olmayacaktır (Işıktaç ve Koloş, 2022: 131).

Sistemler, kendilerini çevrelerinden özel kodlarıyla ayırırlar (Cankurtaran Öntaş ve akçay, 2014:104). Sistem teorisi, hukukun öğelerinin, ne salt bireysel, ne de salt normatif olmadığını, bu öğelere ayrıca iletişimin de katıldığını belirtirken, bir alt sistem olarak hukuk, özel olarak iletişimle ilgili olanakları da göz önüne alır. Hukukun, özel olarak iletişimle ilgili olanakları açısından yazı, tüm toplum kesimlerini kapsayıcı genişliğe erişen muhakemeyle birlikte, güç kazanan hukuk, hem kendini yeniden var ederek ve hem de kendini sabitleyerek gelişmiştir. Hukukun evrilmesinin son aşaması, hukukun pozitifleşmesidir (Işıktaç ve Koloş, 2022: 131). Hukuk, işlevini normatif kurallar aracılığıyla gerçekleştirir ve normatif olguların sistem tarafından nasıl cevaplanacağını sembolik olarak gösterir.

Luhmann'ın Hukuk Sisteminde Adalet Kavramının Önemi

Hukuk, adalet yönelmiş toplumsal bir yasadır. Hukuki bir değer olarak, adalet kavramı kaçınılmazdır (Aral, 1979:155). Hukukun pratik alanı, toplumsal gerçekliği ortaya çıkarır (Aral,1979:159). Hukukal düzlem, adaletin somutlaşmasıdır (Aral, 1979:158). Doğrudan adalet duygusunu ihlal eden her bireysel davranış, sosyal dayanışmayı da ihlal eder ve ona zarar verir (Surlu, 2009: 116). Luhmann'ın sistem yaklaşımında adalet, öncelikle eşitlik olarak, algılansa da sürekli tekrarlarla değişen şartlara uyum sağlayacak şekilde görecelidir. Luhmann, adaleti, yeterli karmaşıklık olarak tanımlarken, aslında hukuk sisteminin kaldırabileceği kadar iletişim ilişkisini kastetmektedir.

Luhmann hukukun adalete yönelmiş bir toplumsal yaşama düzeni, şeklindeki klasik tanımını, özellikle hukuku amaçsal olmayan bir şekilde tanımlayan kendi sistem teorisiyle bağdaştırmaz. Zira autopoietik bir tanımlama ile bir bütünlük içinde düzenlenmiş olan hukuksal modelin, amacın gerçekleşmemesi halinde, yeniden nasıl tanımlanabileceği sorunu, sisteminde halen belirsizliğini korumaktadır.

Genel sistem teorisinde temel ilke, normatif çevceveyi iletişime de yöneltmektir. Lokman sistem teorisinde sistemler, kendilerini çevrelerinden özel kodlarıyla ayırırlar (Cankurtaran Öntaş ve akçay, 2014:104). Hukukun kod ve programı, hukuka uygun ve hukuka aykırı dikotomisi-ikiliği üzerinden anlaşılmalıdır. Bu değerlendirmeyi, dışarda bırakılan mahkeme sonucuyla ortya çıkan adil olan- adil olmayan şeklinde üçüncü bir kodla ilişkisini kurmamak gerekir. Zira adalet sadece sosyal bir ilkedir. Bu yüzden system teorisinde hukukun adaletle oln ilişkisi dışlanmıştır. Sistem teorisinde ayrıca hukukun ahlakla olan bağı da dışlanmıştır. Sistem teorisinin olumsallık anlayışı ve dinamik tutumuyla adalet ve ahlak ilkelerine ilişkin sorunu çözmeye çalışarak, bu nedenle adalet kavramını paranteze aldığı görülmektedir.

Luhmann, sistem teorisinde hukukun öğelerinin ne salt bireysel ne de salt normatif olmadığını, bu öğelere ayrıca iletişimnde katıldığını belirtir. Ayrıca herhangi bir olgunun hukuksal muhakeme de karşılaşacağı kriter, hukuka aykırı- hukuka uygun biçiminde olacaktır. Neyin hukuka uygun ve neyin hukuka aykırı olduğu ise, çevre kadar siyasi kodlar ve programlar aracılığıyla belirlenecektir. Hukuka uygun olmayan şeyler değiştirilebilir, bu yolda sistemin değiştirilmesini sağlanmış olur Adalet ancak sistem teorisinde üçüncü dışsal bir kod olarak sistemin bütünü üzerinden sirayet edebilir. Yeterli karmaşıklık olarak tanımlanan adalet, aslında hukuk sisteminin kaldıracağı kadarlık bir iletişim ilişkisidir.

Ancak, bu adalet tanımının biçimsel ve içeriği bulunmayan bir tanım olduğuna da dikkat çekmek geriekir. Luhmann'ın system teorisine getirilen en önemli eleştiri, mekanik bir sistem olarak kurgulanan sistemin insanı içermiyor olmasıdır. Sistem teorisi, hukukunun toplum sistemi içerisinde başka hiçbir sistemin yerine getiremeyecek temel bir işlevi, normal davranış beklentisini düzenli hale getirme işlevini gerçekleştirmesi bakımından çok önemlidir.

SONUÇ

Adaletin, sadece bir sosyal ilke olarak kabul edildiği, Luhmann'ın sistem teorisinde, hukukun adaletle olan bağı kadar, hukukun ahlakla olan bağının da dışlandığını görmekteyiz. Luhmann'ın sistem teorisinde bir alt yapı olan hukuk sisteminde temel ilgi, normatif çerçeve kadar iletişime de yönelmiş olup, hukukun kod ve programı, hukuka uygun- hukuka aykırı dikotomisi üzerinden yapılandırılmıştır.

Bu değerlendirmenin dışında, ortaya çıkan muhakeme sonucunun, ayrıca adil olan- adil olmayan biçiminde üçücü bir kod ile ilişkisini kurmak gerekir ki bu kabul edilemez. Zira herhangi bir hukuksal olgunun, hukuksal mahkeme de karşılaşacağı kriter, hukuka aykırı ya da hukuka uygun biçiminde olacaktır. Neyin hukuka uygun ya da neyin hukuka aykırı olduğu ise, çevre olarak siyasal kodlar ve programlar aracılığıyla belirlenecek, uygun olmayan içerikler de değiştirilebilecektir. Bu yolla sistemin değiştirilmesi de sağlanmış olur.

Adalet, ancak sistem teorisinde üçüncü bir dışsal kod olarak, sistemin bütünü üzerinden, bütüne sirayet edebilir. Adalet bu yapısıyla, görecelidir. Sürekli tekrarlanan yapısıyla şartlar değiştikçe adalet kavramı da değişir. Luhmann, adaleti, yeterli karmaşıklık olarak tanımlarken, aslında hukuk sisteminin kaldırabileceği kadar iletişim ilişkisini kastetmektedir. Yine de bu adalet tanımının, biçimsel ve içeriği bulunmayan bir tanım olduğunu göz ardı etmemek gerekir. Aynı şekilde Luhmann'ın sistem teorisinin olumsal anlayışı içinde, dinamik bir tutumla adalet ve ahlak ilkelerine ilişkin sorunu çözmeye çalışmasında adalet, paranteze alınmış görünmektedir.

KAYNAKLAR

Akın, İ. F., (1993), Kamu Hukuku, İstanbul, s.386.

Aral, V., (1979). Hukuk Ve Hukuk Bilimi Üzerine, İstanbul.

Cankurtaran Öntaş, Ö. ve Akçay, S., (2014). Niklas luhmann'ın sistem teorisi ve teorinin sosyal hizmet disiplinindeki yansımaları, Toplum ve Hizmet, Cilt 25, sayı 2 ekim 2014.

Çelik, C., (2007). Niklas Luhmann'da Sosyal Sistem Olarak Toplum Ve Modern Toplumun Karmaşıklığı Sorunu, bilimname XII, 2007/1.

Gürkan Ü., (2021). Hukuk Sosyolojisine Giriş, Ankara.

Güriz, A., (2009). Hukuk Felsefesi, HF, Ankara.

Güriz, A., (2009). Hukuk Başlangıcı, HB, Ankara.

Habermas, J. (1998). Sosyal Bilimlerin Mantığı Üzerine, İstanbul.

Işıktaç, Y., (2022). Hukuk Felsefesi, Hf, İstanbul.

Işıktaç, Y. ve Koloş, U., (2022). Hukuk Sosyolojisi, İstanbul.

Luhmann, N., (2002). Refah Devletlerinin Siyaset Teorisi, İstanbul.

Luhmann, N., (1986). The Autopoiesis of Social Systems, in Sociocybernetic Paradoxes: Observation, Control and Evolution of Self-Steering Systems,F. Geyer, J. van der Zouwen, eds., Sage Publications.

Sarıbay, A. Y., (2005). Hukuk Felsefesi ve Sosyal Felsefe, "Hukuk ve Politika:Luhmann Sosyolojisi Bağlamında Bir Tartışma" (http://www.ivrturkey.org/ays. E.T. 6.7.2024.

Surlu, A.Ö., (2009). Leon Duguit'nin Devlet ve Hukuk Anlayışı, EÜHFD, C.XIII, S. 3–4.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

DUGUİT SOSYOLOJİSİNDE SOSYAL BİR FONSİYON OLARAK ÖDEV KURUMU

Prof. Dr.Z. Gönül BALKIR
İstanbul Aydın Üniversitesi Hukuk Fakültesi
ORCID: 0000-0003-0710-8375

ÖZET
Duguit'in sosyolojik hukuk yaklaşımı, objektif hukuk kuralları ile subjektif hak kavramına karşı oluşturduğu ödev ve hukukun toplumsal işlevleriyle tanımlanabilir. Duguit, toplumsal dayanışmayı, bir gereklilik olarak alırken, hukuk kurallarını, toplumsal kural kavramından hareketle inceler. Toplumsal bir kuralın, toplumsal bir yaptırıma bağlanmasının haklılığı düşüncesi, toplum mensuplarının bilincine işlerse, artık bir hukuk kuralı haline gelmiştir. Hukuk kuralı, toplumsal gerçeklik içindeki dayanışma olgusunun, bireylerin bilincine yansıması olarak tanımlanabilir. Duguit'e göre, hukuk kuralı, bir toplumsal grubun tüm üyelerini, kaçınılmaz olarak bağlayan toplumsal statüyü kendiliğinden sağlamaktadır. Hukuk kuralının objektifliği ya da objektif hukuk, bu toplumsallık bağlamında karşımıza çıkmaktadır. Objektif hukuk, belirli bir yer ve zamanda, pozitif kanunlarla sınırlı olmadan var olan tüm hukuk kurallarıdır. Objektif hukuk, toplumsal olarak yaşayan bireylere karşı dayatılırken, aynı zamanda objektif hukuka uyulması, toplumsal faydanın temin edilmesini sağlar. Bu bağlamda hukukun toplumsal niteliği, toplumsal dayanışmayla temellenmektedir ve toplumsal dayanışma bilinci üzerine kurulmuştur. Bireylerin ya da toplumların hakları yerine, bunları belirleyen objektif hukuka odaklanmak gerektiğini söyleyen Duguit, hak teorilerini, sadece insan olmakla ortaya çıktıkları ve subjektif değerler olduğundan red ederken, subjektif hak yerine objektif hukukun sonucu olarak ortaya çıkan ödevi önermektedir. Zira toplumsal yaşam gerçekliği, çoklukla ödevleri ortaya çıkarırken, bu ödevler, aynı zamanda toplumsal yapı içinde, bireyin yerine getirmesi gereken, toplumsal dayanışmanın zorunlu kıldığı davranışlardır. Duguit'te, hukukun toplumsal işlevleri, toplumsal dayanışma ekseninde kendine yer bulur. Ona göre özgürlük, kişinin toplumsal yapı içerisindeki ödevleri yerine getirmesidir. Tüm bireyler, toplum içindeki ödevlerini yerine getirerek, belli bir toplumsal işlevi yerine getirirler. Öte yandan toplumsal ödevler, toplumsal bağımlılık ilişkileriyle şekillenirken, toplumsal bir fonsiyon olarak ödev kurumunu oluştururlar. Ödev kurumunu ortaya çıkaran toplumsal fonksiyon, aynı zamanda toplumsal gerçekliğin değişken ve hareketli bir yapısıyla bağlantılı olarak karşımıza çıkmaktadır.
Anahtar Sözcükler: Toplumsal Dayanışma, Ödev Kurumu, Toplumsal Fonksiyon, Objektif Hukuk, Subjektif Hukuk.

THE INSTITUTION OF DUTY AS A SOCIAL FUNCTION IN DUGUIT'S SOCIOLOGY

ABSTRACT
Duguit's approach to sociological law can be defined by the objective rules of law and the duties he created against the concept of subjective right and the social functions of the law. While taking social solidarity as a necessity, Duguit examines the rules of law based on the concept of social rule. If the idea of the justification of linking a social rule to a social sanction penetrates the consciousness of the members of the society, it has now become a rule of law. The rule of law can be defined as the reflection of the phenomenon of solidarity in social reality on the consciousness of individuals.According to Duguit, the rule of law automatically provides the social status that inevitably binds all members of a social group.

The objectivity of the rule of law or objective law appears in the context of this sociality. Objective law is all the rules of law that exist in a given place and time, without being limited by positive laws. While objective law is imposed against socially living individuals, at the same time, compliance with objective law ensures the provision of social benefit. In this context, the social nature of law is based on social solidarity and is based on the awareness of social solidarity. Stating that instead of the rights of individuals or societies, it is necessary to focus on the objective law that determines them, Duguit rejects the theories of rights as they emerge only as human beings and as subjective values, while proposing the duty that emerges as a result of objective law instead of subjective right. Indeed, social reality often brings forth duties, which within the social structure are behaviors mandated by social solidarity that individuals are required to fulfill. For Duguit, the social functions of law find their place around social solidarity. According to him, freedom is the fulfillment of one's duties within the social structure. All individuals fulfill a certain social function by fulfilling their duties in society. On the other hand, while social tasks are shaped by social dependency relationships, they form the institution of duty as a social function. The social function that creates the institution of duty also emerges in connection with a variable and mobile structure of social reality.
Keywords: Social Solidarity, Institution of Duty, Social Function, Objective Law, Subjective Law.

Giriş

1859 -1928 yılları arasında yaşayan, Fransız kamu hukukçusu Leon Duguit, yapmış olduğu çalışmalar nedeniyle sosyolojik pozitivizmin içinde kabul edilerek, hukuk sosyolojisinin kurucuları arasına girmiştir(Işıktaç ve Koloş, 2022:92).

Duguit'nin, toplumsal yaşam ve sosyal koşullarla hukuk arasındaki ilişkiyi görerek, çağının bireyci hukuk ve devlet anlayışından sosyal hukuk devleti anlayışına geçerek, önemli bir fonksiyon icra etmiştir (Güriz, HF, 2009:308). Duguit, bilgi edinmenin ve bilginin ampirik kaynaklı olduğunu, doğuştan bilginin olmadığını ve gerçekliğin sadece doğrudan gözlemlenebilen olgulardan tespit edilebileceğini ifade eder. Sosyal bilimlerde gözlemenin objektif biçimde tümdem gelimci bir uslamlama ile yapılması gerektiğini ileri sürer.

Duguit, yaşadığı çağda karşılaştığı, modern toplumsal değişikliklerinin, hukuksal yapıdaki sonuçlarını inceleyerek, bazı konuların incelenmesine çalışmıştır (Öktem ve Türkbağ, 2001:308). Bu konuların başında, objektif hukuk temellerinin araştırılması yatmaktadır. Öte yandan, subjektif hukukun pozitif dayanakları incelenmeli ve sübjektif hak kavramı ile devletin ilişkisi araştırılmalıdır.

Duguit çalışmalarıyla, hukukla toplum arasındaki sosyal koşullara ve bunlar arasındaki ilişkiye dikkat çekmiş ve hukuk teorisine bu şekilde önemli katkılarda bulunmuştur. Özellikle hukuk teorisini, fiziksel kavramlardan arındırmak suretiyle yaptığı çalışmalarla hukuk teorisine sürekli bir etkililik yaratmıştır. Kolektif bilinç, sosyal dayanışma gibi kavramların anlamlarını farklı şekillerde kullanarak, sosyolojik pozitivist bir hukuk kuramı geliştirmiştir(Surlu,2009:117). Duguit, toplumsal yaşam gerçekliğinde, çoklukla ödevlerin bulunduğunu ve bu ödevlerin, bireyin yerine getirmesi gereken, toplumsal dayanışmanın zorunlu kıldığı davranışlar olduğunu söyler. Çalışmamızda, bu nedenle ödev konusuna odaklanarak, Duguit'in hukuk sosyolojisindeki ödev yaklaşımını irdelemek istedik.

DUGUIT'IN SOSYOLOJİK HUKUK YAKLAŞIMI

Duguit'in Realist Hukuk Teorisi

Duguit'in sosyolojik hukuk anlayışı, hukukun biricik kaynağının toplumsal yaşam olduğunu gösterir. İnsan, toplumsal yaratılışı gereği, topluluk içinde yaşaması zorunlu olduğundan, toplumsal yaşamın bir takım kurallarla düzenlenmeye ihtiyaç duyar. Bunlar olmadan toplumsal yaşam olamaz. Böylece insanların bir arada yaşamalarıyla, örf ve adetler, gelenekler, ahlak ve hukuk ortaya çıkar (Aral,1979:142) Hukukun yansıtıcısı olan adalet, olması gereken bir şeydir ve normatif bir güçtür(Aral,1979:153). Hukuksal düzlem, adaletin somutlaşmasıdır (Aral, 1979:158).

Hukukun pratik alanı, toplumsal gerçekliği ortaya çıkarır (Aral,1979:159). Hukuk, adalet yönelmiş toplumsal bir yasadır. Hukuki bir değer olarak, adalet kaçınılmazdır (Aral, 1979:155). Topluluklar durağan değildir. Özellikle toplumsal düzeni sağlayan sosyal karakter araçları olarak din, ahlak, örf ve adetle birlikte, hukukun yetersiz ve güçsüz kaldığı durumlarda değişme kaçınılmazdır. Bu değişmeden sosyal kontrolün en etkin aracı olan hukuk kuralları da nasibini alır. Hukuk kuralları bazen ortadan kalkar, bazen de yerlerine yenileri getirilir (Gürkan, 2021:66).

Pozitivist hukuk yaklaşımında, toplumdan önce toplu yaşama dışında hak diye bir kavram düşünülemez. Hiç kimse toplum kurulmadan önce kazanılmış bir takım haklar adına toplumun hukuk kurallarına karşı gelemez. Hak ve özgürlükleri, toplumun koyduğu yasalar yaratır. Haklar ve özgürlükler, ancak yasaların uygun gördüğü oranda vardır (Akın, 1993: 386).

İnsan toplumla yaşayabilir ve toplumda yaşayabilir. Bu nedenle sosyal insan anlayışı, hukuk teorisinin başlangıcı olmak durumundadır (Duguit, 1917:24). Duguit'in hukuk teorisi, sosyolojik pozitivizm yaklaşımını ifade ederken, bu teoriye aynı zamanda realist hukuk teorisi adı da verilmektedir (Güriz, HF, 2009:51). Duguit'e göre, toplumdan kaynaklanan hukukun kaynağı, yine toplumda aranmalıdır. İnsanın, toplum halinde yaşayabilme zorunluluğu, aynı şekilde sosyal bir varlık ve sosyal kurallar demektir. Hukuksal yapı ve bizzat hukukun kendisi de objektif bir kuraldan oluşmuştur ve toplum halinde yaşanılan bir ortamda, sosyal normlarla gerçekleşir (Surlu, 2009: 113).

Duguit'te Toplumsal Dayanışma

Duguit'e göre sosyal bilimlerin konusunu, toplumsal olaylar oluşturmaktadır ve toplumsal olarak bireyin eylemiyle ortaya çıkan kolektif tepki olarak tanımlanır (Işıktaç ve Koloş, 2022:92). Toplumsal olaylar bireysel olaylardan ayrılır. İnsanların yalnız yaşadığı varsayımda, tamamen aynı şartlarda gerçekleştirilecek olan olayları bireysel olaylar olarak tanımlar. Bu anlamda toplumsal yaşamın mevcudiyeti halinde salt bireysel bir olayın mevcut olamayacağını, her insanın toplumsal bir varlık olarak diğer insanların varlığına bağlı olduğu ifade eder.

Sosyal bilimlerin konusu, toplumsal olaylar olarak ortaya konulduğunda, Duguit'in daha ziyade toplumsal olaylarla ilgili düşünceler ürettiğini anlatmak gerekmektedir. Toplumsal kurallar dediği zaman, toplumsal olayları, merkeze almaktadır. Toplumsal kurallar davranış kurallarıdır ve toplumsal dayanışmanın gerçekleşmesi için işbirliğini güçlendirmektedir. Toplumsal kurallar, toplumsal dayanışmanın zorunlu bir sonucudur. Duguit'e göre bireysel davranışların toplumsal değeri toplumsal dayanışma amacıyla hizmet ettiği oranda belirlenmektedir. Zira ona göre toplumu ve insanların uyumlu birlikteliğini yaratan olgu dayanışma olgusudur(Işıktaç ve Koloş, 2022:93).Toplumsal kurallarda toplumsal dayanışma bilincini artan biçimde belirginleşmesi ve tamamlanması ölçüsünde toplumsal dayanışmaya uygun davranmak zorunluluğu bilincini ifade etmektedir.

Duguit'in yaklaşımında toplumsal gerçeklik içinde yer tuttuğunu, toplumsal dayanışmanın bir gerçeklik olarak var olduğunu kabul etmek gerekir. Duguit'in hukuk sosyolojisi yaklaşımı bakımından ilk konu, bir toplumsal norm kategorisi olarak, hukuk kurallarının objektifliği oluşturur. Duguit, hukuk kurallarının toplumsal Kural kavramından hareketle incelerken, toplumsal bir kuralın, hukuk kuralı olduğunu nasıl anlaşılacağınn sorgusunu yapar.
Duguit'e göre bir kuralının hukuk kuralı olmasını sağlayan şey, devlet tarafından vaazedilmesi olmadığına göre, devletsiz bir hukuk nasıl mümkün hale gelebilecektir? Bu soruyu insanın toplumsal bir varlık olmasıyla yanıtlar (Işıktaç ve Koloş, 2022:94).
Ona göre toplumsal bir kuralın, toplumsal bir yaptırıma bağlanmasının haklılığı düşüncesi, o toplumun mensuplarınca, bilinçlerine işlerse, artık bir hukuk kuralından bahsedilebilecektir. Burada önemli olan gereken kuralın bir yaptırma bağlanmasının, haklı ve uygun olduğunun herkesçe düşünülmesidir. Böylece Duguit için, genel olarak hukuktan bahsetmek şart değildir ve doğrudan zorlamaya ilişkin göndermelerle, yapılacak olarak açıklamalar, toplumsal kuralın hukuksal kuralına dönüşme anını ifade etmektedir. Bu bağlamda hukuk kuralları toplumsal gerçeklik içindeki dayanışma olgusunun bireylerin bilincine yansıması olarak tanımlanabilir. Duguit'e göre hukuk kuralı, bir toplumsal grubunun tüm üyelerini kaçınılmaz olarak olarak bağlayan bir toplumsal statüyü kendiliğinden kazanmaktadır(Işıktaç ve Koloş, 2022:95).

DUGUIT'IN OBJEKTİF HUKUK VE ÖDEV YAKLAŞIMI

Objektif Hukukun Tanımlanması

İnsan toplumla yaşayabilir ve toplumda yaşayabilir. Bu nedenle sosyal insan anlayışı, hukuk teorisinin başlangıcı olmak durumundadır (Duguit, 1917:24). Hukuk tümüyle sosyal dayanışmaya dayanır. Sosyal dayanışmanın kendiliğinden ortaya çıkardığı hukuka, Duguit, nesnel hukuk ya da Objektif hukuk adını verir.
Duguit'e göre, hukuk kuralı, bir toplumsal grubun tüm üyelerini, kaçınılmaz olarak bağlayan toplumsal statüyü kendiliğinden sağlamaktadır. Hukuk kuralının objektifliği ya da objektif hukuk, bu toplumsallık bağlamında karşımıza çıkmaktadır. Hukukun objektifliğini sağlayan, onu objektif hukuk olarak tanımlayan niteliği, bağımsız ve objektif olarak toplumsal dayanışmanın bir sonucu olmasıdır.
Objektif hukuk, belirli bir yer ve zamanda, pozitif kanunlarla sınırlı olmadan var olan tüm hukuk kurallarıdır. Objektif hukuk, toplumsal olarak yaşayan bireylere karşı dayatılırken, aynı zamanda objektif hukuka uyulması, toplumsal faydanın temin edilmesini sağlar. Bu bağlamda hukukun toplumsal niteliği, toplumsal dayanışmayla temellenmektedir ve toplumsal dayanışma bilinci üzerine kurulmuştur. Devlet sadece, kendiliğinden var olan ve düzenlenmemiş olan bu hukuku sistemleştirip yazılı hale getirir. Duguit, bu hukuka objektif hukuk adını verir (Surlu, 2009: 114).
Başkaldırıyı salık verdiği gibi bir izlenimden dolayı, Duguit'e kürsü anarşisti sıfatı takılmış olsa da duguit, sosyolojik okullar içine adalet kavramını getirmekle olumlu bir katkı sağlamıştır (Öktem, 1988:261).
Duguit'e göre hukuk, objektif sosyal gerçeklik içinde ele alınmalıdır. Metafizik karakterli bireysel hak anlayışı olamaz. Bireysel hak demek, bireyin iradesinin diğerine üstün tutulması demektir. Kimsenin kimseye ileri süreceği üstün bir hakkı yoktur, devletin de bireyler üzerinde üstün hakları yoktur. Bir olgu olarak devlet, güce dayansa da yönetenlerin, yönetilenlerin temsilcisi olduğu varsayımı, devleti meşrulaşma çabalarından başka bir şey değildir (Öktem, 1988:260).

2.2.Subjektif Hukuk Kavramı

Duguit, subjektif hakkı kabul etmiyor. Kavram olarak insanın davranış ve değerlerinin hukuka dahil edilmesini, metafizik bir hayal ürünü olarak kabul ediyor. Hukuksal yapı için, gerçekçi bir yaklaşımın benimsenmesi zorunludur. Subjektif hak, hukuk hayatında rol oynayan fizik ötesi kavramlardan biridir. Hukuk hayatında gerçekliğe sahip olanlar, sadece hukuk kurallarıdır. İrade ve menfaat teorileri gibi, iradenin yanında menfaatinde hakkın bir unsuru olduğunu kabul eden karma teori de, hak konusunda gerçeği yansıtmaktan çok uzaktır (Güriz, HB, :51).

Duguit, objektif hukuktan başka bir de subjektif hukuk ayırımı yapar ve subjektif hukuku reddeder. Ona göre subjektif hukuk, metafizik bir kavramdır (Surlu, 2009: 117). Duguit'te, objektif hukuk karşısında subjektif hukuk yer alır. Hukuk toplumsal bir niteliğe haizdir. Bu niteliğiyle, toplumsal dayanışma bilinciyle kurulmuştur. Adaletin subjektif bir içeriği yoktur(Işıktaç ve Koloş, 2022: 95).

2.3.Duguit'in Hukuk Sosyolojisinde Ödev Kavramı

Toplumsal yaşam gerçekliği, çoklukla ödevleri ortaya çıkarır bu ödev aynı zamanda toplumsal yapı içinde bireyin yerine getirmesi gereken ve toplumsal dayanışmanın zorunlu kıldığı davranışlardır.

Özgürlük, hukukun toplumsal işlev ve toplumsal dayanışma ekseninde kendine yer bulur. Özgürlük, kişinin toplumsal yapı içerisindeki ödevleri yerine getirmesidir. Bireyler toplum içindeki ödevlerini yerine getirerek, belli bir toplumsal işlevi görürler. Toplumsal fonksiyon, aynı zamanda toplumsal gerçekliklerin, değişken hareketli bir yapıda olmasıyla bağlantılı olarak ortaya çıkmaktadır. Toplumsal ödevler, toplumsal bağımlılık ilişkileriyle şekillenmekte ve ödev Kurumunu oluşturmaktadır.

Duguit'in sosyolojik hukuk yaklaşımı, objektif hukuk kuralları ile subjektif hak kavramına karşı oluşturduğu ödev ve hukukun toplumsal işlevleriyle tanımlanabilir. Duguit, toplumsal dayanışmayı, bir gereklilik olarak alırken, hukuk kurallarını, toplumsal kural kavramından hareketle inceler. Toplumsal bir kuralın, toplumsal bir yaptırıma bağlanmasının haklılığı düşüncesi, toplum mensuplarının bilincine işlerse, artık bir hukuk kuralı haline gelmiştir. Hukuk kuralı, toplumsal gerçeklik içindeki dayanışma olgusunun, bireylerin bilincine yansıması olarak tanımlanabilir(Işıktaç ve Koloş, 2022: 94).

Doğal hukuk yaklaşımı, hukuksal yapıda hukuki bir değer olarak hak kavramına önem verdiği halde, hukuki pozitivist yaklaşım, ödev kavramının daha etkili ve daha önemli olduğu görüşünden hareket eder Güriz, HB, :53). Duguit'de bir pozitivist olarak ödev kavramına ağırlık vermektedir. Öte yandan hak ve ödev kavramları arasında bir karşılıklılık ilişkisi bulunmaktadır (Güriz, HB, :53).

Duguit, subjektif hak kavramına hücum etmekte ve subjektif hak kavramı yerine ödev kavramını hukuk kuralının temeli olarak belirleme konusunda çaba harcamaktadır (Güriz, HF, 2009:296).

Modern hukuk sistemlerinde ödev kavramı ile hukuki ödev olarak sorumluluk kavramı arasında bir özdeşlik kurulmuştur. Hukuki ödevini yerine getirmeyen sorumlu sayılmıştır. Ancak modern hukukta kolektif sorumluluğun istisnai olduğunu söylemek lazımdır (Güriz, HF, 2009:320).

Ödev kavramına özellikle 20. yüzyılda şiddetle saldırıldığını görmekteyiz. Bu kavramın, artık rasyonel değerlendirme dışında kaldığı savunulmaktadır. Öte yandan belli bir biçimde davranmanın ödev olması, hem bireysel hem de genel bir durumu göstermektedir. Hukuk kuralları genel ve normatif önermeler nitelği taşımakla, olması gerekni göstermesinin ötesinde aynı zamanda özellikle ödeve ilişkin bir kapsama sahip bulunmaktadırlar (Işıktaç,2022:490).

Duguit, subjektif hak yerine objektif hukukun bir sonucu olarak görülebilecek ödevi önerir. Ona göre toplumsal yaşam gerçekliğinden çıkan şey, çoklukta subjektif nitelendirmelere haiz olan hak değil ödevdir. Bireylerin ya da toplumların hakları yerine, bunları belirleyen objektif hukuka odaklanmak gerektiğini söyleyen Duguit, hak teorilerini, sadece insan olmakla ortaya çıktıkları ve subjektif değerler olduğundan red ederken, subjektif hak yerine objektif hukukun sonucu olarak ortaya çıkan ödevi önermektedir. Zira toplumsal yaşam gerçekliği, çoklukla ödevleri ortaya çıkarırken, bu ödevler, aynı zamanda toplumsal yapı içinde, bireyin yerine getirmesi gereken, toplumsal dayanışmanın zorunlu kıldığı davranışlardır(Işıktaç ve Koloş, 2022: 96).

Duguit'in hukuka sosyolojik olarak yaklaşımını, ayrıca subjektif hak kavramına karşı, ödev kurumu ve hukukun toplumsal işlevleri açısından değerlendirmek gerekir. Subjektif hakları red eder ve ödev kurumunu oluştururken, bu reddin sebebi, objektif hukuk kavramı ile yakından ilgilidir. Duguit, hukukun varlığını teorik olarak kanıtlamak istemektedir. Ona göre bireylerin ve toplumların haklarından değil, bunları belirleyen objektif hukuktan bahsedilmelidir.

Toplumsal fonksiyon Aracı olarak Ödev Kavramı

Duguit'in hukuka sosyolojik olarak yaklaşımında, ödev kavramıyla birlikte dikkat çeken bir diğer konu da, hukukun toplumsal işlevleridir. Duguit'in toplumsal dayanışma ekseninde kendisine yer bulan yaklaşımı, özgürlük tanımı yaptırır. Özgürlük, kişinin toplumsal yapı içindeki ödevlerini yerine getirmesidir ve tüm bireyler toplumun içindeki ödevlerini yerine getirerek, belli bir toplumsal işlev görürler(Işıktaç ve Koloş, 2022: 96).

Duguit, toplumsal dayanışmayı bir gerçeklik olarak alırken, hukuk kurallarının toplumsal kural olması gerçeğinden hareketle inceler. Toplumsal kuralların, toplumsal bir yaptırıma bağlanması haklılığı düşüncesi, o toplumu mensuplarının bilincine işlerse, artık bir hukuk kuralını haline geldiğini kabul eder. Duguit'e göre, bir hukuk kuralı, toplumsal grubun tüm üyelerini kaçınılmaz olarak bağlayan bir toplumsal stratejiyi kendiliğinden sağlamaktadır. Hukuk kural ve objektifliği ya da objektif hukuk, hukukun bu toplumsallık bağlamında karşımıza çıkmaktadır. Objektif hukuk, belirli yerde ve zamanda pozitif kanunlarla sınırlı olmadan var olan tüm hukuk kurallarıdır

Duguit'te, hukukun toplumsal işlevleri, toplumsal dayanışma ekseninde kendine yer bulur. Ona göre özgürlük, kişinin toplumsal yapı içerisindeki ödevleri yerine getirmesidir. Tüm bireyler, toplum içindeki ödevlerini yerine getirerek, belli bir toplumsal işlevi yerine getirirler. Toplumsal ödevler, toplumsal bağımlılık ilişkileriyle şekillenirken, toplumsal bir fonsiyon olarak ödev kurumunu oluştururlar. Ödev kurumunu ortaya çıkaran toplumsal fonksiyon, aynı zamanda toplumsal gerçekliğin değişken ve hareketli bir yapısıyla bağlantılıdır. Hukukun toplumsal gerçeklikten ibaret olmasıyla birlikte, devlet kurumu da toplumsal gerçekliklerden çıkan materyaller olarak anlaşılmalıdır. Duguit'e göre devlet, yalnızca ortak fayda ve yöneticilerin denetlenmesiyle yapılacak bir kamu hizmetleri sistemidir. Bu sistem, toplumsal dayanışma yükselen ve bu dayanışmayı sergileyen bireylerin toplamından fazlası değildir. Böylece devlet kurumu da, salt siyasal ya da tözsel değil, sosyolojik bir kategori içinde ele alınır (Işıktaç ve Koloş, 2022: 97.

Sonuç

Duguit'in sosyolojik hukuk yaklaşımı, objektif hukuk kuralları ile subjektif hak kavramına karşı oluşturduğu ödev ve hukukun toplumsal işlevleriyle tanımlanabilir. Duguit, toplumsal dayanışmayı, bir gereklilik olarak alırken, hukuk kurallarını, toplumsal kural kavramından hareketle inceler. Toplumsal bir kuralın, toplumsal bir yaptırıma bağlanmasının haklılığı düşüncesi, toplum mensuplarının bilincine işlerse, artık bir hukuk kuralı haline gelmiştir.

Duguit'e göre, hukuk kuralı, bir toplumsal grubun tüm üyelerini, kaçınılmaz olarak bağlayan toplumsal statüyü kendiliğinden sağlamaktadır. Hukuk kuralının objektifliği ya da objektif hukuk, bu toplumsallık bağlamında karşımıza çıkmaktadır. Objektif hukuk, belirli bir yer ve zamanda, pozitif kanunlarla sınırlı olmadan var olan tüm hukuk kurallarıdır. Objektif hukuk, toplumsal olarak yaşayan bireylere karşı dayatılırken, aynı zamanda objektif hukuka uyulması, toplumsal faydanın temin edilmesini sağlar. Bu bağlamda hukukun toplumsal niteliği, toplumsal dayanışmayla temellenmektedir ve toplumsal dayanışma bilinci üzerine kurulmuştur.

Bireylerin ya da toplumların hakları yerine, bunları belirleyen objektif hukuka odaklanmak gerektiğini söyleyen Duguit, hak teorilerini, sadece insan olmakla ortaya çıktıkları ve subjektif değerler olduğundan red ederken, subjektif hak yerine objektif hukukun sonucu olarak ortaya çıkan ödevi önermektedir. Zira toplumsal yaşam gerçekliği, çoklukla ödevleri ortaya çıkarırken, bu ödevler, aynı zamanda toplumsal yapı içinde, bireyin yerine getirmesi gereken, toplumsal dayanışmanın zorunlu kıldığı davranışlardır.

Duguit'te, hukukun toplumsal işlevleri, toplumsal dayanışma ekseninde kendine yer bulur. Ona göre özgürlük, kişinin toplumsal yapı içerisindeki ödevleri yerine getirmesidir. Tüm bireyler, toplum içindeki ödevlerini yerine getirerek, belli bir toplumsal işlevi yerine getirirler. Öte yandan toplumsal ödevler, toplumsal bağımlılık ilişkileriyle şekillenirken, toplumsal bir fonsiyon olarak ödev kurumunu oluştururlar. Ödev kurumunu ortaya çıkaran toplumsal fonksiyon, aynı zamanda toplumsal gerçekliğin değişken ve hareketli bir yapısıyla bağlantılı olarak karşımıza çıkmaktadır.

Kaynakça

Surlu, A.Ö., (2009). Léon Duguıt'nin Devlet Ve Hukuk Anlayışı, EÜHFD, C. XIII, S. 3–4.

ÖKTEM, N. ve TÜRKBAĞ, A. U., (2001). Felsefe, Sosyoloji, Hukuk ve Devlet, Der Yay., İstanbul.

Akın, İ.F..(1993), Kamu Hukuku, İstanbul.

Güriz, A., (2009). Hukuk Felsefesi, HF, Ankara.

Güriz, A., (2009). Hukuk Başlangıcı, HB, Ankara.

Öktem, N. ve Türkbağ, A.U., (2001). Felsefe, Sosyoloji, Hukuk ve Devlet, İstanbul

Duguit, L., (1920), Objektive Law, Columbia Law Review, Vol 20.

Duguit, L..(1917). The Law and State, Harvard Law Review, Vol 31.

Akın, İ.F..(1993), Kamu Hukuku, İstanbul, s.386.

Aral, V., (1979). Hukuk Ve Hukuk Bilimi Üzerine, İstanbul.

Gürkan Ü., (2021). Hukuk Sosyolojisine Giriş, Ankara.

Güriz, A., (2009). Hukuk Felsefesi, HF, Ankara.

Güriz, A., (2009). Hukuk Başlangıcı, HB, Ankara.

Işıktaç, Y., (2022). Hukuk Felsefesi, Hf, İstanbul.

Işıktaç, Y. ve Koloş, U., (2022). Hukuk Sosyolojisi, İstanbul.

Surlu, A.Ö., (2009). Leon Duguit'nin Devlet ve Hukuk Anlayışı, EÜHFD, C.XIII, S. 3–4.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

BOKSÖRLERİN VE JUDOCULARIN DENGE PARAMETRELERİ ÜZERİNE PERFORMANSLARININ İNCELENMESİ

Metin SÖNMEZ
Zonguldak Bülent Ecevit Üniversitesi, Beden Eğitimi ve Spor Yüksekokulu
ORCID: 0000-0004-9399-2236

Doç. Dr. Mustafa GÜMÜŞ
Zonguldak Bülent Ecevit Üniversitesi, Beden Eğitimi ve Spor Yüksekokulu
ORCID: 0000-0002-0666-9237

ÖZET
Bu araştırmanın amacı, boksörlerin ve judocuların denge parametreleri üzerindeki performanslarını incelemektir. Araştırmaya 30 boksör ve 30 judocu olmak üzere toplam 60 elit erkek sporcu katılmıştır ve bu sporcuların tamamı milli sporcu statüsündedir. Katılımcıların demografik özellikleri ve denge performansları detaylı olarak incelenmiştir. Veri analizi için SPSS 21.0 programı kullanılmıştır. İstatistiksel analizde Betimsel İstatistikler, Bağımsız Gruplar T-Testi ve Tek Yönlü ANOVA kullanılmıştır. Araştırmanın anlamlılık düzeyi $p<0,05$ olarak belirlenmiştir. Dengenin hem boks hem de judo sporunda temel motorik özelliklerden biri olarak kabul edilmesi, müsabakalarda sporcuların rakiplerine karşı üstünlük sağlamalarında önemli bir rol oynar. Boksörler, rakiplerinden gelen darbeleri savuşturmak ve denge kaybı yaşamadan hızlı hareket edebilmek için güçlü bir dengeye ihtiyaç duyarlar. Judocular ise, rakiplerini devirmek ve kendi dengelerini korumak için dengeyi aktif olarak kullanırlar. Bu bağlamda, denge performansının bu iki spor dalında başarıya olan etkisi önemlidir.Araştırmaya katılan sporcuların demografik özellikleri yaş ve spor geçmişlerine göre incelenmiştir. Katılımcıların %60'ı 18 yaş altı, %40'ı 18 yaş ve üzeridir. Hem boks hem de judo gruplarında, tüm sporcular milli düzeyde temsil edilen atletlerdir, bu da araştırmaya önemli bir katkı sağlamaktadır. Veri analizinde betimsel istatistikler olan aritmetik ortalama, frekans, standart sapma ve yüzde değerlerine bakılmıştır. Normal dağılım analizinde çarpıklık (skewness) ve basıklık (kurtosis) değerleri incelenmiş ve verilerin normal dağılım gösterdiği kabul edilmiştir. Parametrik testlerle yapılan analizlerde, boksörlerin ve judocuların denge performansları arasındaki farklar belirlenmiştir. Araştırma sonuçları, boksörlerin statik denge performanslarının judoculardan daha iyi olduğunu ($p=0,032$), ancak dinamik denge performanslarında anlamlı bir fark olmadığını göstermiştir. Ayrıca, boyu 180 cm ve üzeri olan sporcuların denge performanslarının diğer gruplara göre anlamlı derecede daha yüksek olduğu tespit edilmiştir ($p<0,05$).
Anahtar Kelimeler: Boks, Judo, Denge

INVESTIGATION OF BALANCE PARAMETERS IN BOXERS AND JUDOKAS

ABSTRACT
The aim of this research is to examine the performance of boxers and judokas on balance parameters. A total of 60 elite male athletes, including 30 boxers and 30 judokas, all of whom are national athletes, participated in the study. The demographic characteristics and balance performance of the participants were analyzed in detail. SPSS 21.0 software was used for data analysis. Descriptive Statistics, Independent Groups T-Test, and One-Way ANOVA were used for statistical analysis. The significance level of the study was set at $p<0.05$.

Balance is considered one of the fundamental motor skills in both boxing and judo, playing a crucial role in athletes' ability to gain superiority over their opponents in competitions. Boxers require strong balance to fend off blows from their opponents and move quickly without losing balance. Judokas actively use balance to throw their opponents and maintain their own balance. Therefore, the impact of balance performance on success in these two sports is significant. The demographic characteristics of the participating athletes were examined according to age and sports background. 60% of the participants were under 18 years old, and 40% were 18 years old or older. In both boxing and judo groups, all athletes were national-level representatives, providing significant contribution to the study. Descriptive statistics, including arithmetic mean, frequency, standard deviation, and percentage values, were examined in the data analysis. In the normal distribution analysis, skewness and kurtosis values were examined, and it was accepted that the data showed a normal distribution. The differences in balance performance between boxers and judokas were determined through parametric tests. The research results showed that boxers' static balance performance was better than that of judokas ($p=0.032$), but there was no significant difference in dynamic balance performance. Additionally, it was found that athletes with a height of 180 cm or more had significantly higher balance performance compared to other groups ($p<0.05$).

Keywords: Boxing, Judo, Balance

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

TAURİN TAKVİYESİNİN AEROBİK KAPASİTE ETKİSİ ÜZERİNE BİR İNCELEME

Araştırma Görevlisi Cemre Didem EYİPINAR
Gaziantep Üniversitesi, Spor Bilimleri Fakültesi, Beden Eğitimi ve Spor Öğretmenliği
ORCID: 0000-0002-9778-2074

ÖZET
Sülfür içeren bir amino asit olan taurin, miyokard, iskelet kasları, sinir, beyin ve diğer organlarda bulunan en bol serbest amino asittir. Taurin amino asidi, endojen sentez yoluyla elde edilebilmesine rağmen, literatürde endojen üretimin vücudun taurin ihtiyacını karşılamak için yetersiz olduğunu gösteren raporlar da yer almaktadır. İskelet kaslarında, taurin içeriğinin ve taşınmasının kararlı durum seviyeleri, yavaş kasılan liflerde (aerobik) hızlı kasılan lif tipi kaslara göre çok daha yüksektir. Bu dokularda, esansiyel olmayan amino asit olan taurin, çeşitli elektrofizyolojik ve biyokimyasal parametreleri de etkiler. Taurin amino asidi, iyon kanallarının düzenlenmesi, hücre hacmi ve membran stabilizasyonu dahil olmak üzere çeşitli işlevlerde yer alır. Taurin takviyesinin fiziksel performansı artırıcı potansiyel etkileri olduğu bildirilmiş olsa da, bu amino asit molekülünün bu tür işlevleri sportif performans açısından nasıl düzenlediği hala tam olarak bilinmemektedir. Bu derlemenin amacı, taurin takviyesinin egzersiz performansı üzerindeki etkinliğini çevreleyen bugüne kadarki literatürü incelemektir. Bu incelemenin amacı doğrultusunda SCI, SCI-Expanded ve ESCI dergileri kapsamında incelenen makalelerden veri toplamak amacıyla PubMed, Google Scholar, SportDiscus ve EMBASE veri tabanlarında literatür incelenmiştir. Yapılan araştırmaların sonucuna göre Taurin takviyesinin aerobik kapasitede artış sağladığı ve bu artışı da antioksidan etkisi, membran stabilizasyonunu sağlaması, kalsiyum akışını artırıcı özelliği vasıtasıyla desteklediği belirlenmiştir.
Anahtar Kelimeler: Taurin, antioksidan etki, aminoasit, aerobik kapasite

THE EFFECT OF TAURINE ON AEROBIC CAPACITY: A REVIEW

ABSTRACT
Taurine, a sulfur-containing amino acid, is the most abundant free amino acid found in the myocardium, skeletal muscles, nerves, brain and other organs. Although the amino acid taurine can be obtained through endogenous synthesis, there are reports in the literature indicating that endogenous production is insufficient to meet the body's need for taurine. In skeletal muscles, steady-state levels of taurine content and transport are much higher in slow-twitch fibers (aerobic) than in fast-twitch fiber-type muscles. In these tissues, the non-essential amino acid taurine also affects various electrophysiological and biochemical parameters. Taurine is a naturally occurring amino acid involved in a variety of functions, including regulation of ion channels, cell volume, and membrane stabilization. Although it has been reported that taurine has potential effects that increase sports performance, it is still not fully known how this molecule regulates such functions in terms of sports performance. The purpose of this review is to examine the literature to date surrounding the effectiveness of taurine supplementation on exercise performance. In this regard, the literature was examined in the PubMed, Google Scholar, SportDiscus, and EMBASE databases in order to collect the data from the articles examined within the SCI, SCI-Expanded, and ESCI.

According to the results of the research, it has been determined that taurine increases aerobic capacity through its antioxidant effect, membrane stabilization and calcium flux enhancing properties.
Keywords: Taurine, antioxidant effect, aminoacid, aerobic capacity

GİRİŞ

Taurin sistein metabolizmasından türetilebilen kükürt içeren bir amino asittir ve serbest amino asit havuzunun %50-60'ını oluşturur. Taurin, glikoz ve lipid regülasyonu, enerji metabolizması, antiinflamatuar modülasyon ve antioksidan etkiler gibi çeşitli metabolik ve fizyolojik süreçlerde faydalı bir rol oynar. Dolayısıyla taurin, atletik performansı geliştirmek için potansiyel bir ergojenik yardımcı haline gelmektedir (Haidari vd., 2019). Taurinin büyük bir ergojenik potansiyele sahip olmasına rağmen, izole edilmiş taurin takviyesi çok daha az araştırılmış ve belgelenmiştir (Duttagupta vd., 2024). Taurin, vücutta kas kasılma sürecinde kalsiyum akışını artırıcı özelliği (Bakker ve Berg, 2002) membrane stablizasyonu (Huxtable, 1992) ve serbest radikallerin temizlenmesinde (De Carvalho vd., 2017) yer alan etki mekanizmalarını modüle eden çeşitli fizyolojik fonksiyonlara sahip bir yarı esansiyel amino asit olduğu bildirilmiştir. Bu işlevler aerobik egzersiz performansı için oldukça önemlidir. Yapılan çalışmalar, 7 gün boyunca günde 6 g taurinin akut takviyesinin, bisiklet ergometresinde tükenmeye kadar geçen süreyi, maksimum iş yükünü ve maksimum oksijen alımını ($VO2_{max}$) önemli ölçüde artırdığını ve oksidatif stres belirteçlerini azalttığını ortaya koymuştur.

Dolayısıyla bu derlemede, taurinin aerobik kapasiteye etki etmesindeki potansiyel biyokimyasal mekanizmalar incelenecektir.

Taurinin Kalsiyum Akışına Etkisi

Sülfonik bir amino asit olan taurin, birçok memeli hücresinde yüksek konsantrasyonlarda bulunur. Taurin ayrıca iskelet kasında da yüksek seviyelerde bulunur. Taurin, Na^+ bağımlı yüksek afiniteli bir taurin taşıyıcısı aracılığıyla çoğu hücre tarafından aktif olarak biriktirilir ve bu taurin taşıyıcısının da iskelet kasında yüksek oranda ifade edildiği gösterilmiştir. İskelet kasında, kasılma aktivitesinin miyoplazmik taurin içeriğinde değişikliklere ve miyofibrillerin Ca^{2+} duyarlılığının modülasyonunun aracılık ettiğine neden olabileceğine dair kanıtlar vardır (Bakker ve Berg, 2002). Taurinin etkileri sarkoplazmik retiküler Ca^{+2} salınımının modülasyonuna bağlanmıştır; Ca^{+2} eksikliği olan sarkoplazmik retikulum içeren preparatlarda etki daha büyüktür, ancak sarkoplazmik retikulum yüksek Ca^{+2}yükü içerdiğinde daha azdır (Schaffer vd., 2010). Uyarım-kasılma eşleşmesi, kas hücresinin sarkolemmasındaki bir aksiyon potansiyelinin miyofilamentlerin kaymasını başlatarak kasılmayla (mekanik bir olay) sonuçlandığı olaylar dizisini ifade eder.

Taurinin uyarma-kasılma eşleşmesini modüle edebilme olasılığı Huxtable ve Bressler tarafından, taurinin Ca^{+2} alım hızını ve iskelet kasından izole edilen sarkoplazmik retikulumun toplam Ca^{+2} tutma kapasitesini artırdığı bulgusu üzerine iskelet kasında da bağlantı olabileceği düşünülmüştür. Yapılan bir in vivo çalışmada, Taurin taşıyıcı inhibitörü (guanidinoetan sülfonat) ile tedavi sonucu iskelet kasında taurin içeriğinin azalması, kasılma için reobaz voltajının daha negatif potansiyellere doğru kayması nedeniyle uyarma-kasılma bağlantı mekanizmasını etkilediği belirlenmiştir (De Luca vd., 1996).

Taurin düzeyindeki bir değişiklik klor iletkenliğinde (G_{Cl}) bir farklılık yaratabilir ve bu da aksiyon potansiyelinin süresini ve depolarizasyon sıklığını etkileyerek kasılmadan önce membranın uyarılma modelinin değişmesine neden olabilir. Fiziksel egzersiz iskelet kasındaki taurin seviyelerini azaltmaktadır ve bu etki taurin uygulaması ile kısmen önlenmektedir.

Taurin uygulaması ayrıca fiziksel dayanıklılığı da artırır. Bakker ve Berg, taurinin kalpteki etkilerine uygun olarak, taurinin etkilerinin en azından kısmen sarkoplazmik retiküler Ca^{2+} birikimi ve salınımındaki artışla açıklandığını bildirmiştir (Renaud vd., 2023).
Ek olarak Taurin varlığının hücre içi membran stabilizasyonunu desteklediği de bildirilmiştir (Gruener vd., 1975).

Taurinin Membran Stablizasyonu/Tamiri Etkisi
Kas membran bariyer fonksiyonundaki kayıplar ve sarkolemmadaki fosfolipit kompozisyonundaki değişiklikler kas hasarına yol açar. Membran stabilizasyonu, hücre içine patolojik Ca^{2+} girişini önler ve hücresel ölüm yollarının aktivasyonunu engeller (Houang vd., 2018).
Taurinin membran stabilize edici özelliği Huxtable ve Bressler tarafından varsayılmıştır. Taurin, fosfatidiletanolaminin fosfatidilkolin oluşturmak üzere metilasyonunu katalize eden fosfolipid metiltransferaz aktivitesini inhibe eder ve böylece fosfolipid membranların bileşimini ve sonuç olarak kas hücresi membranın özelliklerini ve stabilitesini değiştirebilir (Huxtable, 1992). Bu reaksiyon önemlidir çünkü taurin seviyeleri bazı membranların etanolamin:kolin oranını düzenler. Biyolojik membranda, fosfatidiletanolaminin (PE) tercihen çift katmanlı bir yapıya sahip olduğu dış membran yaprakçığına lokalize olurken, fosfatidilkoline (PC) hekzagonal bir yapıya sahiptir ve tercihen membranın iç yaprakçığına lokalize olur. Dolayısıyla, PE/PC oranındaki değişiklikler biyolojik membranların yapısı üzerinde dramatik bir etkiye sahiptir ve bu da hem membran akışkanlığını hem de membran enzimlerinin ve taşıyıcılarının aktivitesini değiştirir (Schaffer vd., 1995).

Taurinin Antioksidan Etkisi
Zorlu aerobik egzersizler, reaktif oksijen türlerinin aşırı üretimine neden olabilir ve endojen savunma etkili değilse oksidatif hasara yol açarak atletik performansı bozabilir (De Carvalho vd., 2017). Egzersizden kaynaklanan oksidatif stresin artmasıyla birlikte taurinin bir antioksidan görevi gördüğü öne sürülmüştür. Süperoksit ve H_2O_2 gibi reaktif oksijen türlerinin (ROS) artan üretimi, Ca^{2+} iyon kanallarının bozulmasına ve dengesizliğine katkıda bulunarak hücre canlılığının bozulmasına, oksidatif strese, bozulmuş kas kontraktilitesine, yorgunluğa ve azalmış hücre canlılığına yol açar (He vd., 2016). Ratlarda yapılan bir çalışmada, eksantrik egzersiz yapıldıktan sonra taurin takviyesinin oksidatif stres biyobelirteçleri üzerindeki etkileri incelenmiştir.
Sonuçta Taurin takviyesinin, iskelet kasında süperoksit radikal üretimini, kreatin kinazı (CK), lipoperoksidasyon düzeylerini azalttığı belirlenmiştir. Taurin, süperoksit radikal üretiminin azalmasıyla bağlantılı olarak oksidatif stresi azaltarak iskelet kası kasılmasını etkilemiştir (Silva vd., 2011). Bu nedenle zorlu aerobic bir egzersiz sonrası antioksidan bileşiklerin kullanımı, oksidatif stresi önlemeyi ve sportif performansı artırmayı amaçlamaktadır (De Carvalho vd., 2017).

YÖNTEM
Bu çalışma birçok kaynağın taranıp özetlendiği bir derleme çalışmasıdır. SCI, SCI-Expanded ve ESCI kapsamında taranan makalelerden, PubMed, Google Scholar, SportDiscus ve EMBASE veri tabanlarında “Taurin”, “aerobik kapasite performans takviyeleri” ve “taurin kullanımı” anahtar kelimeleri ile son 5 yılı kapsayacak şekilde tarama yapılarak belirlenen çalışmalar detaylı bir şekilde incelenmiş ve tauranin ergojenik etkisi özetlenmeye çalışılmıştır.

TARTIŞMA

Bu derleme çalışmasının amacı, taurin takviyesinin aerobik kapasiteye etki etmesindeki potansiyel biyokimyasal mekanizmaları incelemektir. Bu derleme çalışmasının sonucuna göre Taurin takviyesinin aerobik kapasitede artışı; antioksidan etkisi, membran stabilizasyonunu sağlaması, kalsiyum akışını artırıcı özelliği vasıtasıyla sağladığı söylenebilir. Kas dokusundaki taurin konsantrasyonunun korunması, dayanıklılık (aerobik) performansının arttırılması için önemli olabilir. Çalışmalar, akut veya uzun süreli taurin alımının insanlarda dayanıklılık performansının iyileştirilmesi üzerindeki etkisini doğrulamaktadır (Page vd., 2019). Bununla birlikte, antrenmalı bireylerin sedanter bireylere göre daha yüksek taurin kas içeriğine sahip olması, taurinin insan dayanıklılık egzersizi performansındaki potansiyel rolünü göstermektedir. Yapılan bir çalışmada yoruluncaya kadar geçen koşu performansı, katılımcılara 2 hafta boyunca plasebo, taurin (4 g/gün), karnitin (4 g/gün) veya glutamin (4 g/gün) tabletleri verildikten sonra karşılaştırılmıştır. Taurin koşulunda denekler, koşu bandında %75 VO_{2max} yoğunluğunda tükenene kadar 6,9 dakika daha uzun süre koştukları belirlenmiştir (Lee vd., 2003).

Benzer şekilde yapılan bir başka çalışmada ise Taurin takviyesi, sedanter erkeklerde oksidatif stres, aerobik kapasite ve maksimum iş yükünün etkilerini değerlendirmek için araştırılmıştır. Denekler bir VO_{2max} testi gerçekleştirilmiş ve ardından ikinci bir VO_{2max} testinden önce 7 gün boyunca günde üç kez toz halinde 2 g taurin takviyesi almışlardır. Taurin, maksimum VO2'yi (43,7 ± 4,7 ml/kg/dak vs. 46,7 ± 5,3 ml/kg/dak), egzersiz süresini ve iş yükünü (234 ± 65 W vs. 243 ± 67 W) iyileştirdiği bildirilmiştir (Zhang vd., 2004).

Son olarak taurin takviyesinin sportif performans üzerine etkilerinin incelendiği bir sistematik derleme çalışmasında, derlemeye dahil edilen çalışmaların yaklaşık %68'inin çeşitli performans değişkenlerinde iyileşmeler bildirdiği ancak çalışmaya ait istatistiklerin cesaret verici olsa da, çalışma tasarımları, denek popülasyonu ve deneysel sonuçlar, taurinin ergojenik bir yardım olarak etkinliğini tam olarak destekleyemeyecek kadar değişken olduğu da belirtilmiştir (Kurtz vd., 2021). Bununla birlikte, taurin çeşitli fizyolojik, biyokimyasal ve metabolik süreçlerde rol oynamaktadır ve bu nedenle taurin ve performans üzerine daha fazla araştırma yapılması kesinlikle gerekmektedir.

SONUÇ

Bu derleme çalışmasında, taurinin aerobik egzersiz performansı üzerindeki etkileri özetlenmiştir. Taurin, insan iskelet kasındaki bolluğu ve enerji metabolizması, oksidatif stres ve inflamasyon süreçlerini düzelenmesi de dahil olmak üzere çeşitli fizyolojik fonksiyonlardaki rolü nedeniyle egzersiz performansında ergojenik bir takviye olarak önerilmiştir (Schaffer vd., 2010). Seçilmiş literatürden elde edilen bilgiler ışığında taurin takviyesinin antioksidan etkisi, membran stabilizasyonunu sağlaması, kalsiyum akışını artırıcı özelliği vasıtasıyla aerobik performansa katkı sağlama potansiyeli olabileceği sonucuna ulaşılmıştır. Ancak Taurin takviyesinin sportif performanstaki potansiyel rolünü daha kapsamlı bir şekilde incelemek adına daha fazla araştırmaya ihtiyaç vardır.

KAYNAKLAR

Bakker A J, Berg HM. (2002). Effect of taurine on sarcoplasmic reticulum function and force in skinned fast-twitch skeletal muscle fibres of the rat. The Journal of physiology, 538(1), 185–194.

De Carvalho FG, Galan BSM, Santos PC, Pritchett K, Pfrimer K, Ferriolli E, Papoti M, Marchini JS, de Freitas EC. (2017). Taurine: A Potential Ergogenic Aid for Preventing Muscle Damage and Protein Catabolism and Decreasing Oxidative Stress Produced by Endurance Exercise. Frontiers in physiology, 8, 710.

De Luca A, Pierno S, Camerino DC. (1996). Effect of taurine depletion on excitation-contraction coupling and Cl- conductance of rat skeletal muscle. European journal of pharmacology, 296(2), 215–222.

Duttagupta, S, Krishna Roy N, Dey G. (2024). Efficacy of amino acids in sports nutrition- review of clinical evidences. Food research international (187), 114311.

Gruener R, Markovitz D, Huxtable R, Bressler R. (1975). Excitability modulation by taurine. Transmembrane measurements of neuromuscular transmission. Journal of the neurological sciences, 24(3), 351–360.

Haidari F, Asadi M, Mohammadi-Asl, J, Ahmadi-Angali K. (2019). Evaluation of the effect of oral taurine supplementation on fasting levels of fibroblast growth factors, β-Klotho co-receptor, some biochemical indices and body composition in obese women on a weight-loss diet: a study protocol for a double-blind, randomized controlled trial. Trials, (20), 1-6.

He F, Li J, Liu Z, Chuang CC, Yang W, Zuo L. (2016). Redox mechanism of reactive oxygen species in exercise. Frontiers in physiology, 7, 486.

Houang EM, Sham YY, Bates FS, Metzger JM. (2018). Muscle membrane integrity in Duchenne muscular dystrophy: recent advances in copolymer-based muscle membrane stabilizers. Skeletal muscle, 8(1), 31.

Huxtable RJ. (1992). Physiological actions of taurine. Physiological reviews, 72(1), 101–163.

Kurtz JA, VanDusseldorp TA, Doyle JA, Otis JS. (2021). Taurine in sports and exercise. Journal of the International Society of Sports Nutrition, 18(1), 39.

Lee HM, Paik IY, Park TS. (2003). Effects of dietary supplementation of taurine, carnitine or glutamine on endurance exercise performance and fatigue parameters in athletes. The Korean Journal of Nutrition, 711-719.

Page LK, Jeffries O, Waldron M. (2019). Acute taurine supplementation enhances thermoregulation and endurance cycling performance in the heat. European journal of sport science, 19(8), 1101-1109.

Renaud JM, Ørtenblad N, McKenna MJ, Overgaard K. (2023). Exercise and fatigue: integrating the role of K+, Na+ and Cl- in the regulation of sarcolemmal excitability of skeletal muscle. European journal of applied physiology, 123(11), 2345–2378.

Schaffer SW, Azuma J, Madura JD. (1995). Mechanisms underlying taurine-mediated alterations in membrane function. Amino acids, 8(3), 231–246.

Schaffer SW, Jong CJ., Ramila KC, Azuma J. (2010). Physiological roles of taurine in heart and muscle. Journal of biomedical science, 17(1), 1-8.

Silva LA, Silveira PC, Ronsani, MM, Souza PS, Scheffer D, Vieira LC, Pinho RA. (2011). Taurine supplementation decreases oxidative stress in skeletal muscle after eccentric exercise. Cell biochemistry and function, 29(1), 43-49.

Zhang M, Izumi I, Kagamimori S, Sokejima S, Yamagami T, Liu Z, Qi B. (2004). Role of taurine supplementation to prevent exercise-induced oxidative stress in healthy young men. Amino acids, 26, 203-207.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

RESVERATROL TAKVİYESİNİN SPORTİF PERFORMANSA ETKİSİ ÜZERİNE BİR İNCELEME

Araştırma Görevlisi Cemre Didem EYİPINAR
Gaziantep Üniversitesi, Spor Bilimleri Fakültesi, Beden Eğitimi ve Spor Öğretmenliği
ORCID: 0000-0002-9778-2074

ÖZET
Yıllardır, egzersize bağlı kas hasarını ve oksidatif stresi önleyebilecek ve sportif performansını artırabilecek beslenme stratejilerini belirlemek için birçok çaba sarf edilmiştir. Bunlardan, fenolik bileşiklerle takviye, umut verici bir yaklaşım gibi görünmektedir. Fenolik bileşiklerin insan metabolizmasında önemli moleküller olduğu bildirilmiştir. Çünkü bu fenolik bileşikler grubundaki moleküllerin metoksi gruplarından oluşan kimyasal yapıları, onlara inflamatuar süreçleri inhibe etme ve oksidatif hasarı önleme yeteneği gibi sağlığı geliştirici özellikler kazandırmaktadır. Bunlar arasında, öncelikle kırmızı üzümün kabuğunda bulunan resveratrol, hastalıkların tedavisinde ve önlenmesinde umut verici bir yardımcı madde olarak lanse edilmiştir. Resveratrol (3,5,4′-trihidroksi-stilben) doğal bir fitoaleksindir. Resveratrol, bitkiler tarafından, çevredeki değişikliklere yanıt olarak hem tehlikeli çevresel durumlara karşı savunmak hem de hayatta kalmak için erken savunma müdahalelerini uygulamada stres sinyal molekülü olarak üretilir. Egzersizi takiben uygulanan resveratrol takviyesinin oksidatif stres, inflamasyon ve enerji metabolizması üzerindeki etkisi, insanlarda belirsizliğini korumaktadır. Bu nedenle, bu derleme çalışmasının amacı, resveratrol takviyesinin sportif performans üzerindeki etkinliğini çevreleyen literatürü incelemektir. Bu incelemenin amacı doğrultusunda SCI, SCI-Expanded ve ESCI dergileri kapsamında incelenen makalelerden veri toplamak amacıyla PubMed, Google Scholar, SportDiscus ve EMBASE veri tabanlarında son 5 yılın dahil edildiği literatür incelenmiştir. Yapılan araştırmaların sonucuna göre resveratrolün sportif performans artışını; antioksidan ve antiinflamatuvar etkisi ile sağlayabileceği sonucuna ulaşılmıştır.
Anahtar Kelimeler: Resveratrol, antioksidan etki, antiinflamatuvar etki, egzersiz

THE EFFECT OF RESVERATROL ON SPORTIVE PERFORMANCE: A REVIEW

ABSTRACT
Over the years, many efforts have been made to identify nutritional strategies that can prevent exercise-induced muscle damage and oxidative stress and improve sportive performance. Among them, supplementation with phenolic compounds seems to be a promising approach. Phenolic compounds have been reported to be important molecules in human metabolism. Since their chemical structure, consisting of methoxy groups, endows them with health-promoting properties such as the ability to suppress inflammatory processes and prevent oxidative damage. Among these, resveratrol, found primarily in the skin of red grapes, has been touted as a promising adjuvant in the treatment and prevention of diseases. Resveratrol (3,5,4′-trihydroxy-stilbene) is a natural phytoalexin. Resveratrol is produced by plants as a stress signaling molecule in response to changes in the environment, both to defend against dangerous environmental situations and to implement early defense interventions for survival. The effect of resveratrol supplementation following exercise on oxidative stress, inflammation and energy metabolism remains unclear in humans. For that, the aim of this review is to examine the literature surrounding the efficacy of resveratrol supplementation on sporting performance. In this regard, the literature was examined in the PubMed, Google Scholar,

SportDiscus, and EMBASE databases in order to collect the data from the articles examined within the SCI, SCI-Expanded, and ESCI for 5 years. According to the results of the researches, it has been concluded that resveratrol can increase sportive performance with its antioxidant and anti-inflammatory effects.
Keywords: Resveratrol, antioxidant effect, antiinflammatuary effect, exercise

GİRİŞ

Son yıllarda birçok çalışma, çiğ veya işlenmiş gıda ürünleri kullanan sporcularda ergojenik etkiler bildirmiştir. Çoğu durumda, gözlemlenen ergojenik etkiler oksidatif stres ve enflamatuar süreçte azalmaları içermektedir (Toscano vd., 2015). Polifenoller, bitkiler tarafından sentezlenen ve savunmadan tozlaşmaya kadar çok çeşitli işlevlere sahip bileşiklerdir. Son zamanlarda, bu bileşikler tıbbi araştırmalarda giderek daha fazla ilgi görmeye başlamıştır. Bu grup içinde en yaygın olarak değerlendirilen polifenol, üzüm ve meyvelerde (3,5,4-trihidroksi-stilben) bulunan resveratrol olmuştur. Üzümde ve kırmızı şarap da dahil olmak üzere çeşitli yiyecek ve içecek türlerinde doğal olarak bulunur (Raj vd., 2014). Resveratrolün insanlar üzerinde belgelenmiş çok sayıda farmakolojik aktivitesi vardır, ancak antioksidan ve anti inflamatuar aktiviteleri en iyi karakterize edilenlerdir (Sorrenti vd., 2020). Yoğun fiziksel egzersizden kaynaklanan serbest radikal üretimindeki artışa yanıt olarak, metabolizma antioksidan sistemini harekete geçirir. Resveratrol, egzersizde artan O2 gereksinimlerini karşılamak için O2 taşıma sistemindeki adaptasyonları etkiler. Birçok durumda, resveratrol egzersiz sırasında molekül yollarını aktive eder ve performans artırıcı bir etki yaratır (Mercken vd., 2012).
Dolayısıyla bu derlemede, resveratrolün sportif perfromans üzerindeki etkisinin potansiyel biyokimyasal mekanizmaları incelenecektir.

RESVERATROLÜN ANTİİNFLAMATUVAR ETKİSİ

Egzersiz, organizmada metabolik değişikliklere neden olarak yeni bir dinamik denge kurmayı amaçlayan adaptif mekanizmaların aktivasyonuna yol açar. Bununla birlikte, egzersizin enflamatuar ve redoks durumları üzerinde hem olumlu hem de olumsuz etkileri olabilir. Son yıllarda, dikkatler enerji homeostazının düzenlenmesine odaklanmış ve çoğu çalışma, enerji ve hatta enflamatuar homeostazı etkilemede periferik sinyallerin rol oynadığını bildirmiştir (Luti vd., 2020). Resveratrolün antiinflamatuvar etkisi, çeşitli yolaklarla gözlemlenmiştir. İnflamasyona karşı koruyucu aktiviteleri için olası mekanizmalardan biri, inflamatuar yanıtların aşağı regülasyonudur. Bu, proinflamatuar aracıların sentezinin ve salınımının engellenmesini, eikosanoid sentezinin modifikasyonunu, resveratrolün nükleer faktör κB (NFκB) veya aktivatör protein-1 (AP-1) gibi transkripsiyon faktörleri üzerindeki inhibitör etkisi yoluyla proinflamatuar aracıların sentezinden sorumlu olan siklooksijenaz-1 (COX-1) veya siklooksijenaz-2 (COX-2) gibi enzimlerin inhibe edilmesini içerir (Das ve Das, 2007).

Nükleer faktör κB (NFκB) / Aktivatör protein-1 (AP-1) İnhibisyonu

Resveratrolün anti-enflamatuar potansiyeli ağırlıklı olarak transkripsiyon faktörü NF-κB'nin yolak aktivitesini inhibe etmeye dayanıyor olabilir. Bu inhibisyon, resveratrol aracılı, muhtemelen dolaylı olarak SIRT1'in aktivasyonu ve/veya daha aşağı yönde bir hedef aracılığıyla gerçekleştirilebilir. NF-κB enflamasyonda önemli bir rol oynar ve enflamatuar yanıtın düzenlenmesi ve koordinasyonundan sorumludur. NF-κB ailesi p105/p50 (NF-κB1), p100/p52 (NF-κB2), p65 (RelA), RelB ve c-Rel olmak üzere beş üyeden oluşur. Birlikte belirli bir DNA elementine bağlanarak hedef genlerin transkripsiyonuna aracılık ederler (Shang vd., 2019).

Resveratrolün anti-enflamatuar etkileri, IκB kinazı (IKK) inhibe eden klasik yolağa dayanmaktadır. Klasik yolun sinyal iletimine Toll benzeri reseptörler (TLR'ler), interlökin-1 reseptörü (IL-1R), tümör nekroz faktörü reseptörü (TNFR) ve antijen reseptörleri aracılık eder. TNF-α, lipopolisakkaritler (LPS) ve IL-1β sinyal molekülleri olarak görev yapar. Bu uyaranlar, IKK kompleksinin aktivasyonunu indükleyen TGF-β ile aktive olan kinaz 1'in (TAK1) aktivasyonuna yol açar. Bu aktivasyon, NF-κB'nin inhibitörü olan IκB'nin fosforilasyonuna yol açar. IκB proteinlerinin ubikitinasyonu, NF-κB'nin serbest kalması ve bunun sonucunda nükleer translokasyonu ile sonuçlanır ve burada pro-inflamatuar indüklenebilir enzimleri kodlayan genlerin promotör bölgelerindeki κB bağlanma bölgelerine bağlanır. NF-κB aktive edildiğinde, farklı doğuştan gelen bağışıklık hücrelerinde IL-1, IL-6, IL-12 ve TNF-α gibi çeşitli pro-inflamatuar sitokinlerin, kemokinlerin ve inflamatuar aracıların transkripsiyonunu indükleyebilir.
Resveratrol, p65 ve IκB fosforilasyonunun aşağı regülasyonu yoluyla klasik NF-κB yolağı aktivitesini inhibe edebiliyor gibi görünmektedir. Altta yatan mekanizma, resveratrolün IκB fosforilasyonunun ve ayrışmasının baskılanması yoluyla NF-κB-p65 alt birimlerinin sitozolden çekirdeğe translokasyonunu engelleyen inhibitör özelliklerine dayanmaktadır. NF-κB aktivitesinin resveratrol aracılı bu inhibisyonu TNF-α, IL-1ß ve/veya LPS gibi çeşitli tetikleyiciler tarafından doza bağlı bir şekilde indüklenebilir (Sun, 2017).

Siklooksijenaz-1 (COX-1) veya 2 (COX-2) İnhibisyonu

Siklooksijenaz (COX) enzimleri araşidonik asidin prostaglandinlere dönüşümünü katalize eder. Siklooksijenazlar, COX-1 ve COX-2 olarak bilinen 2 izoform halinde bulunur. COX-1 çoğu dokuda eksprese edilir ve homeostatik fonksiyonları düzenlerken, COX-2 inflamasyon ve oksidatif stres dahil olmak üzere fizyolojik uyaranlara yanıt olarak eksprese edilir (Pignet vd., 2021). Etki mekanizması resveratrolün NF-κB üzerindeki etkisiyle ilişkili olabilir. Resveratrol varlığında IκB'nin fosforilasyonu baskılanır ve NF-κB-p65 alt birimlerinin sitozolden çekirdeğe translokasyonu engellenir. Resveratrolün AP-1 erken yanıt transkripsiyon faktörleri c-Jun ve c-Fos'un COX-2 promotörüne bağlanmasını engeller, Ayrıca resveratrolün COX-2 üzerindeki etkilerinde yine SIRT1'e bağlı mekanizmaların rol oynayabileceği bildirilmiştir (Singh vd., 2010).
Özetle, Resveratrolün COX-2 seviyelerini azaltarak inflamasyonu ve oksidatif stresi hafiflettiği gösterilmiştir. COX-2'nin resveratrol aracılı baskılanması, resveratrolün enflamatuar durumlar için yararlı bir tedavi olduğu teorisini desteklemektedir. Resveratrolün COX-2'yi transkripsiyonel düzeyde aşağı regüle ettiği ve sonuç olarak NF-κB, MAPKs ve AP-1 sinyal kaskadlarının modülasyonu yoluyla prostaglandin E (PGE) sentezini baskıladığı bildirilmiştir (Annabi vd., 2012).

RESVERATROLÜN ANTİOKSİDAN ETKİSİ

Zorlu aerobik egzersizler, reaktif oksijen türlerinin aşırı üretimine neden olabilir ve endojen savunma etkili değilse oksidatif hasara yol açarak atletik performansı bozabilir. Bu nedenle zorlu bir egzersiz sonrası antioksidan bileşiklerin kullanımı, oksidatif stresi önlemeyi ve sportif performansı artırmayı amaçlamaktadır (De Carvalho vd., 2017). Son zamanlarda, resveratrolün fiziksel performansı modüle etme ve oksidatif stresi önleme potansiyelini araştırmaya yönelik ilgi giderek artmaktadır (Dolinsky ve Dyck, 2011).
Resveratrolün antioksidan etkisini Nrf-2 yolağını aktive etmesi ve FOXO transkripsiyon faktörüyle etkileşime girmesi gibi bir dizi mekanizma aracılık etmektedir. Tüm bu mekanizmalar antioksidan enzim düzeylerini artırabilir, inflamatuvar yanıtı azaltabilir (Pignet vd., 2021).

Nrf-2 Yolağı Aktivasyonu

SIRT1, redoks dengesinin korunmasında önemli bir rol oynayan nükleer faktör eritroid 2 ile ilişkili faktör 2'nin (Nrf2) ekspresyonunu artırır. Nrf2, anti-oksidatif stres savunma sistemini etkileyen önemli bir transkripsiyon faktörüdür. Resveraltrol'ün etki şekli, Nrf2'nin Kelch benzeri ECH-ilişkili protein-1'e (Keap1) bağlanmasıdır ve bu da Nrf2'nin ubikitin-proteazom yolu aracılığıyla bozulmasını teşvik eder. Oksidatif stres durumunda, Keap1 Nrf2'yi fosforile eder ve aktive eder, bu da daha sonra çekirdeğe transloke olur ve anti-oksidan yanıt elemanları (ARE) ile etkileşime girerek sitoprotektif hedef genlerin, yani glutatyon-S-transferazların (GST), NAD(P)H: kinon oksidoredüktazın (NQO1) ekspresyonunu teşvik eder (Tang vd., 2014).

FOXO Transkripsiyon Faktörü Ailesi

Forkhead box O (FOXOs) transkripsiyon faktör ailesi FOXO1, FOXO3a ve FOXO4'ü içerir ve hücresel stres üzerine apoptozu düzenler, ancak hücrenin hayatta kalması için de aynı derecede önemlidir. Süperoksit dismutaz 2 (SOD2/Mn-SOD) ve katalaz gibi ROS-detoksifiye edici enzimleri aktive ederler. SIRT1, deasetilasyon yoluyla FOXO transkripsiyon faktörlerini düzenler. SIRT1, nükleer translokasyon ve gene özgü transkripsiyonu düzenleyerek FOXO'nun aktivitesini artırabilir. FOXO3a'nın sitoplazmadan çekirdeğe translokasyonu, oksidatif strese yanıt olarak SIRT1 tarafından indüklenen deasetilasyon yoluyla tetiklenir. SIRT1 eş zamanlı olarak stres direncinde rol oynayan FOXO hedef genlerinin ekspresyonunu teşvik eder ve apoptozda rol oynayan genlerin transkripsiyonunu azaltır. Böylece SIRT1, FOXO'lara bağlı yanıtı apoptozdan hücre sağkalımına ve stres direncine doğru kaydırır (Brunet vd., 2004).

Sonuç olarak, yüksek yoğunluklu bir egzersizden sonra indüklenen oksidatif stres, IL-6 ve tümör nekroz faktörü-α (TNF-α) reaksiyonları gibi pro-inflamatuar sitokinleri artırabilir Bu nedenle, pro-enflamatuar yanıtın zayıflatılması, atletik performans sırasında oksidatif stresin hızla ortadan kaldırılmasına bağlı olabilir (Brandt vd., 2010).

YÖNTEM

Bu çalışma birçok kaynağın taranıp özetlendiği bir derleme çalışmasıdır. SCI, SCI-Expanded ve ESCI kapsamında taranan makalelerden, PubMed, Google Scholar, SportDiscus ve EMBASE veri tabanlarında “Resveratrol”, “sportif performans takviyeleri” ve “resveratrol kullanımı” anahtar kelimeleri ile son 5 yılı kapsayacak şekilde tarama yapılarak belirlenen çalışmalar detaylı bir şekilde incelenmiş ve resveratrolün ergojenik etkileri özetlenmeye çalışılmıştır.

TARTIŞMA

Bu derleme çalışmasının amacı, resveratrol takviyesinin sportif performansa etki etmesindeki potansiyel biyokimyasal mekanizmaları incelemektir. Bu derleme çalışmasının sonucuna göre resveratrol takviyesinin sportif performansta artışı; antioksidan ve antiinflamatuvar etkisi vasıtasıyla sağladığı söylenebilir.

İnsanlarda yapılan çalışmalar, 4 haftalık yüksek yoğunluklu interval antrenman sonrasında resveratrol takviyesinin maksimum oksijen alımını, Wingate anaerobik test pik gücünü, peroksizom proliferatör ile aktive edilen reseptör gama koaktivatör 1-α (PGC-1α), Sirtuin 1 (SIRT1) seviyesini ve süperoksit dismutaz 2 (SOD2) aktivitesini geliştirdiğini ortaya koymuştur. Ancak, bu insan çalışmasına göre resveratrol takviyesi ve egzersizin sinerjik etkileri gözlenmemiştir.

Başka bir insan çalışması, daha kısa süreli resveratrol takviyesinin (4 günlük), 60 dakika boyunca %70 VO_{2max} ile bisiklet egzersizi zorluğunun ardından egzersiz yapılan iskelet kasında glikojen yenilenmesini ve mitokondri biyosentezini artıramadığını göstermiştir.
Yüksek yoğunluklu egzersizin fizyolojik etkisi, bu iki insan çalışmasında resveratrolün sportif performansı artırma üzerindeki etkisini maskelemiş olabilir (Huang vd., 2020). Yapılan bir çalışmada, resveratrolün endotel ve düz kas hücrelerinde antioksidan enzimlerin ekspresyonunu artırdığı bildirilmiştir (Gu vd., 2014). Bir başka çalışmada ise, egzersizin aksine, resveratrol reaktif oksijen türlerini ortadan kaldırdığı, SIRT1 aşırı ekspresyonunun endotel hücrelerinde mitokondriyal oksidatif stresi azalttığı gösterilmiş olsa da, resveratrol aynı zamanda SIRT1 seviyelerini doza bağlı bir şekilde yükselteceği ve bunun da egzersizde belirgin bir fayda sağlayabileceği belirtilmiştir (Kao vd., 2010).
Yapılan bir başka çalışmada da izole soleus kasının titanik uyarımına verilen kuvvet tepkisini incelenmiş ve egzersiz ile Resveratrol kombinasyonunun kas kuvvetini önemli ölçüde artırdığı (%53) göstermiştirilmiştir (Murase vd., 2009).

SONUÇ

Seçilmiş literatürden elde edilen bilgiler ışığında resveratrol takviyesinin antioksidan ve antiinflamatar etkisi vasıtasıyla sportif performansa katkı sağlama potansiyeli olabileceği sonucuna ulaşılmıştır. Literatürde resveratrolün egzersiz performansı üzerindeki etkisini araştıran az sayıda çalışma bulunmaktadır ve bazı sonuçlar bunun dayanıklılık kapasitesini artırmada etkili olabileceğini göstermektedir (Tuşat ve Parlak, 2023).
Dolayısıyla resveratrol takviyesinin sportif performanstaki potansiyel rolünü daha kapsamlı bir şekilde incelemek adına daha fazla araştırmaya ihtiyaç vardır.

KAYNAKLAR

Annabi, B., Lord-Dufour, S., Vézina, A., & Béliveau, R. (2012). Resveratrol Targeting of Carcinogen-Induced Brain Endothelial Cell Inflammation Biomarkers MMP-9 and COX-2 is Sirt1-Independent. Drug target insights, 6, 1–11.

Brandt, C., & Pedersen, B. K. (2010). The role of exercise-induced myokines in muscle homeostasis and the defense against chronic diseases. Journal of biomedicine & biotechnology, 2010, 520258.

Brunet, A., Sweeney, L. B., Sturgill, J. F., Chua, K. F., Greer, P. L., Lin, Y., Tran, H., Ross, S. E., Mostoslavsky, R., Cohen, H. Y., Hu, L. S., Cheng, H. L., Jedrychowski, M. P., Gygi, S. P., Sinclair, D. A., Alt, F. W., & Greenberg, M. E. (2004). Stress-dependent regulation of FOXO transcription factors by the SIRT1 deacetylase. Science, 303(5666), 2011–2015.

Das, S., & Das, D. K. (2007). Anti-inflammatory responses of resveratrol. Inflammation & allergy drug targets, 6(3), 168–173.

De Carvalho FG, Galan BSM, Santos PC, Pritchett K, Pfrimer K, Ferriolli E, Papoti M, Marchini JS, de Freitas EC. (2017). Taurine: A Potential Ergogenic Aid for Preventing Muscle Damage and Protein Catabolism and Decreasing Oxidative Stress Produced by Endurance Exercise. Frontiers in physiology, 8, 710.

Dolinsky, V. W., & Dyck, J. R. (2011). Calorie restriction and resveratrol in cardiovascular health and disease. Biochimica et biophysica acta, 1812(11), 1477–1489.

Gu, Q., Wang, B., Zhang, X. F., Ma, Y. P., Liu, J. D., & Wang, X. Z. (2014). Chronic aerobic exercise training attenuates aortic stiffening and endothelial dysfunction through preserving aortic mitochondrial function in aged rats. Experimental gerontology, 56, 37–44.

Huang, C. C., Liu, C. C., Tsao, J. P., Hsu, C. L., & Cheng, I. S. (2020). Effects of Oral Resveratrol Supplementation on Glycogen Replenishment and Mitochondria Biogenesis in Exercised Human Skeletal Muscle. Nutrients, 12(12), 3721.

Kao, C. L., Chen, L. K., Chang, Y. L., Yung, M. C., Hsu, C. C., Chen, Y. C., ... & Hwang, S. J. (2010). Resveratrol protects human endothelium from H2O2-induced oxidative stress and senescence via SirT1 activation. Journal of atherosclerosis and thrombosis, 17(9), 970-979.

Luti, S., Modesti, A., & Modesti, P. A. (2020). Inflammation, Peripheral Signals and Redox Homeostasis in Athletes Who Practice Different Sports. Antioxidants (Basel, Switzerland), 9(11), 1065.

Mercken, E. M., Carboneau, B. A., Krzysik-Walker, S. M., & de Cabo, R. (2012). Of mice and men: the benefits of caloric restriction, exercise, and mimetics. Ageing research reviews, 11(3), 390-398.

Murase, T., Haramizu, S., Ota, N., & Hase, T. (2009). Suppression of the aging-associated decline in physical performance by a combination of resveratrol intake and habitual exercise in senescence-accelerated mice. Biogerontology, 10(4), 423–434.

Pignet, A. L., Schellnegger, M., Hecker, A., Kohlhauser, M., Kotzbeck, P., & Kamolz, L. P. (2021). Resveratrol-Induced Signal Transduction in Wound Healing. International journal of molecular sciences, 22(23), 12614.

Raj, P., Louis, X. L., Thandapilly, S. J., Movahed, A., Zieroth, S., & Netticadan, T. (2014). Potential of resveratrol in the treatment of heart failure. Life sciences, 95(2), 63–71.

Shang, X., Lin, K., Yu, R., Zhu, P., Zhang, Y., Wang, L., ... & Chen, K. (2019). Resveratrol protects the myocardium in sepsis by activating the phosphatidylinositol 3-kinases (PI3K)/AKT/mammalian target of rapamycin (mTOR) pathway and inhibiting the nuclear factor-κB (NF-κB) signaling pathway. Medical science monitor: international medical journal of experimental and clinical research, 25, 9290.

Singh, U. P., Singh, N. P., Singh, B., Hofseth, L. J., Price, R. L., Nagarkatti, M., & Nagarkatti, P. S. (2010). Resveratrol (trans-3, 5, 4′-trihydroxystilbene) induces silent mating type information regulation-1 and down-regulates nuclear transcription factor-κB activation to abrogate dextran sulfate sodium-induced colitis. Journal of Pharmacology and experimental therapeutics, 332(3), 829-839.

Sorrenti, V., Fortinguerra, S., Caudullo, G., & Buriani, A. (2020). Deciphering the Role of Polyphenols in Sports Performance: From Nutritional Genomics to the Gut Microbiota toward Phytonutritional Epigenomics. Nutrients, 12(5), 1265.

Sun, S. C. (2017). The non-canonical NF-κB pathway in immunity and inflammation. Nature reviews immunology, 17(9), 545-558.

Tang, W., Jiang, Y. F., Ponnusamy, M., & Diallo, M. (2014). Role of Nrf2 in chronic liver disease. World journal of gastroenterology: WJG, 20(36), 13079.

Toscano, L. T., Tavares, R. L., Toscano, L. T., Silva, C. S., Almeida, A. E., Biasoto, A. C., Gonçalves, M.daC., & Silva, A. S. (2015). Potential ergogenic activity of grape juice in runners. Applied physiology, nutrition, and metabolism = Physiologie appliquee, nutrition et metabolisme, 40(9), 899–906.

Tuşat, E., & Parlak, E. (2023). Polifenoller ve sportif performans üzerindeki etkileri. Toros University Journal of Nutrition and Gastronomy, (2) 225-243.

KEFİRİN DİYABET ÜZERİNDEKİ TERAPÖTİK ETKİLERİ

Dr. Sedef ZİYANOK-DEMİRTAŞ
Bursa Uludağ Üniversitesi, Fen Edebiyat Fakültesi, Biyoloji Bölümü
ORCID: 0000-0003-3878-3808

ÖZET
Dünya genelinde hızla yayılan ve ciddi bir sağlık sorunu olarak kabul edilen diyabetes mellitus (DM), genetik ve çevresel faktörlerin etkisiyle ortaya çıkan bir metabolik bozukluktur. Diyabet, hiperglisemiye ek olarak oksidatif stresin ardından lipit metabolizması bozuklukları ile karakterize edilir ve bu durum diyabetik komplikasyonların başlaması ve ilerlemesi için önemli risk faktörleri oluşturur. Kefir, fermente edilmiş bir süt içeceğidir. Kefirin, kan kolesterol seviyesini düzenlemenin yanı sıra kardiyovasküler hastalıklar, sindirim sistemi sorunları, kanser ve diyabet gibi çeşitli kronik hastalıkların önlenmesinde birçok olumlu etkisi olduğu bilinmektedir. Bu çalışmada deneysel olarak diyabet oluşturulan sıçanlara, kefir (1 mL/100g vücut ağırlığı) gavaj yoluyla verilmiştir. Kefir alan gruplarda kan glikoz, total kolesterol, trigliserit, aspartat amino transferaz (AST) ve alanin amino transferaz (ALT) seviyelerinde anlamlı azalma, serum insulin seviyelerinde ise anlamlı artış saptanmıştır. Sonuç olarak, bu bulgular, kefirin diyabet tedavisinde potansiyel bir tamamlayıcı gıda olabileceğini göstermektedir.
Anahtar Kelimeler: Diyabet, Kefir, Hiperglisemi, Hiperlipidemi, Hepatoprotektivite.

THERAPEUTIC EFFECTS OF KEFIR ON DIABETES

ABSTRACT
Diabetes mellitus (DM), which is rapidly spreading worldwide and is considered a serious health problem, is a metabolic disorder resulting from genetic and environmental factors. Diabetes is characterized by hyperglycemia and lipid metabolism disorders following oxidative stress, which are significant risk factors for the onset and progression of diabetic complications. Kefir is a fermented milk beverage known for its positive effects on various chronic diseases, including cardiovascular diseases, digestive system disorders, cancer, and diabetes, and for regulating blood cholesterol levels. In this study, kefir (1 mL/100 g body weight) was administered via gavage to experimentally induced diabetic rats. In the groups receiving kefir, significant reductions in blood glucose, total cholesterol, triglyceride, aspartate aminotransferase (AST), and alanine aminotransferase (ALT) levels were observed, along with a significant increase in serum insulin levels. These findings suggest that kefir could serve as a potential complementary food for diabetes treatment.
Keywords: Diabetes, Kefir, Hyperglycemia, Hyperlipidemia, Hepatoprotection.

RADIOLOGICAL EVALUATION OF SPONDYLODISCITIS, MRI FINDINGS

Assist. Prof. Ferit DOGAN
Harran University Faculty of Medicine, Radiology
ORCID: 0000-0001-9507-6670

Abstract
Spinal infection can sometimes appear as a devastating and rapidly progressing disease; If left unnoticed, it may result in neurological deficits and even death. Magnetic resonance imaging (MRI); It is the gold standard imaging method in the diagnosis of spondylodiscitis due to its high sensitivity and specificity. Our aim in this study is to examine the gender, age and MRI findings of cases diagnosed with lumbar spondylodiscitis. A total of 45 cases diagnosed with pyogenic spondylodiscitis, who initially underwent MRI, were included in the study. MRI and demographic characteristics of all cases were examined retrospectively. Gender, age, epidural space involvement, paravertebral abscess, psoas abscess, osteomyelitis, bone marrow edema, paravertebral soft tissue inflammation, decrease in disc height and disc contrast enhancement were examined and the results were recorded. In this study, 45 cases were diagnosed with lumbar spondylodiskitis in 2020-2024. The ages of the cases were 54.98 ± 15. When the gender distribution was examined, 23 (51.1%) were boys and 22 (48.9%) girls. All cases had (100%) endplate and (100%) disk contrast enhancement. Epidural space involvement was detected in 44 (97.8%) of the cases. Paravertebral abscess was found in 7 (15.6%), psoas abscess in 2 (4.4%), osteomyelitis in 7 (15.6%), bone marrow edema in 25 (55.6%), paravertebral soft tissue inflammation in 29 (64.4%) and decreased disc height in 42 (93.3%). There was no significant difference in terms of epidural space involvement between genders, paravertebral abscess, psoas abscess, osteomyelitis, bone marrow, paravertebral soft tissue inflammation, decrease in disk height and disk contrast enhancement ($p > 0.05$). MR imaging, rapid diagnosis, potential nerve damage, prevalence of infection, diagnostic biopsy and/or drainage guidance helps to evaluate the response to treatment. Fast diagnosis is based on characteristic MR imaging findings. Thus, MR imaging is a very important method for early diagnosis and monitoring of vertebral lesions.
Keywords: Spondylodiscitis, paravertebral abscess, MRI

ARI POLENİ ARAŞTIRMALARININ BİBLİYOMETRİK DEĞERLENDİRMESİ: İN VİVO VE İN VİTRO İNCELEMELER

Doç. Dr. İlginç KIZILPINAR TEMİZER
Giresun Üniversitesi, Sağlık Hizmetleri Meslek Yüksekokulu, Tıbbi Hizmetler ve Teknikler Bölümü
ORCID: 0000-0003-0425-5898

ÖZET
Arılar, çiçeklerin erkek üreme organı olan polen taneciklerini toplarlar ve bunları nektar, bal ve kendi bez salgılarıyla bir araya getirerek küçük pelletler halinde kovanın girişine yerleştirirler, bu da arı poleni olarak adlandırılır. Arı poleni, canlıların yaşamı için önemli olan protein, yağ, karbonhidrat, vitaminler, mineraller, antioksidanlar ve diğer biyoaktif bileşenleri içerir. İn vivo (canlı organizmalarda yapılan) çalışmalar da arı poleninin canlı organizmalarda biyoaktif bileşenlerinin ve antioksidan aktivitesinin değerlendirilirken, in vitro (hücresel düzeyde yapılan) çalışmalarda ise bu bileşenlerin hücresel düzeydeki etkileri incelenmektedir. Arı polenin biyoaktif bileşenleri, antioksidan aktivitesi, besin değeri ve potansiyel sağlık faydaları üzerine yapılan in vivo ve in vitro çalışmaları analiz etmek ve karşılaştırmak için Web of Science veritabanında "bee pollen" AND "in vivo" ile "bee pollen" AND "in vitro" anahtar kelimeleri kullanılarak yapılan tarama sonucunda İngilizce yayınlanmış araştırma makaleleri incelendi. Belirlenen bilimsel araştırmaların bibliyometrik analizi, R programının bibliometrix paketi ve VOS izleyici kullanılarak gerçekleştirildi. "Bee pollen" AND "in vivo" anahtar kelimeleri ile 2003 ile 2024 yılları arasında 34 araştırma makalesi bulunurken, "bee pollen" AND "in vitro" anahtar kelimeleri ile 2005-2024 yılları arasında 110 araştırma makalesi tespit edildi. Arı poleni ile ilgili in vitro çalışma sayısı, 2023 yılında 23 makale ile zirveye ulaşmışken, in vivo çalışma sayısı 2020 yılında 6 makale ile en yüksek seviyededir. İn vivo çalışmaları ilgili dergi Journal of Health Science olurken, in vitro çalışmalar ile ilgili dergi Antioxidants'dır. Bu çalışma, arı poleni araştırmalarının bibliyometrik analizini kullanarak, literatürdeki eğilimleri ve araştırma yönelimlerini ortaya koyarak, gelecekteki araştırmalar için potansiyel araştırma boşluklarını ve odak noktalarını belirlemede önemli bir kaynak oluşturacaktır.
Anahtar Kelimeler: arı poleni, bibliometrik analiz, in vivo, in vitro, Web of Science

BIBLIOMETRIC ASSESSMENT OF BEE POLLEN RESEARCH: IN VIVO VERSUS IN VITRO INVESTIGATIONS

ABSTRACT
Bees collect pollen grains, the male reproductive cells of flowers, and pack them into small pellets at the entrance of their hive, using a mixture of nectar, honey, and their own gland secretions, which is known as bee pollen. Bee pollen contains important nutrients for life such as proteins, fats, carbohydrates, vitamins, minerals, antioxidants, and other bioactive compounds. In vivo studies assess the bioactive components and antioxidant activities of bee pollen in living organisms, while in vitro studies examine their cellular effects. Research articles published in English were identified through searches using the keywords "bee pollen" AND "in vivo" and "bee pollen" AND "in vitro" in the Web of Science database. A bibliometric analysis of the identified scientific studies was conducted using the bibliometrix package in R and VOSviewer. Between 2003 and 2024, 34 research articles were found using the keywords "bee pollen" AND "in vivo", and 120 research articles were identified using

"bee pollen" AND "in vitro" between 2005 and 2024. The peak year for in vitro studies on bee pollen was 2023 with 23 articles, while in vivo studies reached their highest level in 2020 with 6 articles. The Journal of Health Science published most of the in vivo studies, while Antioxidants published most of the in vitro studies. This study will be an important resource in identifying potential research gaps and focal points for future research by revealing trends and research directions in the literature using bibliometric analysis of bee pollen research.
Keywords: Bee pollen, bibliometric analysis, in vivo, in vitro, Web of Science

Introduction

Bees collect pollen grains from the male reproductive organs of flowers, combining them with nectar, honey, and their own glandular secretions to form small pellets known as bee pollen, which they place at the entrance of the hive (Çobanoğlu et al., 2023). Bee pollen is a rich reservoir of proteins, fats, carbohydrates, vitamins, minerals, carotenoids, volatile compounds, and other bioactive components, essential for the life of various organisms. It is often referred to as a "perfect supplementary food" or a "functional food" (Alimoglu et al., 2021; Çobanoğlu et al., 2023). However, the chemical composition and nutritional value of bee pollen can vary significantly, influenced by factors such as the plant source of the pollen, geographical location, soil type, and climate conditions. These differences lead to varying levels of biological activity in pollen collected from different regions (Çobanoğlu et al., 2023; Kizilpinar-Temizer et al., 2022; Temizer et al., 2018). Numerous studies have explored the therapeutic properties of bee pollen, highlighting its spectrum of biological activities, including antioxidant, antimicrobial, hypoglycemic, anti-inflammatory, antibacterial, antitumor, and anticancer effects (Attia et al., 2011; Aylanc et al., 2021; Çobanoğlu et al., 2023; Ishikawa et al., 2008; Ishikawa et al., 2009; Kizilpinar-Temizer et al., 2022; Laaroussi et al., 2020; Mohdaly et al., 2015; Wang et al., 2013).

Bibliometric studies, a research methodology used in information and library science, employ a combination of qualitative, quantitative, and visual procedures to generalize the patterns and dynamics of publications (Temizer & Çobanoğlu, 2023). Bibliometric analysis reveals key metrics such as the size and growth rate of a research field, the level of collaboration among authors and institutions, the most cited works, and other relevant indicators (Temizer & Çobanoğlu, 2023). These insights help in understanding the overall development and impact of a particular topic or research area. To monitor the global research on bee products, several bibliometric analyses have been conducted by researchers like Vit et al. (2024), Temizer and Çobanoğlu (2023), Şenel and Demir (2018), Zakaria et al. (2021), Andreo-Martínez et al. (2020), Stefanis et al. (2023), and Jaramillo-Zárate and Londoño-Giraldo (2023).

This study aims to provide a comprehensive overview of in vitro and in vivo research on bee pollen, contributing to future investigations in this field. The study identifies publication trends related to "bee pollen and in vitro" and "bee pollen and in vivo" research from the year 2000 onwards, highlights the active periods of research on these topics, and assesses changes in the themes explored. By analyzing co-authorship models and citation networks, the study identifies key authors, institutions, or countries contributing to this area of research. Additionally, the study examines citation patterns to determine the most cited articles and identify the most influential works in this field.

Metot

This study focuses on academic documents related to in vitro and in vivo research on bee pollen, published between January 2000 and July 2024. The keywords "bee pollen" AND "in vitro" and "bee pollen" AND "in vivo" were used to search all fields.

The keyword searches were conducted across research areas related to natural sciences, life sciences, physical sciences, environmental sciences, health, agriculture and food sciences, biomedical sciences, social sciences, and applied sciences. Only research articles published in English were included in this study. The data was collected from the "Web of Science" (Thomson Reuters, New York, NY, USA) electronic database, and a bibliometric analysis of the identified scientific studies was conducted using the bibliometrix (Aria and Cuccurullo, 2017) in R Studio and VOSviewer packages.

Results

"In vitro," meaning "in glass" in Latin, refers to experiments conducted in a controlled, artificial environment. In contrast, "in vivo," meaning "within the living" in Latin, describes research performed within a living organism. A search combining the keywords "in vitro" and "bee pollen" yielded 120 research articles, while a search for "in vivo" and "bee pollen" identified 34 research articles (Table 1).

Table 1. Bibliometric Descriptors of Published Pollen Research in vitro and in vivo (2000-2024)

Web of Science database (2000─2024)			
In vitro		In vivo	
Döküman tipi	Sayısı	Döküman tipi	Sayısı
Toplam döküman	151	Toplam döküman	43
Article	121	Article	34
Review Article	26	Review Article	7
Book chapters	3	Book chapters	1
Letter		Letter	1
Meeting abstract	2	Meeting abstract	─
Proceeding paper	2	Proceeding paper	─
Number of Languages	2	Number of Languages	2

Between 1990 and 2000, no publications were found on bee pollen in vitro or bee pollen in vivo. However, between 2005 and 2010, the number of in vitro studies on bee pollen ranged from 1 to 5 per year. Notably, no studies were recorded in 2012. From 2016 onwards, a general upward trend in scientific research on bee pollen is observed. Specifically, in 2016, there were 7 studies, followed by 4 in 2017, 8 in 2018, and 9 in 2019. Starting in 2020, there was a significant increase in studies related to "bee pollen and in vitro." There were 14 new studies in 2020, 13 in 2021, 10 in 2022, and 23 in 2023. This surge indicates the beginning of an intensive research period focused on bee pollen in vitro compared to previous years (Table 2). Regarding bee pollen and in vivo studies, the highest number of publications was in 2020, with 7 studies. However, there were no publications in the years 2004, 2005, 2012, 2014, 2016, and 2021. In other years, the number of publications varied between 1 and 4 (Table 2).

Table 2. Number of Published Articles on Bee Pollen In Vitro and In Vivo (2000-2024)

	Manuscripts				
Year	**In vitro**	**In vivo**	**Year**	**In vitro**	**In vivo**
2003	—	1	2014	5	—
2004	—	—	2015	1	2
2005	1	—	2016	7	—
2006	3	1	2017	4	1
2007	1	2	2018	8	2
2008	1	2	2019	9	3
2009	5	1	2020	14	7
2010	2	1	2021	13	—
2011	2	1	2022	10	3
2012	0	—	2023	23	4
2013	4	1	2024	7	1

The journal "Antioxidants" stands out as the most prominent source for publications on bee pollen and in vitro studies, with 7 articles. The journals "European Food Research and Technology," "Journal of Health Science," and "Molecules" have each published four articles on the subject. In the area of bee pollen and in vivo studies, the "Journal of Health Science" ranks first with 3 articles. The journals "Journal of Agricultural and Food Chemistry," "Journal of the Science of Food and Agriculture," and "Molecules" each rank second with 2 articles. These journals are recognized as significant sources in the fields of agricultural and food chemistry, as well as molecular sciences (Table 3).

Table 3. Top ten journals on bee pollen published in vitro and in vivo from 2000 to 2024 and the number of articles in those journals.

In vitro		**In vivo**	
Sources	**No of Articles**	**Sources**	**No of Articles**
ANTIOXIDANTS	7	JOURNAL OF HEALTH SCIENCE	3
EUROPEAN FOOD RESEARCH AND TECHNOLOGY	4	JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY	2
JOURNAL OF HEALTH SCIENCE	4	JOURNAL OF THE SCIENCE OF FOOD AND AGRICULTURE	2
MOLECULES	4	MOLECULES	2
FOOD & FUNCTION	3	ALERGOLOGIA POLSKA-POLISH JOURNAL OF ALLERGOLOGY	1
JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY	3	ANTIBIOTICS-BASEL	1
BMC COMPLEMENTARY AND ALTERNATIVE MEDICINE	2	ANTIOXIDANTS	1
CHEMISTRY, BIOLOGY AND POTENTIAL APPLICATIONS OF HONEYBEE PLANT-DERIVED PRODUCTS	2	BIOCATALYSIS AND AGRICULTURAL BIOTECHNOLOGY	1
FOOD BIOSCIENCE	2	BIOCONTROL SCIENCE AND TECHNOLOGY	1
FOOD CHEMISTRY	2	CANCER NANOTECHNOLOGY	1

Table 4 illustrates which journals are more influential in their respective fields based on citation counts. Journals focusing on food chemistry and agricultural chemistry, such as "Food Chemistry" and "Journal of Agricultural and Food Chemistry," are among the sources with the highest number of citations in both "in vitro and bee pollen" and "in vivo and bee pollen" studies. These journals have created a significant scientific impact in areas such as food components, nutritional value, food chemistry, and analytical methods (Table 4).

Table 4. The top ten most cited local sources on in vitro and bee pollen, and in vivo and bee pollen

In vitro		In vivo	
Sources	No of Articles	Sources	No of Articles
FOOD CHEM	231	FOOD CHEM	42
J AGR FOOD CHEM	195	J AGR FOOD CHEM	28
MOLECULES	159	MOLECULES	25
LWT-FOOD SCI TECHNOL	115	J HEALTH SCI	18
FOOD CHEM TOXICOL	103	LWT-FOOD SCI TECHNOL	18
J APICULT RES	79	J ETHNOPHARMACOL	17
EVID-BASED COMPL ALT	74	FOOD CHEM TOXICOL	16
J HEALTH SCI	68	J SCI FOOD AGR	16
FOOD RES INT	64	J FOOD COMPOS ANAL	15
J ETHNOPHARMACOL	62	EVID-BASED COMPL ALT	14

The study analyses the authors who have contributed to "in vitro" and "in vivo" research in scientific studies, as well as the relative impact of these contributions (Table 5). In "in vitro" studies, authors such as Wu L and Xue X have made the most significant contributions, each with 6 articles. The Fractionalized values for these authors (0.74) reflect the importance of their work, while other authors like Li Q and Wang K have also made notable contributions with 5 articles each. Particularly, Yamaguchi M, despite contributing 4 articles, has a high fractionalized value of 1.87. In "in vivo" studies, Uchiyama S and Yamaguchi M stand out with 3 articles each. Yamaguchi M's presence in both categories highlights this author as a versatile researcher. While Wang L has a lower fractionalized value (0.37) compared to Yamaguchi M, indicating a lesser impact, authors like Bakour M have made smaller contributions with 2 articles (Table 5).

Table 5. Top ten authors contributing to in vitro and in vivo bee pollen studies and relative impact analysis values

In vitro			**In vivo**		
Authors	**Articles**	**Articles Fractionalized**	**Authors**	**Articles**	**Articles Fractionalized**
WU L	6	0.74	UCHIYAMA S	3	0.73
XUE X	6	0.74	WANG L	3	0.37
LI Q	5	0.60	YAMAGUCHI M	3	0.73
WANG K	5	0.60	ZHANG J	3	0.41
KACANIOVA M	4	0.94	BAKOUR M	2	0.24
MONTENEGRO G	4	0.52	BOVERA F	2	0.31
YAMAGUCHI M	4	1.87	HAMAMOTO R	2	0.40
ZHANG J	4	0.55	HASHIMOTO K	2	0.40
FRATINI F	3	0.33	ISHIKAWA Y	2	0.20
HAMAMOTO R	3	0.73	ISHIYAMA K	2	0.40

Table 6 analyzes the top 10 most cited institutions for in vitro and in vivo bee pollen research. PONTIFICIA UNIV CATOLICA CHILE and INST APICULTURAL RES lead in in vitro studies, while UNIV FED UBERLANDIA and HUAZHONG AGR UNIV have a significant impact in in vivo research. These institutions play crucial roles in food science and technology research, demonstrating their extensive influence in the literature.

Table 6. The ten most cited institutions on In Vitro and In Vivo bee pollen research

In vitro		**In vivo**	
Affiliation	**Articles**	**Affiliation**	**Articles**
PONTIFICIA UNIV CATOLICA CHILE	18	UNIV FED UBERLANDIA	7
INST APICULTURAL RES	16	HUAZHONG AGR UNIV	6
SLOVAK UNIV AGR	16	JUNTENDO UNIV	6
UNIV PISA	14	KING SAUD UNIV	6
HUAZHONG AGR UNIV	12	SLOVAK UNIV AGR	6
CHULALONGKORN UNIV	10	UNIV FED MARANHAO	6
UNIV RZESZOW	10	UNIV SHIZUOKA	6
KING SAUD UNIV	9	FUJIAN AGR AND FORESTRY UNIV	5
UNIV MINHO	8	HASSIBA BENBOUALI UNIV	4
UNIV SHIZUOKA	8	INST APICULTURAL RES	4

Out of 39 countries, 23 meet the threshold of having at least 2 publications. The map divides these countries into five clusters:
Cluster 1 (Red): Canada, Chile, People's Republic of China, South Korea, Spain. Collaboration among these countries is stronger compared to other clusters.
Cluster 2 (Green): Poland, Slovakia, Thailand, USA. These countries also exhibit strong collaboration.
Cluster 3 (Blue): Egypt, Italy, Saudi Arabia. This cluster is centered particularly around Italy.

Cluster 4 (Yellow): France, Morocco, Portugal. This group forms a smaller but distinct network of collaboration.
Cluster 5 (Purple): United Kingdom and India.
The People's Republic of China is depicted as the largest node on the map, indicating its central role in international collaboration. Italy also has strong connections both within its own cluster (Cluster 3) and with other clusters, establishing it as a significant hub in international collaborations (Figure 1).

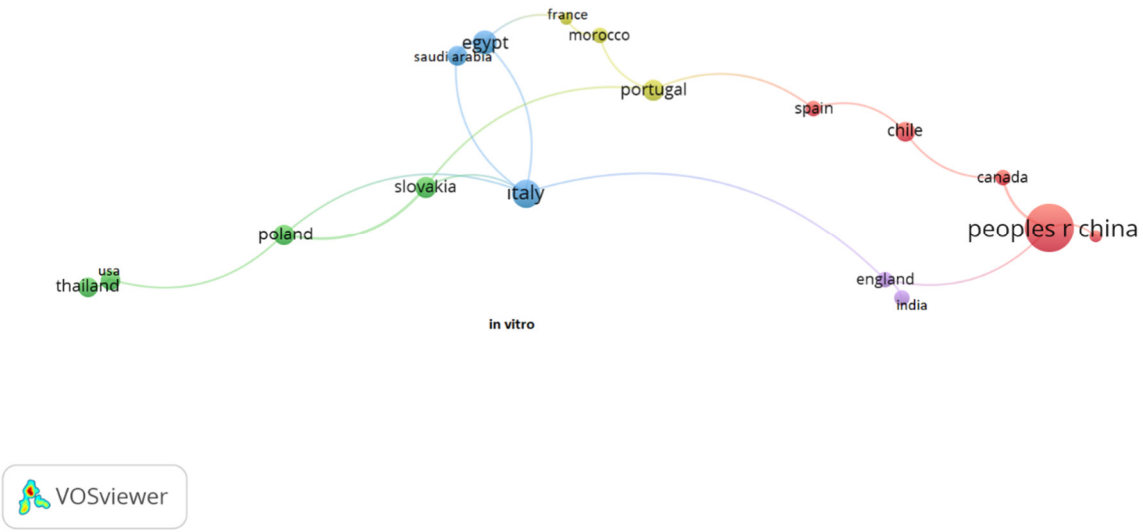


Figure 1: Network map of international collaboration in vitro and in bee pollen research, showing 20 links with a total link strength of 25. The map categorizes 17 countries into five clusters based on their collaboration patterns.

Out of 22 countries, 9 meet the threshold of having at least 2 publications. The graph divides these 9 countries into seven distinct clusters, with very weak or non-existent connections between the clusters. Each cluster contains only one or two countries, indicating that collaboration between these countries is quite limited. The map divides these countries into seven clusters:
Cluster 1: Canada and China.
Cluster 2: Egypt and Italy.
Cluster 3: Brazil.
Cluster 4: Japan.
Cluster 5: Morocco.
Cluster 6: USA.
Cluster 7: India.
Although the People's Republic of China is positioned close to the center of the map, its connections with other countries are minimal. This suggests that despite China's central role in international collaboration, it has limited strong collaboration in the field of "in vivo" and "bee pollen" research. The map shows only two connections, both depicted with very weak link strength. This indicates that collaboration between the countries is both limited and weak. Countries such as the USA, Japan, and India appear to be completely isolated on the map, suggesting either a lack of involvement in international collaboration or low potential for collaboration in this analysis (Figure 2).

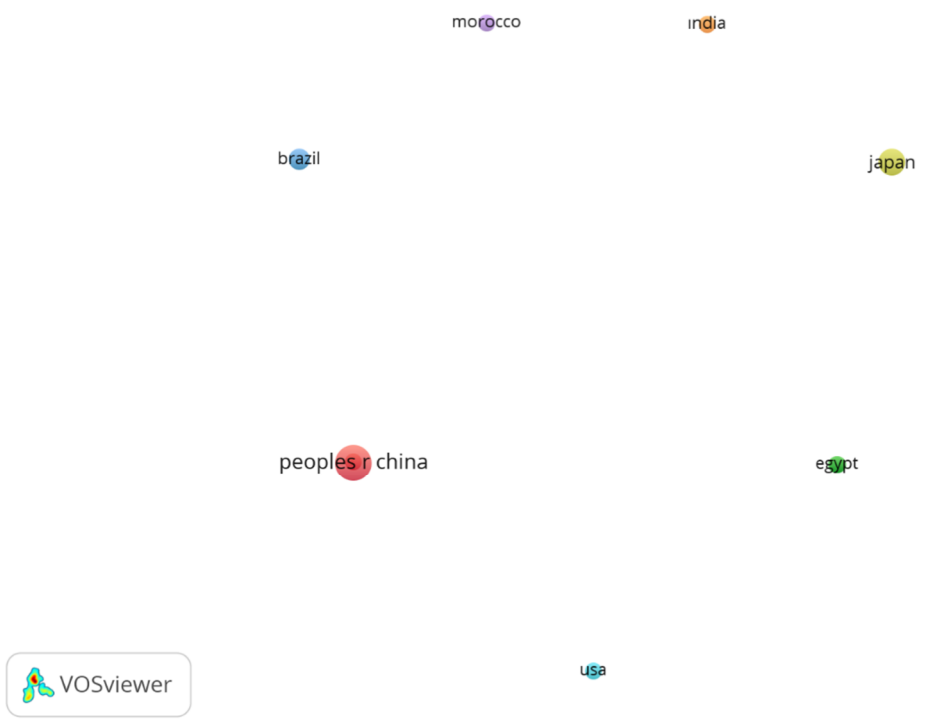


Figure 2: Network map of international collaboration in in vivo and bee pollen research, showing 9 countries divided into seven clusters with minimal connections. The map features only 2 links, both depicted with weak strength, indicating that collaboration between these countries is limited and weak, with isolated countries such as the USA, Japan, and India.

Table 7 compares the total citation counts (TC) and average citations per article for the top 10 countries in both "in vitro" and "in vivo" studies. China stands out with the highest total citations in both categories, leading with 602 citations in "in vitro" studies and 226 citations in "in vivo" studies. Notably, China has achieved a higher average of 25.10 citations per article in "in vivo" research, despite having a moderate overall impact level. Spain, Portugal, and Egypt have the highest average citations per article in "in vitro" studies, with averages of 85.00, 69.00, and 46.30 respectively, indicating that these countries can achieve high impact even with a limited number of publications. On the other hand, the United Kingdom, Morocco, and Brazil show significant impact in "in vivo" studies with average citations of 39.00, 36.00, and 35.30, respectively (Table 7).

Table 7. Comparison of total citations (TC) and average citations per article for the top ten countries in 'In Vitro' and 'In Vivo' studies.

In vitro			**In vivo**		
Country	**TC**	**Average Article Citations**	**Country**	**TC**	**Average Article Citations**
CHINA	602	20.80	CHINA	226	25.10
JAPAN	379	37.90	JAPAN	108	21.60
PORTUGAL	276	69.00	BRAZIL	106	35.30
ITALY	177	19.70	EGYPT	46	23.00
EGYPT	139	46.30	UNITED KINGDOM	39	39.00
TURKEY	112	18.70	MOROCCO	36	36.00
SAUDI ARABIA	102	20.40	FINLAND	33	33.00
CHILE	92	18.40	TURKEY	25	25.00
SLOVAKIA	86	21.50	SLOVAKIA	14	14.00
SPAIN	85	85.00	ITALY	11	11.00

In the field of "in vitro" and “bee pollen” research, several documents stand out for their high local citation rates. Yamaguchi M (2006) leads with the highest local citation rate, recording 7 local citations and achieving a local/global citation ratio of 19.44%. Similarly, Alimoglu G (2021) also garners attention with 7 local citations and a slightly higher local/global citation ratio of 22.58%. Aylanc V (2023), on the other hand, demonstrates a significant local citation impact with 5 local citations and a notably high local/global citation ratio of 29.41%. Additionally, Morais M (2011) and Mohdaly AAA (2015) have received 16 and 8 local citations, respectively, marking them for their high normalized local citation values. These documents collectively highlight influential contributions in the research area, with varying degrees of local impact and visibility in the broader global context (Table 8).

Table 8. Most locally cited documents in 'In Vitro' and bee pollen research among the top ten.

Document	DOI	Year	Local Citations	Global Citations	LC/GC Ratio (%)	Normalized Local Citations	Normalized Global Citations
MORAIS M, 2011, FOOD CHEM TOXICOL	10.1016/j.fct.2011.01.020	2011	16	217	7.37	2.00	1.81
MOHDALY AAA, 2015, J FOOD BIOCHEM	10.1111/jfbc.12160	2015	8	82	9.76	1.00	1.00
YAMAGUCHI M, 2006, J HEALTH SCI	10.1248/jhs.52.43	2006	7	36	19.44	1.50	1.52
ALIMOGLU G, 2021, LWT-FOOD SCI TECHNOL	10.1016/j.lwt.2021.110973	2021	7	31	22.58	10.11	1.55
GERCEK YC, 2022, MOLECULES	10.3390/molecules27010117	2022	5	30	16.67	4.55	2.05
AYLANC V, 2023, FOOD CHEM	10.1016/j.foodchem.2023.135597	2023	5	17	29.41	14.38	4.39
HAMAMOTO R, 2006, J HEALTH SCI-a	10.1248/jhs.52.607	2006	4	13	30.77	0.86	0.55
PINTO B, 2010, EUR J MED CHEM	10.1016/j.ejmech.2010.06.001	2010	4	32	12.50	2.00	2.00
WANG B, 2013, MOL MED REP	10.3892/mmr.2013.1382	2013	4	44	9.09	2.00	1.66
FANALI C, 2013, J CHROMATOGR A	10.1016/j.chroma.2013.06.055	2013	4	33	12.12	2.00	1.25

In the field of "in vivo" and bee pollen research, the top ten documents with the highest number of local citations are authored by Yamaguchi M (2007) and Medeiros KCP (2008), each receiving 2 local citations. Among these, Yamaguchi M (2007) paper has the highest local citation to global citation ratio, with a ratio of 8.00. In contrast, other papers such as Li GQ (2003), Yamaguchi M (2007), Ishikawa Y (2009), Akkol EK (2010), Attia YA (2011), and Kacaniova M (2013) received no local citations but are prominent for their global citation counts. This indicates that while these studies may be less recognized for their local impact, they have achieved significant recognition at the global level (Table 9).

Table 9. Top ten most locally cited documents in 'In Vivo' and "bee pollen" research

Document	DOI	Year	Local Citations	Global Citations	LC/GC Ratio (%)	Normalized Local Citations	Normalized Global Citations
YAMAGUCHI M, 2006, J HEALTH SCI	10.1248/jhs.52.43	2006	2	36	5.56	1.00	1.00
YAMAGUCHI M, 2007, J HEALTH SCI-a	10.1248/jhs.53.190	2007	2	25	8.00	2.00	1.47
MEDEIROS KCP, 2008, J ETHNOPHARMACOL	10.1016/j.jep.2008.05.036	2008	2	80	2.50	1.00	1.50
ISHIKAWA Y, 2008, J MED FOOD	10.1089/jmf.2006.163	2008	2	27	7.41	1.00	0.50
LI GQ, 2003, BIOCONTROL SCI TECHNOL	10.1080/0958315031000140983	2003	0	9	0.00		1.00
YAMAGUCHI M, 2007, J HEALTH SCI	10.1248/jhs.53.571	2007	0	9	0.00	0.00	0.53
ISHIKAWA Y, 2009, PHYTOTHER RES	10.1002/ptr.2824	2009	0	11	0.00		1.00
AKKOL EK, 2010, PHARM BIOL	10.3109/13880200903085482	2010	0	25	0.00		1.00
ATTIA YA, 2011, J ANIM PHYSIOL ANIM NUTR	10.1111/j.1439-0396.2010.01054.x	2011	0	46	0.00		1.00
KACANIOVA M, 2013, RES VET SCI	10.1016/j.rvsc.2013.02.022	2013	0	14	0.00		1.00

Table 10 presents the most globally cited documents in the field of "in vitro" and bee pollen research. Morais M (2011) leads with the highest total citations, receiving 217 citations and a notable annual citation rate of 15.50. Nakajima Y (2009) follows with 125 citations and an annual citation rate of 7.81, indicating significant impact. Sun L (2017) has garnered 94 citations and an annual citation rate of 11.75, reflecting the high influence of manuscript.

Table 10. Top ten most globally cited documents in 'In Vitro' and bee pollen research

Paper	DOI	Total Citations	TC per Year	Normalized TC
MORAIS M, 2011, FOOD CHEM TOXICOL	10.1016/j.fct.2011.01.020	217	15.50	1.81
NAKAJIMA Y, 2009, BMC COMPLEMENT ALTERN MED	10.1186/1472-6882-9-4	125	7.81	1.76
SUN L, 2017, FRONT PHARMACOL	10.3389/fphar.2017.00104	94	11.75	2.32
GONZÁLEZ G, 2005, INT J FOOD MICROBIOL	10.1016/j.ijfoodmicro.2005.05.001	85	4.25	1.00
LI F, 2009, CARBOHYDR POLYM	10.1016/j.carbpol.2009.04.005	83	5.19	1.17
MOHDALY AAA, 2015, J FOOD BIOCHEM	10.1111/jfbc.12160	82	8.20	1.00
IZUTA H, 2009, BMC COMPLEMENT ALTERN MED	10.1186/1472-6882-9-45	80	5.00	1.12
ATTIA YA, 2014, LIVEST SCI	10.1016/j.livsci.2014.03.005	70	6.36	2.24
VAZQUEZ DE, 2018, PLOS ONE	10.1371/journal.pone.0205074	67	9.57	3.37
LI Q, 2017, J AGRIC FOOD CHEM	10.1021/acs.jafc.7b02285	60	7.50	1.48

The table presents the top ten most cited documents in "in vivo" and bee pollen research, highlighting their global citation counts and annual citation rates. Medeiros KCP (2008) leads with the highest total citations, receiving 80 citations and an annual citation rate of 4.71.

Li X (2017) follows with 51 citations and an annual citation rate of 6.38. Bakour M (2022) stands out with 33 citations and a notably high annual citation rate of 11.00, indicating significant impact. Laaroussi H (2020) and Ketkar S (2015) also make important contributions with 36 and 39 citations, respectively, featuring high annual citation rates and notable normalized citation values.

Table 11. Top ten most cited documents in 'In Vivo' and bee pollen research

Paper	DOI	Total Citations	TC per Year	Normalized TC
MEDEIROS KCP, 2008, J ETHNOPHARMACOL	10.1016/j.jep.2008.05.036	80	4.71	1.50
LI X, 2017, MOLECULES	10.3390/molecules22050699	51	6.38	1.00
ATTIA YA, 2011, J ANIM PHYSIOL ANIM NUTR	10.1111/j.1439-0396.2010.01054.x	46	3.29	1.00
LI Q, 2019, J AGRIC FOOD CHEM	10.1021/acs.jafc.9b03082	41	6.83	1.27
KETKAR S, 2015, INTEGR MED RES	10.1016/j.imr.2015.02.003	39	3.90	1.81
YAMAGUCHI M, 2006, J HEALTH SCI	10.1248/jhs.52.43	36	1.89	1.00
LAAROUSSI H, 2020, FOOD RES INT	10.1016/j.foodres.2020.109802	36	7.20	2.08
BAKOUR M, 2022, ANTIBIOTICS-BASEL	10.3390/antibiotics11020203	33	11.00	1.53
YANG Y, 2019, J SCI FOOD AGRIC	10.1002/jsfa.9774	29	4.83	0.90
SHEN Z, 2019, MOLECULES	10.3390/molecules24061090	27	4.50	0.84

Table 12 highlights the most frequently mentioned terms in research on bee pollen and antioxidants in "in vitro" studies. The term "bee pollen" appears 49 times, indicating its prominence in research topics. Other significant terms include phenolic compounds, polyphenols, and related components, which are also central to the research focus. In "in vivo" studies, "bee pollen" is the most frequently used term, appearing 13 times, underscoring its central role in the research. Important keywords in this context include "allergy," "antioxidant," "*cistus ladaniferus*," and "osteoporosis," each mentioned 3 times, reflecting the diverse health effects under investigation.

Table 12. Top ten most frequently mentioned keywords in 'In Vitro' and 'In Vivo' studies on Bee Pollen

In vitro		**In vivo**	
Words	**Occurrences**	**Words**	**Occurrences**
bee pollen	49	bee pollen	13
antioxidant	13	allergy	3
pollen	11	antioxidant	3
antioxidant activity	8	*cistus ladaniferus*	3
propolis	8	osteoporosis	3
bee bread	7	antioxidant activity	2
phenolic compounds	7	mast cell	2
polyphenols	7	pollen	2
bioaccessibility	6	rat femur	2
flavonoids	6	structural identification	2

Discussion and Conclusion

The number of studies focusing on bee pollen in "in vivo" research is approximately one-fourth of the number conducted in "in vitro" studies. This significant difference can be attributed to the inherent complexities and requirements of "in vivo" research.

"In vitro" studies play a crucial role in advancing "in vivo" research by providing foundational insights and preliminary data that are essential for designing and conducting experiments involving live animals. However, Conducting "in vivo" studies involves working with live animals, which necessitates rigorous ethical approvals and adherence to stringent animal welfare guidelines. These approvals often require comprehensive review processes by ethical committees to ensure humane treatment and minimize animal suffering. Additionally, "in vivo" research demands the use of highly specialized and often costly laboratory equipment and facilities. The need for sophisticated tools and controlled environments to monitor and manage experimental conditions further contributes to the higher costs and logistical challenges associated with "in vivo" studies. The lower number of "in vivo" studies compared to "in vitro" research is therefore expected. "In vitro" studies, which are conducted in controlled environments outside of a living organism, generally have fewer regulatory hurdles and lower costs. Consequently, they are more feasible and accessible for researchers, leading to a higher volume of such studies.

We hope that the findings from this bibliometric analysis will serve as a valuable guide for researchers planning future studies on bee pollen. By providing a comprehensive overview of existing research trends, key publications, and influential authors, this analysis aims to highlight critical areas of focus and identify gaps in the current knowledge base. We anticipate that this information will facilitate more informed research planning, enhance the strategic direction of future studies, and contribute to advancing the understanding of bee pollen's various applications and benefits.

References

Aria, M. & Cuccurullo, C. (2017) bibliometrix: An R-tool for comprehensive science mapping analysis, Journal of Informetrics, 11(4), pp 959-975, Elsevier.

Alimoglu, G., Guzelmeric, E., Yuksel, P. I., Celik, C., Deniz, I., & Yesilada, E. (2021). Monofloral and polyfloral bee pollens: Comparative evaluation of their phenolics and bioactivity profiles. Lwt, 142, 110973.

Andreo-Martínez, P., Oliva, J., Giménez-Castillo, J. J., Motas, M., Quesada-Medina, J., & Cámara, M. Á. (2020). Science production of pesticide residues in honey research: A descriptive bibliometric study. Environmental Toxicology and Pharmacology, 79, 103413.

Attia, Y., Al-Hanoun, A., Tag El-Din, A., Bovera, F., & Shewika, Y. (2011). Effect of bee pollen levels on productive, reproductive and blood traits of NZW rabbits. Journal of animal physiology and animal nutrition, 95(3), 294-303.

Attia, Y. A., Abd Al-Hamid, A., Ibrahim, M. S., Al-Harthi, M., Bovera, F., & Elnaggar, A. S. (2014). Productive performance, biochemical and hematological traits of broiler chickens supplemented with propolis, bee pollen, and mannan oligosaccharides continuously or intermittently. Livestock Science, 164, 87-95.

Aylanc, V., Falcão, S. I., Ertosun, S., & Vilas-Boas, M. (2021). From the hive to the table: Nutrition value, digestibility and bioavailability of the dietary phytochemicals present in the bee pollen and bee bread. Trends in Food Science & Technology, 109, 464-481. https://doi.org/https://doi.org/10.1016/j.tifs.2021.01.042

Bakour, M., Laaroussi, H., Ousaaid, D., El Ghouizi, A., Es-Safi, I., Mechchate, H., & Lyoussi, B. (2022). Bee bread as a promising source of bioactive molecules and functional properties: an up-to-date review. Antibiotics, 11(2), 203.

Çobanoğlu, D. N., Kizilpinar Temizer, İ., Candan, E. D., Yolcu, U., & Güder, A. (2023). Evaluation of the nutritional value of bee pollen by palynological, antioxidant, antimicrobial, and elemental characteristics. European Food Research and Technology, 249(2), 307-325. https://doi.org/10.1007/s00217-022-04117-5

Fanali, C., Dugo, L., & Rocco, A. (2013). Nano-liquid chromatography in nutraceutical analysis: Determination of polyphenols in bee pollen. Journal of Chromatography A, 1313, 270-274.

Gercek, Y. C., Celik, S., & Bayram, S. (2021). Screening of plant pollen sources, polyphenolic compounds, fatty acids and antioxidant/antimicrobial activity from bee pollen. Molecules, 27(1), 117.

González, G., Hinojo, M., Mateo, R., Medina, A., & Jiménez, M. (2005). Occurrence of mycotoxin producing fungi in bee pollen. International Journal of Food Microbiology, 105(1), 1-9.

Hamamoto, R., Ishiyama, K., Hashimoto, K., & Yamaguchi, M. (2006). Characterization of the active component in bee pollen Cistus ladaniferus extract in stimulating bone calcification and in inhibiting bone resorption in vitro. Journal of Health Science, 52(5), 607-612.

Ishikawa, Y., Tokura, T., Nakano, N., Hara, M., Niyonsaba, F., Ushio, H., Yamamoto, Y., Tadokoro, T., Okumura, K., & Ogawa, H. (2008). Inhibitory effect of honeybee-collected pollen on mast cell degranulation in vivo and in vitro. Journal of Medicinal Food, 11(1), 14-20.

Ishikawa, Y., Tokura, T., Ushio, H., Niyonsaba, F., Yamamoto, Y., Tadokoro, T., Ogawa, H., & Okumura, K. (2009). Lipid-soluble components of honeybee-collected pollen exert antiallergic effect by inhibiting IgE-mediated mast cell activation in vivo. Phytotherapy Research, 23(11), 1581-1586.

Izuta, H., Shimazawa, M., Tsuruma, K., Araki, Y., Mishima, S., & Hara, H. (2009). Bee products prevent VEGF-induced angiogenesis in human umbilical vein endothelial cells. BMC Complementary and Alternative Medicine, 9, 1-10.

Jaramillo-Zárate, M. J., & Londoño-Giraldo, L. M. (2023). Pesticides in honey: bibliographic and bibliometric analysis towards matrix quality for consumption. Brazilian Journal of Food Technology, 26, e2022112.

Kačániová, M., Rovná, K., Arpášová, H., Hleba, L., Petrová, J., Haščík, P., Čuboň, J., Pavelková, A., Chlebo, R., & Bobková, A. (2013). The effects of bee pollen extracts on the broiler chicken's gastrointestinal microflora. Research in Veterinary Science, 95(1), 34-37.

Ketkar, S., Rathore, A., Kandhare, A., Lohidasan, S., Bodhankar, S., Paradkar, A., & Mahadik, K. (2015). Alleviating exercise-induced muscular stress using neat and processed bee pollen: oxidative markers, mitochondrial enzymes, and myostatin expression in rats. Integrative Medicine Research, 4(3), 147-160.

Küpeli Akkol, E., Orhan, D. D., Gürbüz, I., & Yesilada, E. (2010). In vivo activity assessment of a "honey-bee pollen mix" formulation. Pharmaceutical Biology, 48(3), 253-259.

Kizilpinar-Temizer, I., Guder, A., Candan, E. D., & Yolcu, U. (2022). Antioxidant properties, element contents and antimicrobial activities of bee pollen collected by Apis mellifera L. in Türkiye. Spanish Journal of Agricultural Research, 20(4), e0506. https://doi.org/10.5424/sjar/2022204-18826

Laaroussi, H., Bakour, M., Ousaaid, D., Aboulghazi, A., Ferreira-Santos, P., Genisheva, Z., Teixeira, J. A., & Lyoussi, B. (2020). Effect of antioxidant-rich propolis and bee pollen extracts against D-glucose induced type 2 diabetes in rats. Food Research International, 138, 109802.

Li, F., Yuan, Q., & Rashid, F. (2009). Isolation, purification and immunobiological activity of a new water-soluble bee pollen polysaccharide from Crataegus pinnatifida Bge. Carbohydrate Polymers, 78(1), 80-88.

Li, G., Huang, H., & Acharya, S. (2003). Importance of pollen and senescent petals in the suppression of alfalfa blossom blight (Sclerotinia sclerotiorum) by Coniothyrium minitans. Biocontrol Science and Technology, 13(5), 495-505.

Li, Q., Liang, X., Zhao, L., Zhang, Z., Xue, X., Wang, K., & Wu, L. (2017). UPLC-Q-exactive orbitrap/MS-based lipidomics approach to characterize lipid extracts from bee pollen and their in vitro anti-inflammatory properties. Journal of Agricultural and Food Chemistry, 65(32), 6848-6860.

Li, Q., Sun, M., Wan, Z., Liang, J., Betti, M., Hrynets, Y., Xue, X., Wu, L., & Wang, K. (2019). Bee pollen extracts modulate serum metabolism in lipopolysaccharide-induced acute lung injury mice with anti-inflammatory effects. Journal of Agricultural and Food Chemistry, 67(28), 7855-7868.

Li, X., Gong, H., Yang, S., Yang, L., Fan, Y., & Zhou, Y. (2017). Pectic bee pollen polysaccharide from Rosa rugosa alleviates diet-induced hepatic steatosis and insulin resistance via induction of AMPK/mTOR-mediated autophagy. Molecules, 22(5), 699.

Medeiros, K., Figueiredo, C., Figueredo, T., Freire, K., Santos, F., Alcântara-Neves, N. M., Silva, T., & Piuvezam, M. (2008). Anti-allergic effect of bee pollen phenolic extract and myricetin in ovalbumin-sensitized mice. Journal of Ethnopharmacology, 119(1), 41-46.

Mohdaly, A. A., Mahmoud, A. A., Roby, M. H., Smetanska, I., & Ramadan, M. F. (2015). Phenolic extract from propolis and bee pollen: composition, antioxidant and antibacterial activities. Journal of Food Biochemistry, 39(5), 538-547.

Morais, M., Moreira, L., Feás, X., & Estevinho, L. M. (2011). Honeybee-collected pollen from five Portuguese Natural Parks: Palynological origin, phenolic content, antioxidant properties and antimicrobial activity. Food and Chemical Toxicology, 49(5), 1096-1101.

Nakajima, Y., Tsuruma, K., Shimazawa, M., Mishima, S., & Hara, H. (2009). Comparison of bee products based on assays of antioxidant capacities. BMC Complementary and Alternative Medicine, 9, 1-9.

Pinto, B., Caciagli, F., Riccio, E., Reali, D., Šarić, A., Balog, T., Likić, S., & Scarpato, R. (2010). Antiestrogenic and antigenotoxic activity of bee pollen from Cystus incanus and Salix alba as evaluated by the yeast estrogen screen and the micronucleus assay in human lymphocytes. European Journal of Medicinal Chemistry, 45(9), 4122-4128.

Shen, Z., Geng, Q., Huang, H., Yao, H., Du, T., Chen, L., Wu, Z., Miao, X., & Shi, P. (2019). Antioxidative and Cardioprotective Effects of Schisandra chinensis Bee Pollen Extract on Isoprenaline-Induced Myocardial Infarction in Rats. Molecules, 24(6). https://doi.org/10.3390/molecules24061090

Stefanis, C., Stavropoulou, E., Giorgi, E., Voidarou, C., Constantinidis, T. C., Vrioni, G., & Tsakris, A. (2023). Honey's antioxidant and antimicrobial properties: A bibliometric study. Antioxidants, 12(2), 414.

Sun, L., Guo, Y., Zhang, Y., & Zhuang, Y. (2017). Antioxidant and anti-tyrosinase activities of phenolic extracts from rape bee pollen and inhibitory melanogenesis by cAMP/MITF/TYR pathway in B16 mouse melanoma cells. Frontiers in Pharmacology, 8, 104.

Şenel, E., & Demir, E. (2018). Bibliometric analysis of apitherapy in complementary medicine literature between 1980 and 2016. Complementary Therapies in Clinical Practice, 31, 47-52. https://doi.org/https://doi.org/10.1016/j.ctcp.2018.02.003

Vázquez, D. E., Ilina, N., Pagano, E. A., Zavala, J. A., & Farina, W. M. (2018). Glyphosate affects the larval development of honey bees depending on the susceptibility of colonies. PloS One, 13(10), e0205074.

Vit, P., Chuttong, B., de Oliveira Santos, A. D., & Contreras, R. R. (2024). Nutraceutical properties and bibliometrics on chemical research of stingless bee pollen.

Wang, B., Diao, Q., Zhang, Z., Liu, Y., Gao, Q., Zhou, Y., & Li, S. (2013). Antitumor activity of bee pollen polysaccharides from Rosa rugosa. Molecular Medicine Reports, 7(5), 1555-1558.

Yamaguchi, M., Hamamoto, R., Uchiyama, S., Ishiyama, K., & Hashimoto, K. (2006). Anabolic effects of bee pollen Cistus ladaniferus extract on bone components in the femoral-diaphyseal and-metaphyseal tissues of rats in vitro and in vivo. Journal of Health Science, 52(1), 43-49.

Yamaguchi, M., Hamamoto, R., Uchiyama, S., Ishiyama, K., & Hashimoto, K. (2007). Preventive effects of bee pollen Cistus ladaniferus extract on bone loss in streptozotocin-diabetic rats in vivo. Journal of Health Science, 53(2), 190-195.

Yamaguchi, M., Uchiyama, S., & Nakagawa, T. (2007). Preventive effects of bee pollen Cistus ladaniferus extract on bone loss in ovariectomized rats in vivo. Journal of Health Science, 53(5), 571-575.

Yang, Y., Zhang, J. l., Zhou, Q., Wang, L., Huang, W., & Wang, R. d. (2019). Effect of ultrasonic and ball-milling treatment on cell wall, nutrients, and antioxidant capacity of rose (Rosa rugosa) bee pollen, and identification of bioactive components. Journal of the Science of Food and Agriculture, 99(12), 5350-5357.

Temizer, İ. K., & Çobanoğlu, D. N. (2023). Bibliometric analysis of research on bee pollen: Global trends and collaboration patterns. Gıda, 48(5), 1084-1098.

Temizer, İ. K., Güder, A., Temel, F. A., & Avci, E. (2018). A comparison of the antioxidant activities and biomonitoring of heavy metals by pollen in the urban environments. Environmental Monitoring and Assessment, 190(8), 462. https://doi.org/https://doi.org/10.1007/s10661-018-6829-6

Wang, B., Diao, Q., Zhang, Z., Liu, Y., Gao, Q., Zhou, Y., & Li, S. (2013). Antitumor activity of bee pollen polysaccharides from Rosa rugosa. Molecular Medicine Reports, 7(5), 1555-1558.

Zakaria, R., Ahmi, A., Ahmad, A. H., Othman, Z., Azman, K. F., Ab Aziz, C. B., Ismail, C. A. N., & Shafin, N. (2021). Visualising and mapping a decade of literature on honey research: A bibliometric analysis from 2011 to 2020. Journal of Apicultural Research, 60(3), 359-368.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

TIBIA EXTREMITAS DISTALIS'inin MORFOMETRİK ÖLÇÜMLERİNİN KORELASYON ANALİZİ

Dr. Öğr. Üyesi Eda Duygu İPEK
Aydın Adnan Menderes Üniversitesi, Tıp Fakültesi, Anatomi Anabilim Dalı
ORCID: 0000-0002-9851-6157

Arş. Gör. Dr. Aybüke SADE
Aydın Adnan Menderes Üniversitesi, Tıp Fakültesi, Anatomi Anabilim Dalı
ORCID: 0009-0005-2343-5239

Doç Dr. Mukadder SUNAR
Erzincan Binali Yıldırım Üniversitesi, Tıp Fakültesi, Anatomi Anabilim Dalı
ORCID: 0000-0002-6744-3848

ÖZET
Fibula ile birlikte talokrural eklemi oluşturan tibia distali, eklem yüzünün büyük bölümünü ihtiva etmesi ve kalınlığı sebebiyle talokrural eklem stabilitesinde ve vücut ağırlığının ayağa iletilmesinde en önemli fonksiyonu üstlenir. Tibia'nın distal ucunda bulunan eklem yüzünün taşıdığı yüke kıyasla oldukça küçük olması ve şekillenen mekanik stresin distal ucun morfometrik parametrelerinde değişime neden olabileceği, ayrıca uzun kemiklerin morfometrik parametrelerinde saptanan varyasyonların distal uçlarında daha belirgin olduğu bildirilmektedir. Bu çalışmada tibia'nın extremitas distalis'inin morfometrik analizi ve bu değerlerin birbirleri ile, distal ve proksimal uzunluk-kalınlık indeksi ile ilişkisinin araştırılması amaçlandı. Toplam 60 adet tibia'da (30 sağ, 30 sol) dijital kumpas ve mezura ile tibia uzunluğu, incisura fibularis genişliği, pilon mesafesi, malleolus medialis uzunluğu ve genişliği, facies articularis inferior uzunluğu ve genişliği, tibia proksimal ve distalinin genişliği ve uzunluğu ölçüldü, proksimal ve distal genişlik değerlerinin tibia uzunluğuna oranı yüz ile çarpılarak proksimal ve distal uzunluk-kalınlık indeks değerleri hesaplandı. Verilerin istatiksel analizinde Kolmogorov Smirnov testi ile dağılım paterni değerlendirildi. Student-t testi ile sağ ve sol tarafa ait veriler karşılaştırıldı. Pearson korelasyon testi ile değişkenler arasındaki ilişkiler değerlendirildi. Ölçümünü gerçekleştirdiğimiz morfometrik parametrelerin tümü sağ ve sol tarafta istatiksel olarak farklı bulunmadı ($p>0,05$), istatiksel olarak anlamlılık düzeyi en düşük pilon mesafesinde ($p=0,078$) saptandı. Facies articularis inferior'un mediolateral uzunluğu tibia proksimal ve distal genişlik ve uzunluk değerleri ile orta ve yüksek dereceli korelasyon gösterirken, anteroposterior uzunluğunun zayıf korelasyon gösterdiği bulundu.Incisura fibularis genişliği ile tibia uzunluğu ($r=0,525$), pilon mesafesi ($r=0,575$), facies articularis inferior uzunluğu arasında ($r=0,449$) orta derecede korelasyon saptandı. Incisura fibularis genişliği, proksimal tibia genişliği ($r=0,548$), distal tibia genişliği ($r=0,441$) ve uzunluğu ($r=0,517$) arasında orta derecede korelasyon, proksimal tibia uzunluğu arasında ($r=0,384$) zayıf korelasyon saptandı. Proksimal ve distal uzunluk-kalınlık indeks değerleri arasında yüksek korelasyon bulundu ($r=0,611$). Çalışmamızın bulguları rekonstrüktif cerrahide ve adli antropolojide tibia'dan boy tahmininde önemli olabileceğini düşündüğümüz tibia distalinin morfometrik parametrelerini, değişkenlerin birbiri ile olan korelasyonlarını sağlamaktadır.
Anahtar Kelimeler: distal tibia, malleolus medialis, talokrural eklem, fibular çentik

CORRELATION ANALYSIS OF MORPHOMETRIC MEASUREMENTS OF TIBIA EXTREMITAS DISTALIS

ABSTRACT
The distal tibia, forming the talocrural joint with the fibula, crucially stabilizes the joint due to its large articular surface and thickness, transmitting body weight to the foot. Articular surface small size relative to the load it bears and mechanical stresses may alter distal morphometric parameters. Variations in long bone morphometric parameters are more pronounced at their distal ends. This study aimed to analyze the morphometric characteristics of the distal end of the tibia and investigate their relationships with each other and with the proximal and distal length-thickness index. In a total of 60 tibia (30 right, 30 left), measurements were taken using digital calipers and a measuring tape for tibia length, fibular notch width, pilon distance, medial malleolus length and width, inferior articular surface length and width, and width and length of proximal and distal tibia. Proximal and distal width values were multiplied by 100 and divided by tibia length to calculate proximal and distal length-thickness index values. Statistical analysis included evaluating distribution patterns using the Kolmogorov-Smirnov test, comparing data between right and left sides using the Student's t-test, and assessing relationships between variables using Pearson correlation tests. All morphometric parameters measured showed no statistical difference between sides ($p>0.05$); lowest significance at pilon distance($p=0.078$). Inferior articular surface mediolateral length correlated moderately to highly with proximal and distal tibia width and length; anteroposterior length showed weak correlation. Moderate correlations found between fibular notch width and tibia length($r=0.525$), pilon distance($r=0.575$), and inferior articular surface length($r=0.449$). Moderate correlations also found between fibular notch width and proximal tibia width($r=0.548$), distal tibia width($r=0.441$), and length($r=0.517$); weak correlation with proximal tibia length($r=0.384$). High correlation found between proximal and distal length-thickness index values ($r=0.611$). This study provides important parameters of distal tibia and correlations, which could be valuable for reconstructive surgery and estimation of height in forensic anthropology.
Keywords: distal tibia, malleolus medialis, talocrural joint, fibular notch

GİRİŞ
Bacak kemiklerinin en kalın olanı tibia'nın extremitas distalis'i, diğer bacak kemiği fibula'nın extremitas distalis'i ve ayak bileği kemiklerinin en proksimalde yer alanı talus ile birlikte diartrodial bir eklem ayak bileği ekleminin (articulatio talocruralis) yapısına katılır. Talus'un trochlea tali'si ile eklem yapan tibia'nın extremitas distalis'inde yer alan eklem yüzü facies articularis inferior (tibial plafond) olarak isimlendirilir. Tibia'nın extremitas distalis'inde inferomedial olarak uzanan piramit şeklindeki çıkıntı malleolus medialis ile lateralde fibula ile eklemleşen çentik şeklinde eklem yüzü olan incisura fibularis bulunur (Khurshid ve Afza., 2019; Ülkir ve ark., 2024). Tibia ile fibula birbirleri ile syndesmosis tipi eklem oluştururlar. Distal tibiofibular eklemin morfolojisi ayak bileği kırığı örüntüsü ve redüksiyon stratejisinde önemli rol oynamaktadır (Labbai ve Tapiyawala, 2019; Misir ve ark., 2021). Tibial plafond ile tibia'nın malleolus medialis'inin dış yüzünde bulunan eklem yüzü ve fibula'nın malleolus lateralis'inin iç yüzünde bulunan eklem yüzü birlikte trochlea tali'ye uyumlu derin bir girinti oluştururlar (Gupta ve ark., 2017; Akter ve ark., 2021).

Articulatio talocruralis vücut ağırlığını başlıca taşıyan, en sık yaralanan eklemdir ve ayak bileği eklemi kırıkları tüm kırıkların %10'unu, ayak bileği eklemi kırıklarının ise %7'sini malleolus medialis kırıkları oluşturmaktadır (Gupta ve ark., 2017; Uzuner ve ark., 2018; Khurshid ve Afza., 2019; Akter ve ark., 2021; Xin ve ark., 2023; Ülkir ve ark., 2024). Ayak bileği eklemini şekillendiren distal tibia, distal fibula ve talus kırıklarının sıklıkla birlikte şekillendiği bildirilmektedir. Malleolar çıkıntıların kırıkları rotasyonel kuvvetler sonucu şekillenirken, distal tibia kırıkları (pilon kırıkları) yüksekten düşme ve motorlu araç kazaları gibi dikey yüklenme kuvvetinin sonucu meydana gelmektedir (Elrod, 2014). Malleolus medialis kırığı insidansının, fibula'da bulunan malleolus laterlis kırıklarından 3 kat fazla olduğu bildirilmektedir (Xin ve ark., 2023) Tibia kalınlığı sebebiyle vücut ağırlığının iletilmesinde fibula'ya kıyasla daha fonksiyoneldir. Dolayısıyla ayak bileği ekleminin stabilizasyonunda, ayak bileği eklem protezlerinin tasarlanmasında, fraktür cerrahisi sırasında malredüksiyon riskinin azaltılmasında ve malleolus medialis ile distal tibia kırıklarının radyolojik diagnozunda tibia extremitas distalis'inin morfometrik parametrelerinin bilinmesi önemlidir (Gupta ve ark., 2017; Misir ve ark., 2021).
Adli antroplojide iskelet kalıntılarından bireyin boyunu belirlemede sıklıkla alt ekstremite kemikleri tercih edilmektedir. Bu amaçla alt ekstremite kemiklerinin farklı bölümlerini içeren morfometrik ölçümlere dayalı regresyon formülleri geliştirilmektedir. Tibia da boy tahmini yapılabilen kemiklerdendir, dolayısıyla tüm uzunluğunun yanında farklı bölümlerinin morfometrik parametrelerinin bilinmesi önem arz etmektedir (Ugochukwu ve ark., 2016; Babacan ve Kafa, 2020). Literatürde tibia'nın extremitas distalis'inin morfometrik analizini içeren çalışmalar ise oldukça sınırlıdır. Bu çalışmada tibia'nın extremitas distalis'inin morfometrik parametrelerinin ölçümü ve bu parametrelerin birbirleri ile olan ilişkisinin araştırılması amaçlanmıştır.

ARAŞTIRMA VE BULGULAR

Çalışmamız Aydın Adnan Menderes Üniversitesi Tıp Fakültesi ve Erzincan Binali Yıldırım Üniversitesi Tıp Fakültesi Anatomi Anabilim Dalları kemik arşivinden seçilen tibia kemikleri üzerinde morfometrik ölçümler yapılarak gerçekleştirildi. Çalışmamızda hedeflenen morfometrik ölçümlerin yapılmasına engel teşkil edecek hasarı bulunmayan, yapısal ve/veya edinsel deformitesi olmayan, kemik üzerinde patolojik süreçlerin belirtilerinin, kortikal deformitelerin gözlenmediği, 30 adet sağ ve 30 adet sol ekstremiteye ait toplam 60 adet tibia kullanıldı.
Morfometrik ölçümlerden incisura fibularis genişliği, pilon mesafesi, proksimal tibia genişliği, proksimal tibia uzunluğu, distal tibia genişliği, distal tibia uzunluğu dijital kumpas; tibia uzunluğu, malleolus medialis uzunluğu, malleolus medialis genişliği, facies articularis inferior anteroposterior uzunluğu, facies articularis inferior mediolateral uzunluğu ise mezura kullanılarak ölçüldü. Ölçülen tüm parametreler santimetre cinsinden ifade edildi.

Çalışma kriterlerine uygun şekilde seçilen tibia'lar üzerinde ölçülen morfometrik ölçümler ve referans noktaları;
Tibia uzunluğu (TU): Condylus medialis'ten malleolus medialis'in alt ucuna kadar olan mesafe
Incisura fibularis genişliği (IFG): Incisura fibularis'in iki ucu arasında kalan mesafe
Pilon mesafesi (PM): Malleolus medialis hariç tutularak margo anterior ile margo interosseus arasında kalan mesafe
Malleolus medialis genişliği (MG): Malleolus medialis'in başladığı yerde en geniş kısmının genişliği

Malleolus medialis uzunluğu (MU): Malleolus medialis'in başladığı yerden en uç kısmına kadar olan uzunluğu
Facies articularis inferior anteroposterior uzunluğu (FAI-APU): Tibia'nın facies articularis inferior'unda en geniş kısmının anteroposterior uzunluğu
Facies articularis inferior mediolateral uzunluğu (FAI-MLU): Facies articularis inferior anteroposterior uzunluğunun orta noktasından geçecek şekilde en uzun kısmının mediolateral uzunluğu
Proksimal tibia genişliği (PG): Condylus medialis ile condylus lateralis'in uçları arasında kalan mesafe
Proksimal tibia uzunluğu (PU): Area intercondylaris anterior ve area intercondylaris posterior arasında kalan mesafe
Distal tibia genişliği (DG): Malleolus medialis dahil edilerek distal tibia'nın yatay olan en uç iki bölümü arasında kalan mesafe
Distal tibia uzunluğu (DU): Distal tibia'nın en uzun olacak şekilde iki uç bölümü arasında kalan mesafedir.
Tibia'nın extremitas proximalis'i ve extremitas distalis'ine ait genişlik değerleri (PG ve DG) ve tibia uzunluğu değerleri, proksimal uzunluk-kalınlık indeksi (PI) = (tibia proksimal genişliği/tibia uzunluğu) X 100 ile distal uzunluk-kalınlık indeksi (DI) = (tibia distal genişliği/tibia uzunluğu) X 100 formüllerinde yerine konularak her bir tibia için proksimal ve distal uzunluk-kalınlık indeks değeri hesaplandı.
Verilerin istatiksel analizi SPSS (Version 21.0, SPSS Inc., Chicago, ABD) kullanılarak gerçekleştirildi. Kolmogorov Smirnov testi ile verilerin dağılım paterni değerlendirildi. Sağ ve sol tibia'lara ait morfometrik ölçümlerin karşılaştırılmasında Student-t testi kullanıldı, $p<0.05$ istatiksel olarak anlamlı kabul edildi. Değişkenler arasındaki ilişkinin değerlendirilmesi amacıyla Pearson korelasyon testi uygulandı. Korelasyon katsayısının büyüklüğüne göre değişkenler arasındaki ilişki; 0.2-0.4 zayıf korelasyon, 0.4-0.6 orta derecede korelasyon, 0.6-0.8 yüksek korelasyon, 0.8-1 çok yüksek korelasyon, olarak değerlendirildi.
Kolmogorov Smirnov test sonuçlarına göre tibia'da gerçekleştirdiğimiz tüm morfometrik ölçümlerin normal dağılım gösterdiği tespit edildi ($p>0.05$). Dolayısıyla Tablo 1'de tüm değerler ortalama ve standart sapma (Ort±ss) değerleri ile ifade edildi.
Student-t testi ile karşılaştırılan sağ ve sol tarafa ait tibia morfometrik ölçümlerinin hiçbirinde anlamlı farklılık saptanmadı. Tablo 1'de yer alan istatiksel anlamlılık düzeyini ifade eden p değerleri incelendiğinde, en küçük p değerinin pilon mesafesinde tespit edildiği görülmektedir.

Tablo 1: Student-t testi bulguları

	Sağ Ort±ss	**Sol Ort±ss**	**p değeri**
TU	34.08±2.61	34.23±2.64	0.836
IFG	2.05±0.19	2.15±0.19	0.677
PM	3.62±0.36	3.72±0.28	0.078
MG	2.39±0.14	2.32±0.2	0.106
MU	1.44±0.13	1.47±0.13	0.884
IAG	2.75±0.26	2.72±0.26	0.676
IAU	2.88±0.3	2.93±0.26	0.480
PG	6.98±0.51	6.92±0.44	0.239
PU	4.54±0.41	4.46±0.37	0.425
DG	4.25±0.27	4.24±0.27	0.820
DU	3.69±0.29	3.58±0.26	0.380
PI	20.52±1.27	20.27±1.17	0.447
DI	12.49±0.6	12.44±0.77	0.301

Tablo 2'de morfometrik ölçümler arasında saptanan Pearson korelasyon katsayısı değerleri verilmiştir. Tibia'nın proksimal ve distal uzunluk ve genişlik değerleri arasında saptanan pozitif yüksek korelasyonlar ($p>0,6$) kemiğin proksimal ve distal uçlarının birbirleri ile orantılı şekilde geliştiğini göstermektedir. Nitekim proksimal ve distal uzunluk değerleri ile tibia uzunluğu arasında ve proksimal ve distal uzunluk-kalınlık indeks değerleri arasında da ($r=0,611$) pozitif yüksek korelasyon tespit edilmiştir. Facies articularis inferior'un mediolateral uzunluğu ile tibia proksimal ve distal genişlik ve uzunluk değerleri arasında orta ve yüksek derecede pozitif korelasyonlar bulunurken, FAI-APU'nun tibial uzunluk ve genişlik değerleri ile zayıf pozitif korelasyon göstermesi dikkat çekicidir. Benzer şekilde IFG ile de FAI-MLU arasında orta derecede pozitif korelasyon bulunurken, FAI-APU ile arasında korelasyon saptanmadı ($r<0.2$).

Tablo 2: Morfometrik ölçümler arasında saptanan Pearson korelasyon katsayısı (r) değerleri

Pearson korelasyon katsayısı (r)	TU	IFG	PM	MG	MU	FAI-APU	FAI-MLU	PG	PU	DG	DU	PI	DI
TU	1												
IFG	**0.525****	1											
PM	**0.555****	**0.575****	1										
MG	0.295*	0.059	0.135	1									
MU	0.216	0.202	0.236	0.380*	1								
FAI-APU	0.189	0.144	0.062	0.375*	0.391*	1							
FAI-MLU	**0.602****	**0.449****	**0.407****	**0.581****	**0.415****	0.366*	1						
PG	**0.672****	**0.548****	**0.700****	0242	**0.481****	0.269*	**0.535****	1					
PU	**0.705****	0.384*	**0.594****	0.298*	0.357*	0.087	**0.551****	**0.777****	1				
DG	**0.707****	**0.441****	**0.614****	0.333*	0.392*	0.325*	**0.574****	**0.699****	**0.708****	1			
DU	**0.664****	**0.517****	**0.629****	0.527**	0.358*	0.261*	**0.672****	**0.697****	**0.738****	**0.758****	1		
PI	**-0.512****	-0.049	0.124	-0.12	0.266*	0.047	-0.161	0.288*	-0.013	-0.098	-0.50	1	
DI	**-0.584****	-0.221*	-0.052	-0.053	0.128	0.085	-0.192	-0.133	-0.174	0.157	-0.058	**0.611****	1

Çalışmamızda incisura fibularis genişliği ve mediolateral yönlü bir ölçüm olan pilon mesafesi arasında da orta dereceli pozitif korelasyon (r=0,575) saptandı. Incisura fibularis genişliği tibia'nın distal genişlik ve uzunluk değerleri, proksimal genişlik değeri ile orta dereceli pozitif korelasyon, proksimal uzunluk değeri ile zayıf dereceli pozitif korelasyon göstermektedir. Malleolus medialis'in genişlik ve uzunluk değerlerinin de FAI-MLU ile orta derecede pozitif korelasyon gösterdiği ancak FAI-APU ile zayıf pozitif korele olduğu Tablo 2'de görülmektedir.

SONUÇ

Çalışmamızın bulguları, tibia distalinin morfometrik parametrelerini, değişkenlerin birbiri ile olan korelasyonlarını göstermektedir. Bu bulguların rekonstrüktif cerrahide, adli tıpta ve adli antropolojide özellikle tibia'dan boy tahmininde önemli ve yardımcı olabileceğini düşünüyoruz.

Cerrahi açıdan malleolus medialis hem arkasından geçen oluşumlar (musculus tibialis posterior, arteria ve vena tibialis posterior, nervus tibialis, musculus flexor hallucis longus, musculus flexor digitorum longus) hem de malleolus'a tutunan ligamentler (ligamentum deltoideum) itibariyle oldukça önemli bir anatomik yapıdır.

Ayak bileği ekleminin anatomik yapısına hâkim olunmasıyla ayak bileği ile ilgili patolojilerin ameliyat gerektirdiği durumlarda ameliyat öncesi ve sonrası müdahalesi ve muayenesi daha kolay yapılabilecektir. Literatürde malleolus medialis ve tibia distalinin morfometrisi hakkında sınırlı sayıda çalışma bulunmaktadır. Bu nedenle malleolus medialis ve tibia distalinin morfometrisini çalıştık. Bu çalışmamız ile ileride yapılacak olan çalışmalara katkı sağlayacağımızı umuyoruz.

KAYNAKÇA

Khurshid N, Afza R. Morphometric Study of Distal End of Tibia, with Special Emphasis of Morphometry of Fibular Incisura and Its Clinical Relevance. Global Journal for Research Analysis 2019;8(7):48-49.

Ülkir, M., Akdemir Aktaş, H., Yılmaz, M., & Günenç Beşer, C. (2024). The morphometry of distal tibia and posterior malleolus and its clinical implications in total ankle prosthesis. *Surgical and Radiologic Anatomy*, 1-9.

Gupta, C., Palimar, V., Nayak, N., Yadav, J. S., & Kalthur, S. G. (2017). A morphometric study of distal articulating surfaces of tibia and fibula in South Indian population with its clinical implications. *Int. J. Pharm. Sci. Rev. Res*, *42*(2), 36-38.

Misir, A., Uzun, E., & Tokmak, T. T. (2021). Morphology of the incisura fibularis in the Turkish population.

Elrod, C. S. (2013). Musculoskeletal System. *Acute Care Handbook for Physical Therapists*, 85.

Labbai, J., & Tapiyawala, K. (2019). Morphometric Analysis of Distal End of Dry Adult Human Fibulae. *Int J Cur Res Rev| Vol*, *11*(12), 7.

Uzuner, M. B., Sargon, M. F., Sancak, T., Demiryürek, D., Geneci, F., Ocak, M., & Bilecenoğlu, B. (2018). Radiographic Examination of Talocrural Joint Morphometry in Individuals with Normal Joint Anatomy. *Kafkas Journal of Medical Sciences, Kafkas Tip Bilimleri Dergisi*, *8*(3).

Akter, M., Ara, J. G., Nahar, L., Afreen, K. N., Zaman, F., & Sultana, P. Morphometric Study of Height of Medial Malleolus of Fully Ossified Dry Human Left Tibia.

Babacan, S., & Kafa, İ. M. (2020). Estimating the entire length of the fragmentary tibia with proximal and distal dimensions. *Antropoloji*, (40), 77-83.

Ugochukwu, E. G., Ugbem, L. P., Ijomone, O. M., & Ebi, O. T. (2016). Estimation of maximum tibia length from its measured anthropometric parameters in a Nigerian population. *Journal of Forensic Science and Medicine*, *2*(4), 222-228.

Xin, L., Liu, K., He, B., Chen, M., Tang, B., Tang, C., & Zhang, L. (2023). Morphological classification and clinical significance of medial malleolus based on computed tomography three-dimensional reconstruction. *Folia Morphologica*, *82*(1), 176-182.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

HEK 293 HÜCRELERİNE FARKLI DOZ VE SÜRELERDE UYGULANAN ÇİNKONUN HÜCRE CANLILIĞININ MTT VE XCELLigence YÖNTEMLERİYLE KARŞILAŞTIRILMASI

Dr. Öğr. Üyesi Sevil EROL
Beykent Üniversitesi, Meslek Yüksekokulu, Tıbbi Hizmetler ve Teknikler Bölümü
ORCID: 0000-0002-7711-2639

Prof. Dr. Semra ÖZDEMİR
İstanbul Üniversitesi-Cerrahpaşa, Cerrahpaşa Tıp Fakültesi, Biyofizik Anabilim Dalı
ORCID: 0000-0001-5262-3574

Arş. Gör. Dr. Bahar Öztürk KURT
İstanbul Üniversitesi-Cerrahpaşa, Cerrahpaşa Tıp Fakültesi, Biyofizik Anabilim Dalı
ORCID: 0000-0002-1171-002X

Dr. Öğr. Üyesi Bircan DİNÇ
Bahçeşehir Üniversitesi Tıp Fakültesi, Biyofizik Anabilim Dalı
ORCID: 0000-0002-9717-6410

ÖZET

Amaç: Klorpirifos tarımda, ormanda, bahçede ve evlerde zararlı böceklerle mücadelede yaygın olarak kullanılan organofosfatlı insektisittir. Organofosfatlı insektisitler, kansere, nörodejeneratif hastalıklara, üreme bozukluğuna ve organ fonksiyonlarının bozulmasına neden olurlar. Klorpirifos asetilkolinesterazın etkinliğini engelleyerek, kalp kasında, düz kasta, merkezi sinir sisteminde asetilkolin birikimine yol açar ve zehirlenmeye neden olur. Çinko canlılığın sürdürülmesinde, hücre bölünmesinde ve çoğalmasında, hücre farklılaşmasında, membran onarımında, apoptozun engellenmesinde ve hücrenin serbest radikallere karşı korunmasında büyük öneme sahiptir. Çalışmamız insan embriyonik böbrek hücresi olan HEK 293 hücre hattına klorpirifos ve çinkonun farkı doz ve sürelerde uygulanmasının hücre canlılığı üzerine etkilerinin MTT ve XCELLigence yöntemleriyle araştırılması ve karşılaştırılması üzerine planlanmıştır.

Gereç ve Yöntem: Kontrol, klorpirifos ve çinko grubu olmak üzere 3 grup ile yapılan çalışmada HEK 293 hücrelerinde klorpirifos ve çinkonun hücre canlılığı üzerine hangi dozlarda ve hangi sürelerde daha etkin olduğunu belirlemek amacıyla MTT ve xCELLigence analiz yöntemleri kullanılmıştır. Hücre kültürü ortamına 10, 30, 60 ve 90 µg/ml klorpirifos ve 25, 50, 75, 100 ve 150 µM çinko oksit (ZnO) eklenerek inkübasyon gerçekleştirilmiş ve hücre canlılığı analizleri yapılmıştır.

Bulgular: MTT analizine göre 30 µg/ml, 60 µg/ml ve 90 µg/ml klorpirifos uygulanan gruplarda 24, 48 ve 72 saatlik sürede hücre canlılığının kontrol grubuna göre, Çinko Oksitin kontrol grubunun absorbans değerinin ise 100 µM ve 150 µM uygulanan gruplara göre anlamlı olarak azaldığı belirlendi. HEK293 hücrelerinin 24 saatlik XCELLigence analiz sonuçlarına göre, 30 µg/ml ve 60 µg/ml klorpirifos uygulanan gruplarda hücre indeksinin 90 µg/ml uygulanan gruba göre anlamlı olarak yüksek olduğu belirlendi. HEK293 hücrelerinin 24 saatlik xCELLigence analiz sonuçlarına göre, 100 µM ve 150 µM Çinko Oksit uygulanan grubun hücre indeksinin kontrol grubuna göre anlamlı olarak düşük olduğu, 72 saatlik analiz sonuçlarına göre ise 100 ve 150 µM Çinko Oksit uygulanan grupların hücre indeksinin kontrol grubuna göre anlamlı olarak yüksek olduğu saptandı.

Sonuç: Klorpirifosun hücre canlılığı üzerinde özellikle yüksek dozlarda etkili olduğu ve canlılığı daha çok azalttığı görülmüştür. Çalışmamızda kullandığımız farklı iki analiz yöntemi olan MTT ve xCELLigence yöntemlerinin sonuçlarının birbirini destekler yönde hareket ettiğini ifade edebiliriz.
Anahtar Kelimeler: HEK-293, klorpirifos, çinko, MTT, XCELLigence, Hücre canlılığı analizi

COMPARISON OF CELL VIABILITY OF ZINC APPLIED TO HEK 293 CELLS IN DIFFERENT DOSES AND DURATIONS WITH MTT AND XCELLigence METHODS

ABSTRACT

Aim: Chlorpyrifos is an organophosphate insecticide widely used in agriculture, forests, gardens and homes to combat harmful insects. Organophosphate insecticides cause cancer, neurodegenerative diseases, reproductive disorders and organ dysfunction. Chlorpyrifos inhibits the activity of acetylcholinesterase, leading to acetylcholine accumulation in the heart muscle, smooth muscle and central nervous system, causing poisoning. Zinc is of great importance in maintaining vitality, cell division and proliferation, cell differentiation, membrane repair, prevention of apoptosis and protection of the cell against free radicals. Our study was planned to investigate and compare the effects of different doses and durations of chlorpyrifos and zinc on cell viability in the HEK 293 cell line, which is a human embryonic kidney cell, using MTT and XCELLigence methods.

Materials and Methods: In the study conducted with 3 groups as control, chlorpyrifos and zinc group, MTT and xCELLigence analysis methods were used to determine at which doses and for which periods chlorpyrifos and zinc were more effective on cell viability in HEK 293 cells. 10, 30, 60 and 90 µg/ml chlorpyrifos and 25, 50, 75, 100 and 150 µM zinc oxide (ZnO) were added to the cell culture medium and incubation was performed and cell viability analyses were performed.

Results: According to MTT analysis, it was determined that cell viability in 30 µg/ml, 60 µg/ml and 90 µg/ml chlorpyrifos applied groups decreased significantly compared to the control group at 24, 48 and 72 hours, while the absorbance value of the Zinc Oxide control group decreased significantly compared to the 100 µM and 150 µM applied groups. According to the 24-hour XCELLigence analysis results of HEK293 cells, it was determined that the cell index was significantly higher in 30 µg/ml and 60 µg/ml chlorpyrifos applied groups compared to the 90 µg/ml applied group. According to the 24-hour xCELLigence analysis results of HEK293 cells, the cell index of the 100 µM and 150 µM Zinc Oxide applied groups was significantly lower than the control group, and according to the 72-hour analysis results, the cell index of the 100 and 150 µM Zinc Oxide applied groups was significantly higher than the control group.

Conclusion: It was observed that chlorpyrifos was effective on cell viability especially at high doses and reduced viability more. We can say that the results of the two different analysis methods we used in our study, MTT and xCELLigence methods, supported each other.
Keywords: HEK-293, chlorpyrifos, zinc, MTT, XCELLigence, Cell viability analysis

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

AKCİĞER KANSERİNİN YAPAY ZEKA KULLANARAK VİSUAL STUDİO İLE TEŞHİSİ

Öğr. Gör. Dr. Firdevs Banu ÖZDEMİR
Kütahya Sağlık Bilimleri Üniversitesi, Simav SHMYO, Optisyenlik
ORCID: 0000-0002-7935-2062

Öğr. Gör. Mehmet Üsame KARAOSMAN
Kütahya Sağlık Bilimleri Üniversitesi, Simav SHMYO, Tıbbi Görüntüleme Teknikleri
ORCID: 0000-0002-8786-8317

ÖZET
Akciğer kanseri, akciğerlerdeki hücrelerin kontrolsüz bir şekilde büyüyüp mutasyon geçirmesi ile oluşan kanser türüdür. Dünya genelinde çok sayıda ölüme sebep olan kanser türlerinden biridir. Dünya sağlık örgütünün (WHO) 2020 yılında yaptığı çalışmada ölüm oranı ve kansere yakalanma sıklığı tahminlerine bakıldığında dünya çapında kadınlarda akciğer kanserine yakalanma oranı 3. sırada iken erkeklerde ilk sıradadır. 2020'de dünya genelinde iki milyon iki yüz bin yeni vaka teşhis edilmiş ve 20 yıllık ölçekte bakıldığında 2040 yılına kadar 28,9 milyon akciğer kanseri vakasının ortaya çıkacağı tahmin edilmektedir. Akciğer kanseri teşhisinde radyografi, Pozitron Emisyon Tomografisi (PET-BT ve bilgisayarlı tomografi (BT) görüntüleri kullanılmaktadır. Akciğer kanseri teşhisinde kullanılan PET ve BT güvenirliliği daha fazla olan yöntemler olmakla birlikte akciğer grafisine kıyasla daha maliyetlidir. Maliyet arttığı için orta ve alt gelir grubundaki ülkelerde BT ve PET-BT çekim sayısı daha azdır. Bu sebeple hekim teşhis koyarken yanılabilir aynı zamanda hekimlerin birbirinden farklı teşhis koymaları sebebi ile kanser tespiti gecikebilir veya yapılamayabilir. Bu durumların önüne geçmek için tek çekim bilgisayarlı akciğer tomografi görüntüsü ile teşhis yapılması amaçlanmaktadır. Bu çalışmada yapay zekâ destekli visual studio programı kullanılarak bilgisatar destekli akciğer kanseri teşhisi yapılması hedeflenmiştir. Visual studio programında ML Modül kullanılarak sınıflandırma yapılmıştır. Sistemi eğitmek için kanser arşiv merkezinden alınan 1500 adet sağlıklı ve 1500 adet akciğer kanseri tanısı konmuş bilgisayar tomografi görüntüleri kullanılmıştır. Sonrasında test aşamasında 150 adet akciğer kanseri tanısı konmuş bilgisayar tomografi görüntülerinden yararlanılmıştır. Test aşaması sonucunda sistem 139 görüntüyü doğru teşhis etmiştir. Sistemin doğruluk oranı %92,6 olarak tespit edilmiştir. Bu bilgisayar destekli teşhis programı hekimlere akciğer kanseri teşhisi koymalarında yardımcı olması için tasarlanmıştır. Yukarıdaki dezavantajlı durumların önüne geçilmesi hedeflenmiştir.
Anahtar Kelimeler: Görüntü işleme, Yapay zekâ, Akciğer Kanseri

DIAGNOSIS OF LUNG CANCER WITH VISUAL STUDIO USING ARTIFICIAL INTELLIGENCE

Abstract
Lung cancer is a type of cancer that occurs when cells in the lungs grow and mutate uncontrollably. It is one of the cancers that cause many deaths worldwide. According to the World Health Organization (WHO)'s 2020 study, when we look at the mortality rate and cancer incidence estimates, the lung cancer incidence rate in women ranks third worldwide, while it ranks first in men.

In 2020, two million two hundred thousand new cases were diagnosed worldwide, and when looked at on a 20-year scale, it is estimated that 28.9 million lung cancer cases will occur by 2040. Radiography, Positron Emission Tomography (PET-CT) and computerized tomography (CT) images are used in lung cancer diagnosis. Although PET and CT used in lung cancer diagnosis are more reliable methods, they are more costly compared to chest radiography. Since the cost increases, the number of CT and PET-CT scans is lower in middle and low-income countries. For this reason, doctors may make mistakes while making a diagnosis, and cancer detection may be delayed or not made due to doctors making different diagnoses. In order to prevent these situations, it is aimed to make a diagnosis with a single-shot computerized lung tomography image. In this study, it is aimed to make a computer-aided lung cancer diagnosis using the artificial intelligence-supported Visual Studio program. Classification was made using the ML Module in the Visual Studio program. 1500 healthy and 1500 lung cancer diagnosed computerized tomography images taken from the cancer archive center were used to train the system. Then, 150 lung cancer diagnosed computerized tomography images were used in the test phase. As a result of the test phase, the system correctly diagnosed 139 images. The accuracy rate of the system was determined as 92.6%. This computer-aided diagnostic program was designed to assist physicians in diagnosing lung cancer. It is aimed to prevent the above disadvantages.
Keywords: Image processing, Artificial intelligence, Lung Cancer

1. GİRİŞ

Kapsamlı özelliklere sahip olan Visual Studio, hem akademik çalışmalarda hem de pratik uygulamalarda büyük bir etkiye sahiptir. C#, VB.NET, F#, C++, Python, JavaScript, TypeScript, HTML, CSS ve daha birçok programlama dilleri tarafından desteklenen Visual Studio, Microsoft tarafından sağlanan ve güncelleştirilen bir entegre geliştirme ortamıdır (IDE). Web, yazılım ve mobil uygulamalar vb. birçok alanda kullanılmaktadır. Visual studio da kod yazma zamanını hızlandıran ve hata yapma olasılığını düşüren IntelliSence ismi verilen bir kod düzenleyici mevcuttur. Bu kod düzenleyicinin yanısıra kod çalıştırırken kodu takip ederek hata noktalarını belirleyen hata ayıklama (Debugging), Git ve diğer versiyon kontrol sistemleriyle entegre çalışabilen Entegre Araçlar ve Uzantılar ve Microsoft Azure ile derin entegrasyona sahiptir. Visual Studio, veri bilimi, biyomedikal mühendislik ve yapay zekâ gibi uygulamalarda kullanılmaktadır. Visual Studio, OpenCV, SimpleITK gibi tıbbi görüntüleme kütüphaneleri ile birlikte çalışarak tıbbi görüntülerin analizi ve işlenmesinde akciğer kanseri teşhisi gibi hastalıklar için radyoloji görüntülerinin analizinde kullanılabilir (Thanoon ve ark. 2023). Geçmeyen öksürük, göğüs ağrısı ve nefes darlığı gibi belirtilere sahip akciğer kanseri, hücrelerin kontrolsüz bir şekilde çoğalması ve büyümesiyle başlayan ciddi zararlara ve ölüme neden olabilen bir kanser türüdür. Akciğer kanseri, dünya genelinde hem erkekler hem de kadınlar arasında kanserden ölümlerin başlıca nedeni olup, en yüksek ölüm oranına sahiptir. Akciğer kanseri çoğunlukla tedavi seçeneklerinin sınırlı olduğu ileri evrelerde tespit edilir. Yüksek riskli bireylerin taranması, erken teşhise olanak tanıyarak sağ kalım oranlarını önemli ölçüde artırabilir (WHO, 2011). Akciğer kanserini erken teşhis, tedaviden alınacak pozitif sonucu artırabilir. Yapay zekâ, bilgisayarlı tomografi (BT) ve manyetik rezonans görüntüleme (MRG), radyografi gibi tıbbi görüntüleme sonuçlarını analiz ederek, doktora hem daha hızlı hem de hata yapma olasılığı daha düşük bir şekilde teşhis koymada kolaylık sağlamaktadır. Derin öğrenme modellerini kullanan yapay zaka algoritmaları ile oluşturulan bilgisayar destekli teşhis (BDT) programlarında akciğer lezyonları teşhis edilebilir ve hekimlerin erken evrede hastaya tedavi uygulaması sağlanabilir (Ardilla ve ark., 2018).

2. ARAŞTIRMA VE BULGULAR

2.1 Akciğer Kanseri Teşhisinde Kullanılan Teknolojiler

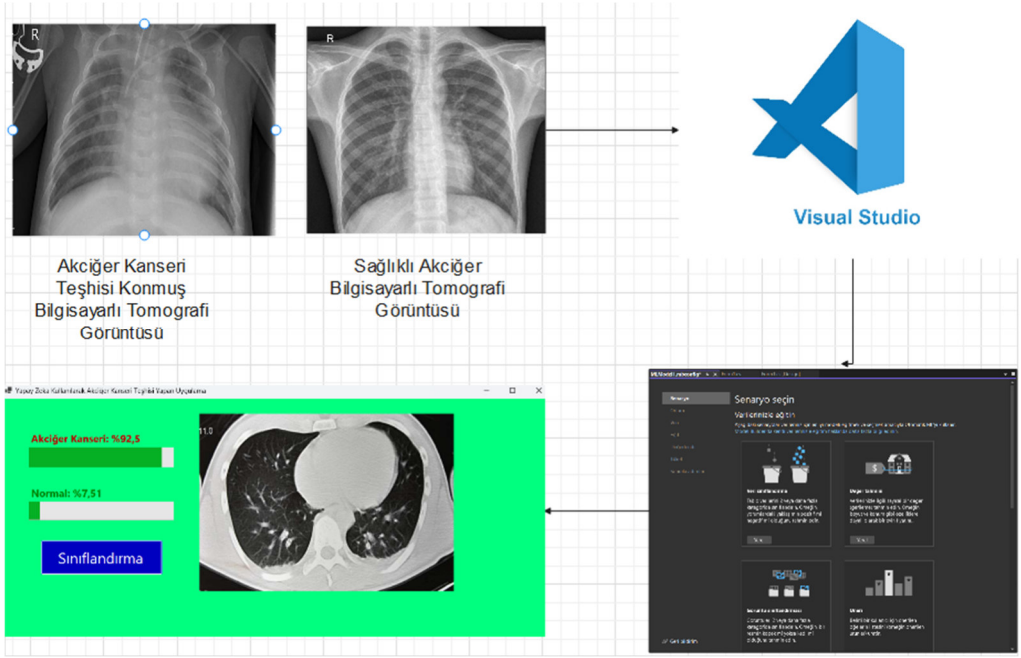
Akciğer kanseri teşhsisinde akciğer grafisi, bilgisayarlı tomografi (BT), pozitron emisyon tomografi (PET) ve manyetik rezonanas (MR) gibi radyolojik teşhis araçları ile beraber balgam incelenmesi, bronkoskopi ve akciğer doku biyopsiside kullanılmaktadır (Nooreldeen ve Bach, 2021). ROS1, EGFR, ALK, gibi moleküler genetik testler gen mutasyonlarını belirleme amacıyla kullanılmakta ve hedefe yönelik tedavi planı oluşturmada yardımcı olmaktadır (Lindeman ve ark., 2013). Göğüs radyografisi kullanılarak akciğer kanseri teşhisinde, tümör tespiti için duyarlılık yaklaşık 1 cm çapındadır. BT, periferik akciğer lezyonlarını tespit etmede düz radyografiden veya tüm akciğerin konvansiyonel tomografisinden daha etkilidir (Sobue ve ark., 2002). BT, yüksek çözünürlüklü kesitsel görüntü sağlayarak tümörlerin şeklini, boyutunu ve yerleşimini belirlemede kullanılan etkili bir yöntemdir (National Lung Screening Trial Research Team, 2011). PET, özellikle kanserli hücrelerdeki metabolik aktiviteyi değerlendirme amacıyla kullanılmaktadır. Kanserli hücreler, normal hücrelere kıyasla daha fazla glukoz tüketimine sahip olduğu için PET taramaları ile bu fark tespit edilebilmektedir (Fischer ve ark., 2009). MR, nadirende olsa akciğer kanserinin teşhisinde kullanılmaktadır. Yumuşak doku veya nörolojik yapıların incelenmesi amacıyla tercih edilebilmektedir (Ohno ve ark., 2008). Göğüs röntgeni, akciğer kanseri taramalarında genellikle ilk adım olarak kullanılır ancak erken evre tümörleri saptamada sınırlı kalabilir. Göğüs röntgeni sadece erken evredeki tümörleri saptama amacıyla kullanılmakta ve akciğer kanser taramasında ilk adım olarak tercih edilmektedir (Bach ve ark., 2007).

Zhang ve arkadaşları, akciğer nodüllerini kategorize etmek ve tanımak amacıyla üç modüle sahip üç boyutlu bir evrişimsel sinir ağı (CNN) oluşturmuşlardır. Bu yöntemin %84,4'lük bir duyarlılık oranı ile manuel olarak yapılan teşhis koyma performansını geride bıraktığını tespit etmişlerdir (Zhang ve ark.,2019). Nasser ve Abu-Naser, yapay sinir ağı (YSA) kullanarak %96,67'lik bir doğrulukla akciğer kanseri tespit eden bir sistem geliştirmişlerdir (Nasser ve Abu-Nasser, 2019). Jakimovski ve Davcev ise BT görüntülerini kullanarak akciğer nodüllerini sınıflandırmak ve tanımak amacıyla çift evrişimli derin sinir ağı (CDNN) ve geleneksel bir CDNN ile bir sistem tasarlamışlardır. Geliştirdikleri CDNN'in doğruluk performansı %90,9 ve geleneksel CDNN'in doğruluk performansını ise %87,2 olarak tespit etmişlerdir (Jakimovski ve Davcev, 2019). Jin ve arkadaşları, BT taramalarında akciğer nodüllerini otomatik olarak tespit etmek amacıyla yanlış pozitifleri azaltmaya odaklanan derin bir 3B kalıntı evrişim sinir ağı geliştirmişler ve %98,3'lük duyarlılık oranı elde etmişlerdir (Jin ve ark., 2018).

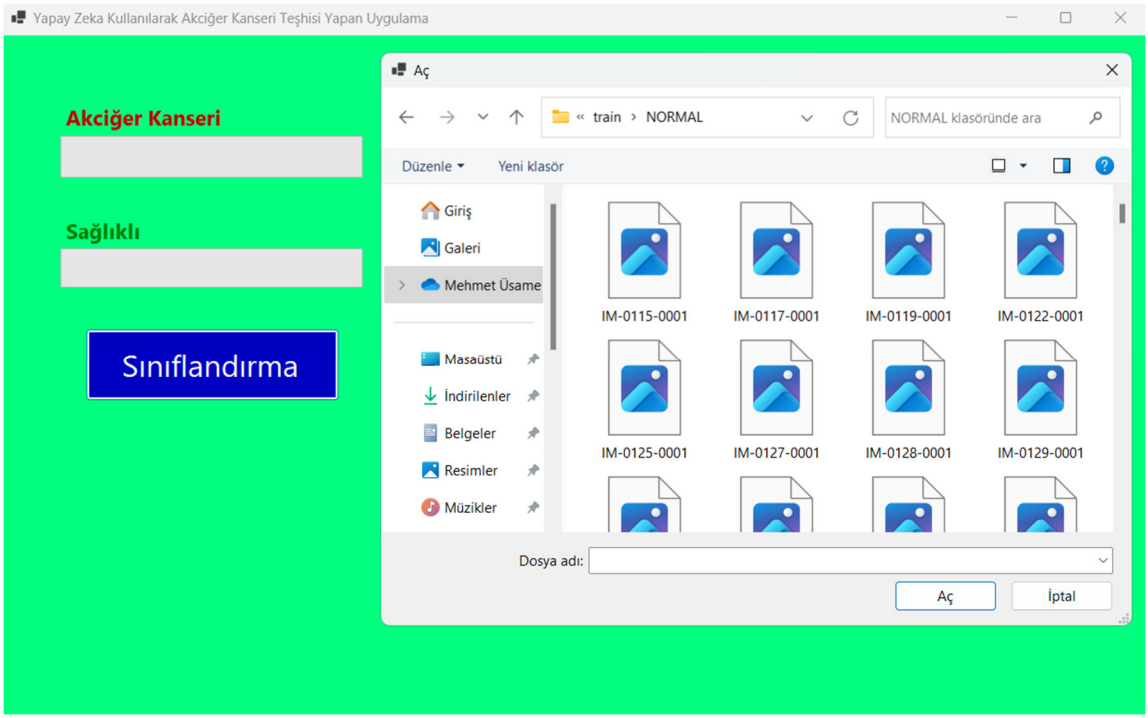
2.2 Sistem Tasarımı

Bu çalışma Visual Studio programında gerçekleştirilmiştir (Şekil 1). Makine öğrenmesi kullanmak amacıyla Visual Studio programında ML model eklentisi ile çalışılmıştır. ML.NET bir makine öğrenmesi modelidir. ML.NET gerçekleştirilen uygulamada kullanılan verileri işleyerek otomatik olarak tahmin yapılabilen bir eklentidir. Model, girişteki verileri öngörü haline getirmek amacıyla gereken adımları belirtmektedir. 1500 adet sağlıklı ve 1500 adet akciğer kanseri teşhisli BT görüntüsü sınıflandırma amacı ile ML Modele eklenmiştir. BT görüntülerinin programa eklenebilmesi ve eklenmiş BT görüntülerinin teşhisi için "Sınıflandırma" butonu kullanılmaktadır. BT görüntülerini bilgisayardan çekebilmek için Sınıflandırma butonuna basılması yeterli olacaktır (Şekil 2). Görüntü bilgisayardan seçildikten sonra BT görüntüsünün sağlıklı veya akciğer kanserli bireye ait olduğu yüzdesel olarak program tarafından tespit edilecektir (Şekil 3).

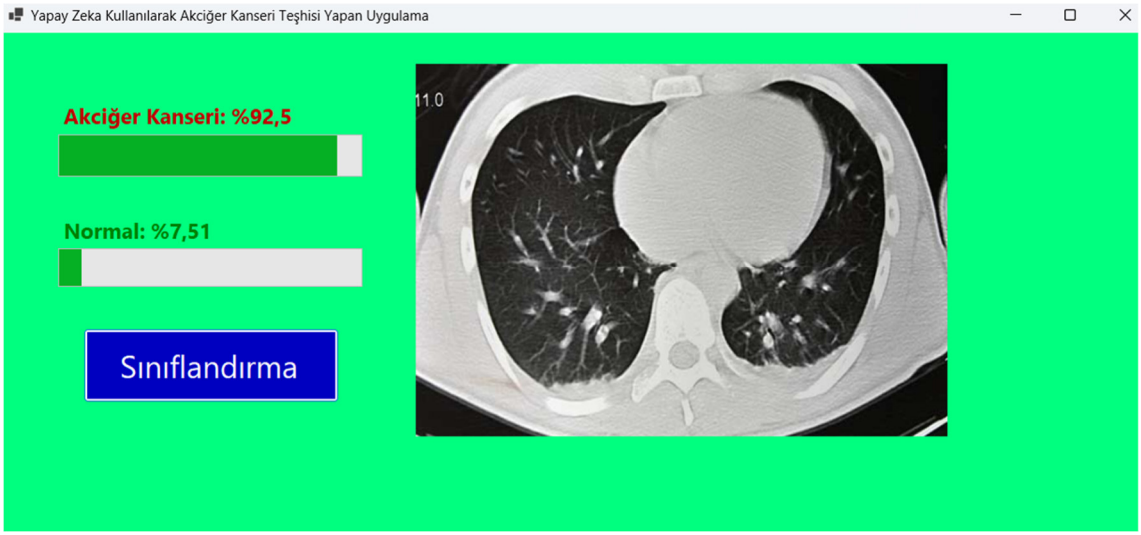
Ekranda seçilmiş olan BT görüntüsü görülebilmektedir. Oluşturmuş olduğumuz BDT uygulamasının algoritma şeması Şekil 4'de görülmektedir.



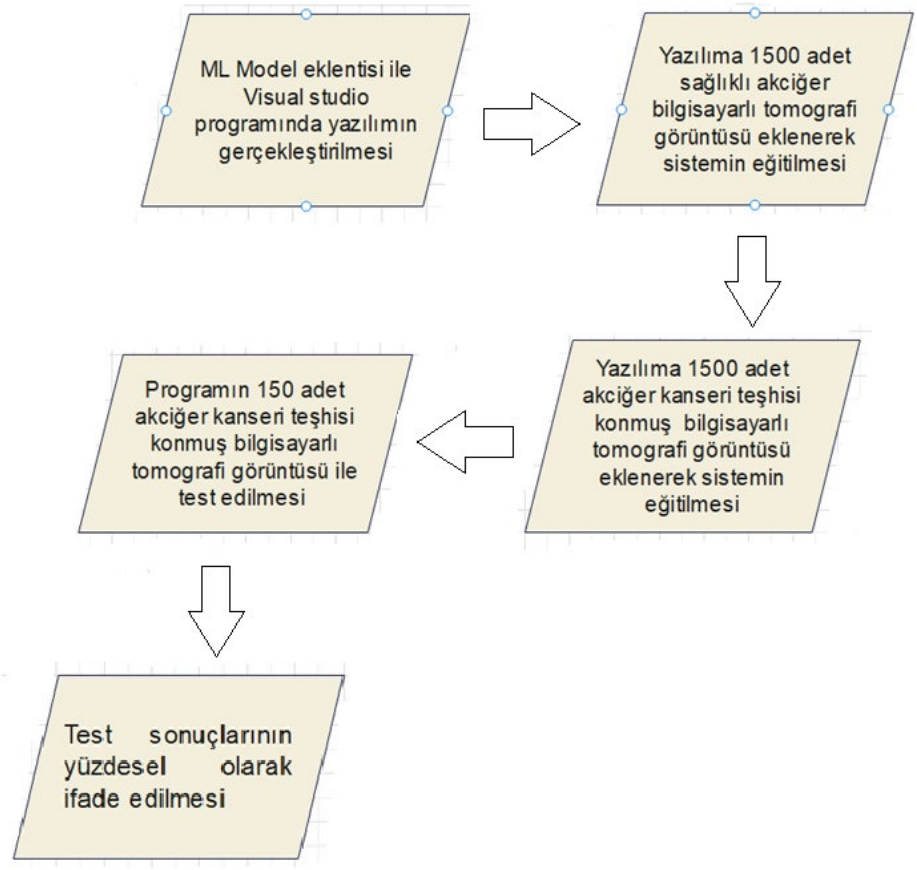
Şekil 1. Yapay zeka kullanılarak Visual studio'da akciğer kanser teşhisi yapan uygulama görseli



Şekil 2. Bilgisayarlı tomografi görüntüsü seçme



Şekil 3. Sonuç Ekranı



Şekil 4. Akciğer kanseri teşhisi yapan uygulamanın akış diyagramı

3. SONUÇ VE TARTIŞMA

Akciğer kanseri dünya genelinde kanser hastalıklarına yakalanmada 3. sırada, kanserden ölüm oranında ise ilk sırada yer almaktadır. Teşhisi çoğunlukla son evrelerde yapılabilmektedir. Bilgisayar destekli teşhis programları 1960lı yıllardan beri kullanılmakta ve ilk olarak tıbbi görüntüleme alanında kullanılmıştır.

Akciğer kanserinin geç teşhis edilmesi ve dünya genelinde çok sık görülmesi bizi hekimlere teşhis koymada yardımcı bir program yapmaya yönlendirmiştir. Programı eğitmek amacıyla 1500 adet sağlıklı ve 1500 adet de akciğer kanser teşhisi konmuş BT görüntüsü olmak üzere toplamda 3000 adet akciğer BT görüntüsü kullanılmıştır. Programın test edilmesi amacıyla 150 adet akciğer kanseri teşhisi konmuş BT görüntüsü kullanılmıştır. Program 139 görüntünün akciğer kanserli bir bireye ait olduğunu doğru bir şekilde tespit etmiştir ve 11 adet görüntüyü tespit edememiştir. Bu bilgilere dayanarak programın doğruluğu %92,6 olarak bulunmuştur. Bu çalışma hekimlerin akciğer kanseri teşhisinde daha doğru ve hızlı karar vermelerine yardımcı olacaktır. Bundan önceki çalışmamızda pnömoni teşhisi için bilgisayar destekli teşhis programı gerçekleştirilmiştir. Gelecek çalışmalarımızda KOAH veya diğer kanser çeşitleri ile ilgili çalışmalarımız devam edecektir.

KAYNAKÇA

Ardila, D., Kiraly, A. P., Bharadwaj, S., Choi, B., Reicher, J. J., Peng, L., ... & Shetty, S. (2019). End-to-end lung cancer screening with three-dimensional deep learning on low-dose chest computed tomography. *Nature medicine*, *25*(6), 954-961.

Bach, P. B., Jett, J. R., Pastorino, U., Tockman, M. S., Swensen, S. J., & Begg, C. B. (2007). Computed tomography screening and lung cancer outcomes. Jama, 297(9), 953-961.

Fischer, B., Lassen, U., Mortensen, J., Larsen, S., Loft, A., Bertelsen, A., ... & Højgaard, L. (2009). Preoperative staging of lung cancer with combined PET–CT. *New England Journal of Medicine*, *361*(1), 32-39.

Jakimovski, G., & Davcev, D. (2019). Using double convolution neural network for lung cancer stage detection. *Applied Sciences*, *9*(3), 427.

Jin, H., Li, Z., Tong, R., & Lin, L. (2018). A deep 3D residual CNN for false-positive reduction in pulmonary nodule detection. *Medical physics*, *45*(5), 2097-2107.

Lindeman, N. I., Cagle, P. T., Beasley, M. B., Chitale, D. A., Dacic, S., Giaccone, G., ... & Ladanyi, M. (2013). Molecular testing guideline for selection of lung cancer patients for EGFR and ALK tyrosine kinase inhibitors: guideline from the College of American Pathologists, International Association for the Study of Lung Cancer, and Association for Molecular Pathology. Journal of Thoracic Oncology, 8(7), 823-859.

Nasser, I. M., & Abu-Naser, S. S. (2019). Lung cancer detection using artificial neural network. *International Journal of Engineering and Information Systems (IJEAIS)*, *3*(3), 17-23.

National Lung Screening Trial Research Team. (2011). Reduced lung-cancer mortality with low-dose computed tomographic screening. New England Journal of Medicine, 365(5), 395-409.

Nooreldeen, R., & Bach, H. (2021). Current and future development in lung cancer diagnosis. International journal of molecular sciences, 22(16), 8661.

Ohno, Y., Koyama, H., Onishi, Y., Takenaka, D., Nogami, M., Yoshikawa, T., ... & Sugimura, K. (2008). Non–small cell lung cancer: whole-body MR examination for M-stage assessment—utility for whole-body diffusion-weighted imaging compared with integrated FDG PET/CT. Radiology, 248(2), 643-654.

Sobue, T., Moriyama, N., Kaneko, M., Kusumoto, M., Kobayashi, T., Tsuchiya, R., ... & Eguchi, K. (2002). Screening for lung cancer with low-dose helical computed tomography: anti-lung cancer association project. *Journal of clinical oncology*, *20*(4), 911-920.

Thanoon, M. A., Zulkifley, M. A., Mohd Zainuri, M. A. A., & Abdani, S. R. (2023). A review of deep learning techniques for lung cancer screening and diagnosis based on CT images. Diagnostics, 13(16), 2617.

WHO, 2011. Lung cancer. National Institute Cancer.Available at http://www.cancer.gov/cancertopics/types/lung. Accessed October.

Zhang, C., Sun, X., Dang, K., Li, K., Guo, X. W., Chang, J., ... & Zhong, W. Z. (2019). Toward an expert level of lung cancer detection and classification using a deep convolutional neural network. *The oncologist*, *24*(9), 1159-1165.

YENİ NESİL BULAŞIK MAKİNESİ KAPSÜL DETERJAN ÜRÜN GELİŞTİRİLMESİ

Orkan AKKOYUN
Viking Temizlik ve Kozmetik Paz.San.Tic.A.Ş,
ORCID: 0009-0009-5588-656X

Aylin RAZLIKLI
Viking Temizlik ve Kozmetik Paz.San.Tic.A.Ş,
ORCID: 0000-0002-1981-9812

Berkay ŞERAN
Viking Temizlik ve Kozmetik Paz.San.Tic.A.Ş,
ORCID: 0009-0007-8353-6124

Çetin TÖREMEN
Viking Temizlik ve Kozmetik Paz.San.Tic.A.Ş,
ORCID: 0009-0008-5920-6325

ÖZET
Temizlik ürünleri içerisinde önemli bir paya sahip olan bulaşık deterjanları, teknolojinin gelişmesi ve fonksiyonel hammaddelerin sentezlenerek piyasaya kazandırılması ile zengin bir temizlik ürün grubu haline gelmiştir. Deterjan içeriklerinin firmalar tarafından her geçen gün daha fazla geliştirilmesi, etkin ve fonksiyonel temizlik ürünlerinin tüketicilere alternatif olarak sunulabilmesini de beraberinde getirmiştir. Geliştirilen formülasyonlarla sektörel çeşitlilik sağlansa da bir süre sonra artan çevre problemleri ve yaşanan su kıtlığı sebebiyle sektörü daha yenilikçi ve çevreci bir yola itmiştir. Otomatik bulaşık makinelerinde kullanılan deterjanlar için en pratik seçenekler yeni nesil kapsül deterjanlar ve tablet deterjanlardır. Son yıllarda, bulaşık makinesi için kullanım trendi artan kapsül ürünlerinin hem az miktarda deterjan içermesi hem de etkili temizlik açısından ön plana çıktığı gözlemlenmektedir. Tüketici açısından kullanım kolaylığı sağlayan bu deterjan formları tüm dünyada daha fazla ilgi görmektedir. Dolayısıyla sektördeki firmalar kapsül ve tablet deterjan formlarını daha fazla geliştirmek için araştırmalar yapmaya devam etmektedir. Bulaşık makinesi kapsülleri genel olarak temizlik kimyasallarından oluşan ve suda çözünen petrokimyasal bir film kaplamasıyla paketlenen ürünlerdir. Bu çalışmanın amacı; çevre dostu yeni nesil bulaşık makinesi kapsül deterjanı geliştirmektir. Bu kapsamda 4 ortaklı bir çalışma gerçekleştirilmiştir. Yüksek oranda doğal hammaddeler kullanılarak formülasyonlar oluşturulmuştur. Ürün içeriğinde bakteriyel kaynaklı yüzey aktif maddeler ve nişasta bazlı kaplama materyali kullanılmıştır. Hazırlanan formülasyonlar IKW test metodu kullanılarak performans testleri gerçekleştirilmiştir.
Anahtar Kelimeler: Bakteri, Bulaşık Makinesi, Kapsül Deterjan, Nişasta, Yüzey Aktif Madde

NEW GENERATION DISHWASHER CAPSULE DETERGENT PRODUCT DEVELOPMENT

ABSTRACT
Dishwashing detergents, which have an important share in cleaning products, have become a rich cleaning product group with the development of technology and the synthesis of functional raw materials.

The daily development of detergent ingredients by companies has enabled companies to offer effective and functional cleaning products to consumers as alternatives. Although sectoral diversity is provided by the formulations developed, increasing environmental problems and water scarcity have pushed the sector to a more innovative and environmentally friendly path. The most practical detergent options for automatic dishwashers are new-generation capsule detergents and tablet detergents. In recent years, capsule products, which have increased the trend of using dishwashers, have come to the forefront in terms of containing a small amount of detergent and effective cleaning. These detergent forms, which provide ease of use for consumers worldwide, have attracted increasing attention. Therefore, companies in the sector continue to conduct research to further develop capsule and tablet detergent forms. Dishwasher capsules are generally composed of cleaning chemicals and packaged with a water-soluble petrochemical film coating. The aim of this study is to develop a new generation of environmentally friendly dishwasher capsule detergents. In this context, a 4-partner study was conducted. Formulas were prepared using high proportions of natural raw materials. Bacterial surfactants and starch-based coating materials were used in the product content. Performance tests were performed using the IKW test.
Keywords: Bacteria, Capsule Detergent, Dishwasher, Starch, Surfactant

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

THE EFFECT OF DISTANCE BETWEEN SPINNERET – LUBRICATION POINT ON VARIOUS PROPERTIES OF POLYESTER FILAMENTS

Alper USALP
Gaziantep University, Engineering Faculty, Textile Engineering Department
ORCID: 0009-0000-3075-1428

ABSTRACT
Polyester (PET) is produced as chips , filament or fiber from the reaction of PTA and MEG. The chips produced are available in two different viscosities: bottle and textile grade Textile grade is produced as fiber or filament in the market. Melt spinning is the process of melting chips, cooling and drawing filaments after the drying process and then winding them on the bobbin. During the melt spinning process the transformation of the amorphous structure into a crystalline structure is called crystallization. It is the chain structure arrangement of polymers that determines the physical and mechanical properties in the polyester melt spinning process. This sequence determines glass transition (Tg) and melting (Tm) temperatures by creating amorphous and crystalline regions. There are parameters that determine the amount or size of crystallites. Parameters such as draft, temperature, cooling rate and amount, and winding speed can be intervened during filament production. In this study, the fiber samples were obtained by producing 480 denier 144 filament additive-free and colorless circular cross-section POY from IV (intrinsic viscosity) values of 0.640-0.645 polyester chips. While all parameters were constant, eight samples were taken in which only the lubrication-spinneret distance was changed. In this filament production, it was examined at which temperature value or at which distance from the spinneret the filaments would absorb more oil, depending on the amount of amorphous structure. Oil absorption was provided to each sample from the lubrication unit at distances from 800mm to 1150 mm from the spinneret. Oil analysis and DSC analysis were performed by taking samples from all points. Oil analysis, DSC analysis, elongation and strength tests were performed by taking samples from all points. The analysis and test results were interpreted with the graphs created, and the closest distance to the glass transition temperature was determined.
Keywords: Polyester, melt spinning, lubrication distance

INTRODUCTION
Polyethylene terephthalate (PET, Polyester) is a linear polyester consisting of organic compounds of repeating ester groups (–COO–). The PET textiles made possible the increasingly wider applications of synthetic fibers due to the outstanding physical and chemical characteristics which polyester fibers possess in comparison with natural and synthetic fibers; such as, excellent dimensional stability and sturdiness, a high degree of crease resistance, good bulk elasticity, and warm handle. Further PET characteristics such as great stability of thermoset creases, a high degree of light and heat resistance, and durability of polyester textiles, due to their great fiber strength and elongation, are also very good[1].
Polyester has been the subject of R&D studies by manufacturers to improve features such as performance, insulation, comfort and appearance in the products in which it is used. Many products have been developed with changes made to the parameters in the production machines. Depending on these parameters, the amorphous and crystalline regions in the structure of the filaments, their ratio, and the size of the crystallites can be controlled.

However, the amount of brightness, absorption, strength, elongation, elasticity, softness and shrinkage in the yarn could be changed. Crystallization has been investigated many times by researches [2, 3,4, 5, 6,7]
Spinning speed and spinning temperatures increase the density, birefringence, crystal size ,crystal and amorphous orientation factors, thus to increase the spinning temperature improved the amorphous orientation and decreased the crystal size. [8]
Dye uptake of the yarn is important for the brightness and fastness of the color on textile products. Various studies have examined how dye absorption rates change with the polymer structure changing depending on the parameters. Dye uptake and the rate of diffusion of dye depend on the structure of polymer such as crystallinity and degree of molecular orientation [9]. The dye uptake behavior of PET increase with the annealing. This related to structure such as micro voids was formed by highly increased free volume under annealing conditions. [10]
In this study the samples were produced to determine the region where liquid absorption would be highest in the filament yarn production line. At the same time, various tests were performed on these samples and the results were compared.

MATERIALS AND METHOD

The yarn samples used in this study were produced by MSG İplik (Gaziantep / Turkiye) The intrinsic viscosity (IV) of the raw material used was of 0,655±0,012 , and color was raw white.
In trial production, a POY production machine with 2 positions and 10 ends in each position was used. 480 denier 144 filament delta cross section shaped samples were taken with the same properties as the yarns produced in the carpet manufacturing. Only the lubrication level has been changed at this study.
There are parameters that determine the physical properties in polyester yarn production, only the lubrication level of these parameters has been changed and all other parameters are kept constant. Properties such as strength, elongation, flexibility, shrinkage and permeability vary depending on the lubrication distance. These properties are related to the orientation of the polyester. For example, increasing the draft rate increases the amount of orientation, which results in increased strength and decreased elongation. The parameters affecting the above-mentioned features are given in the Table 1.

Table 1. The parameters affecting fiber properties

Crystallizing and drying temperature
Extruder pressure and temperature
Quench speed and temperature
Oiling level
Godets speeds
Winding speed

The spin finish oil used in this study was TAKEMOTO brand. The oil mix was prepared as 13% oil and 87% pure water. Spin finish oils used in filament production are applied in the drafting and winding areas of the filaments to reduce the friction force and reduce thread breaks when they come into contact with the metal and ceramic parts in the texturing or twisting machines where they will be processed further. Applying too much or too little spin finish oil can cause problems in all processes. Therefore, the amount of oil is constantly measured (according to ASTMD2257 standards).

In this study, samples were taken from certain distances to determine the amount of oil adhering to the yarn according to different nozzle distances. In addition, DSC (according to ASTM D3418 standard), strength (according to ASTM D2256 standards) and elongation (according to ASTM D2256 standards) tests were also performed on these samples. Samples taken according to distance and test results are given in the Table 2.

Table 2. Process parameters involved

Distance(mm)	Oil pickup(%)	Tc(°C)	Tm(°C)	Elongation(%)	Strength(Cn/dtex)
800	0,315	217	257	126,41	880,46
850	0,317	216	249	128,8	915,72
900	0,322	216	259	132,4	938,47
950	0,312	217	250	126,1	896,54
1000	0,315	217	250	131,55	947,19
1050	0,319	217	251	126,82	928,23
1100	0,324	215	256	131,86	959,46
1150	0,331			127,12	925,58

RESULTS

Oil Pick Up

Oil test results of 480 denier 144 filament raw white polyester POY are as shown in the Figure 1. The obtained sample tests were carried out on the Oxford MQC-23 device.

In the measurements made on the 480 denier/144 filament yarn starting from 800 mm away from the spinneret and up to 1150 mm, it was observed that the amount of oil in the yarn increased as it moved away from the spinneret. Oil absorption may vary with the speed of the oil pump, filament cross-section shape, number of filaments, surface area of the filaments and speed of the filaments. All of these variables were kept constant in this study. Absorption value in filament is directly proportional to crystallinity [11]. In general, the orientation from the lowest distance to the highest distance continued, crystallinity increased and as a result oil absorption increased. However, a decrease in oil uptake was observed at a distance of between 900mm and 950 mm.

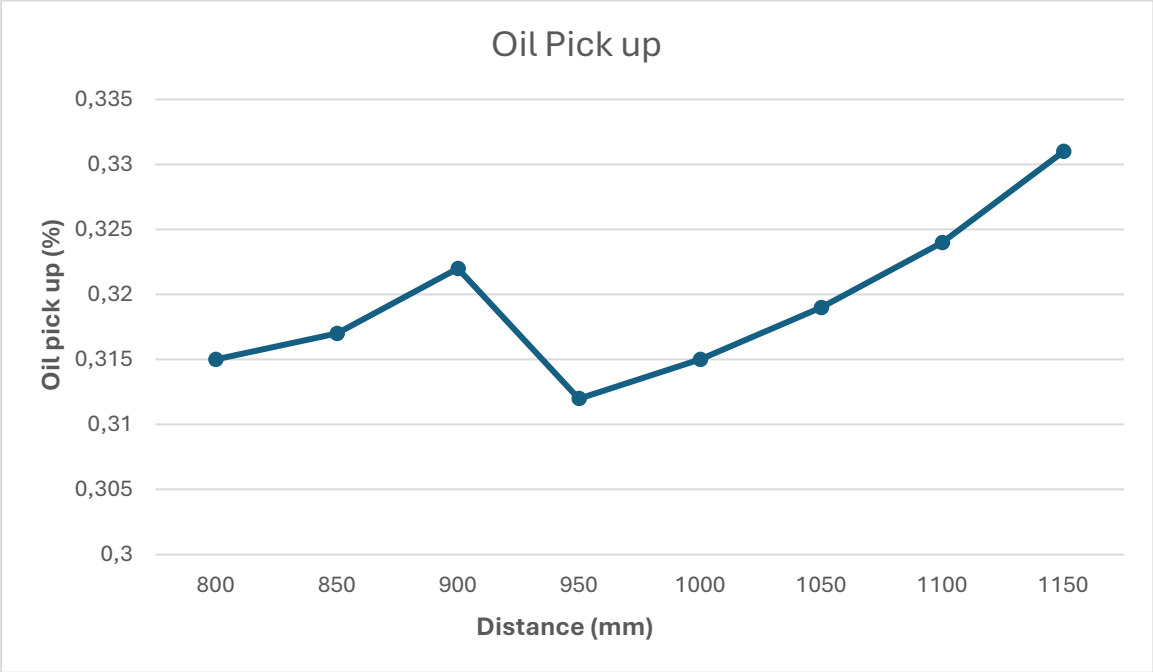


Figure 1. The oil pick up versus lubrication distance

DSC Analysis

DSC analysis measures the amount of latent energy absorbed or released while the sample is heated, cooled, or kept at a constant temperature. The analysis results for crystallinity (Tc) and melting (Tm) temperatures and latent heat obtained are given in Figure 2 and 3. The samples were tested on the PerkinElmer DSC-4000 device.

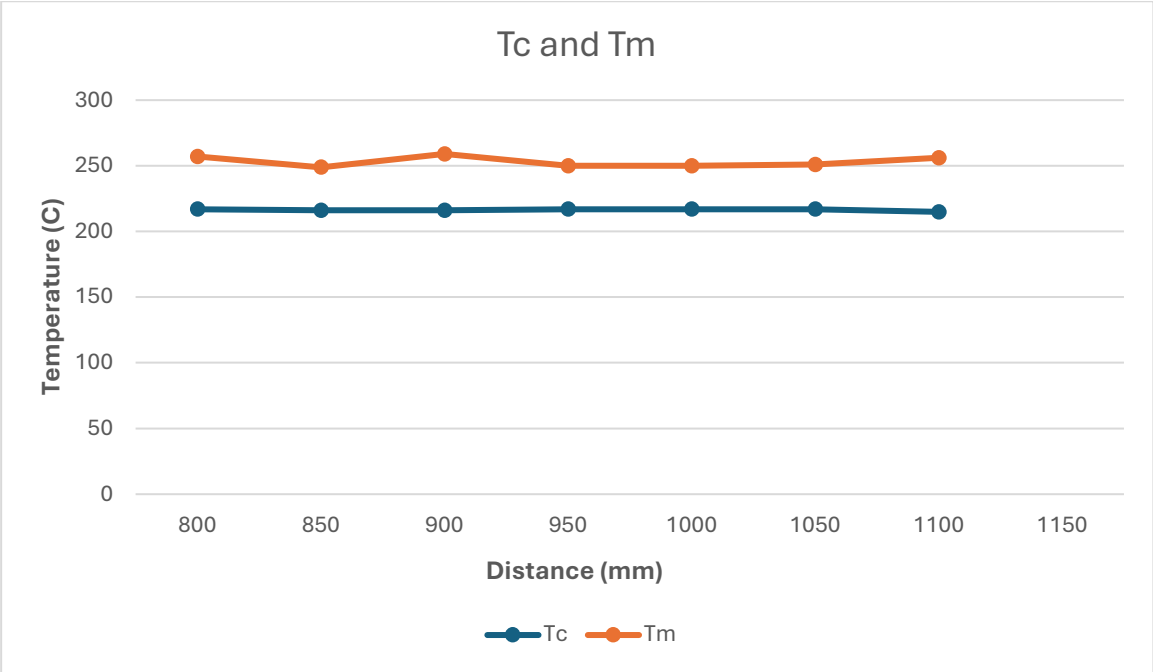


Figure 2. Tc and Tm values versus lubrication distance

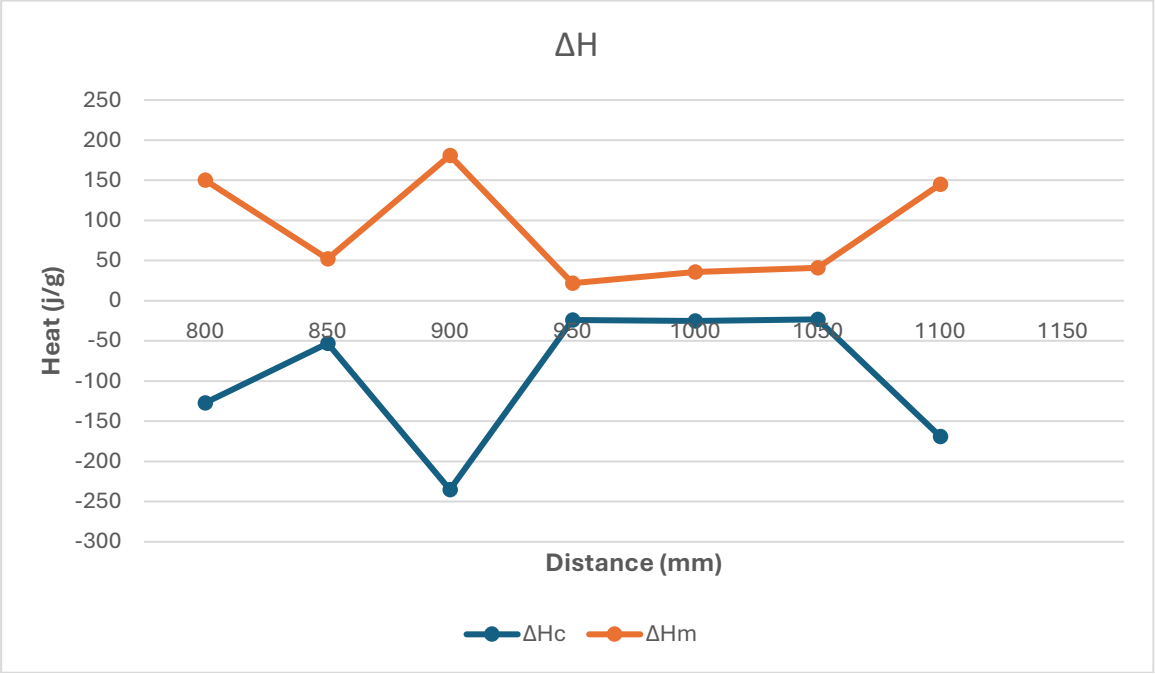


Figure 3. The released latent heat during crystallization (Hc) and melting (Hm) of samples versus lubrication distance

Figure 2 and 3 showed that lubrication distance during melt spinning has not dramatically changed Tc and Tm values (similar crystalline structure) but latent heat changes pointed the changes at crystalline dimensions. However, the relation was not strong.

Elongation and Strength

Since the lubrication distance changes, there are differences in the cooling rates of the filaments. In this case, it affects elongation and strength. The samples obtained were tested on the Uster Tensorapid 5 device in accordance with the standards. The elongation and strength behaviors are shown in the Figure 4.

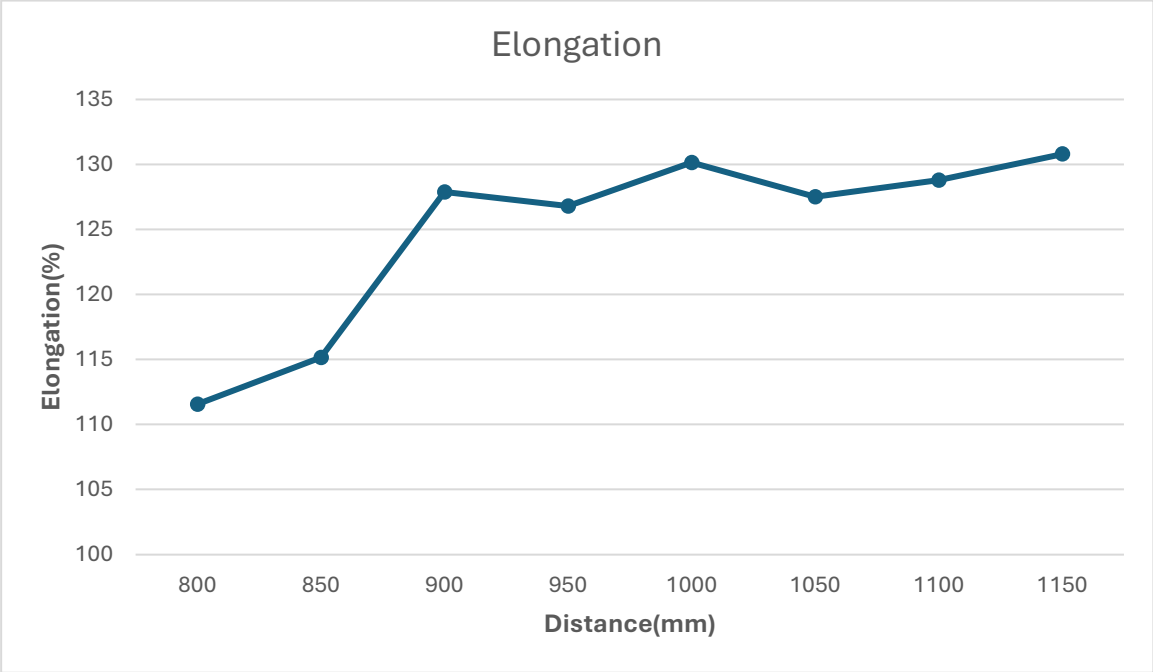


Figure 4. The breaking elongation of samples versus lubrication distance

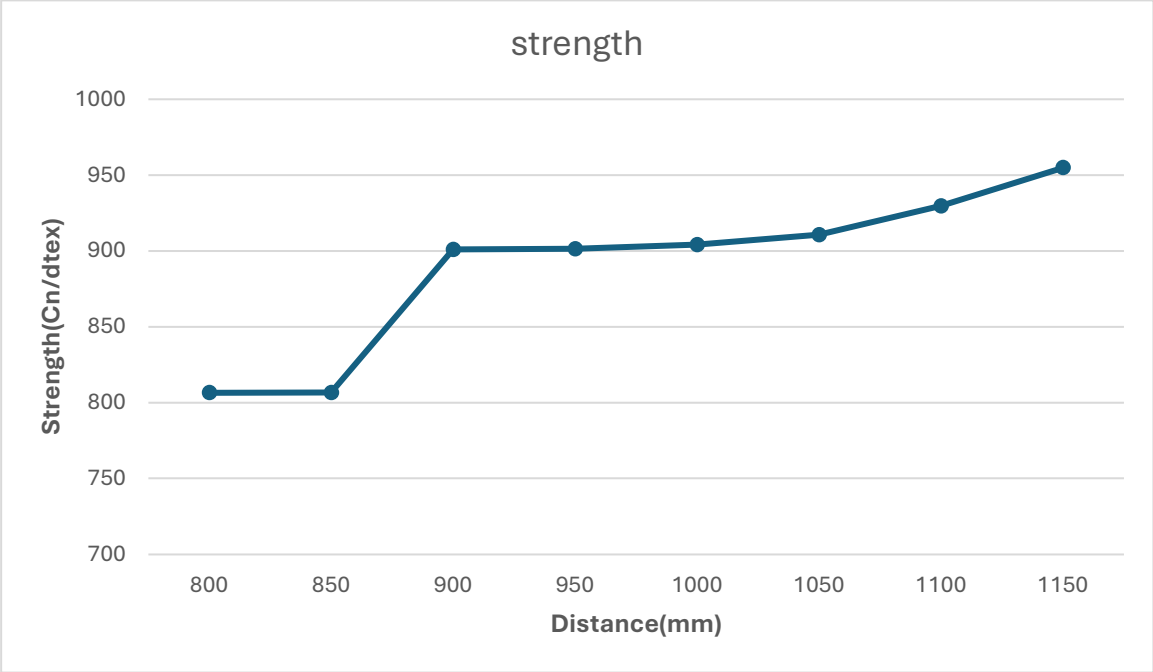


Figure 5. Breaking strength of samples versus lubrication distance

A general increase in elongation and strength values was observed at distances starting from 800 mm to 1150 mm. This increase showed that the amorphous structure continued to transform into a crystalline structure in this interval, depending on the orientation state. While the rate of increase in elongation and strength values was high in the range from 800 mm to 900 mm, this rate of increase slowed down after 900 mm. The slowing down of the speed after 900 mm indicates that the filaments are more resistant to shooting. It has been observed that at distances less than 900 mm, the orientation of the filaments is rapid and they begin to transition to solid form.

CONCLUSION

In this study, a study was conducted to show the variability of the properties of the 480 denier 144 filament polyester yarn used in carpet manufacturing, depending on the crystallization rate and amount at every point, from the spinneret exit area to the winding area. Starting from a distance of 800 mm from the spinneret exit area, 8 different samples were taken by fixing a lubrication application every 50 mm up to a distance of 1150 mm. Since the cooling rate and crystallinity of these samples changes depending on the lubrication distance, DSC, elongation and strength values at these points were examined. From 800 mm distance to 1150 mm distance , the amount of oil absorption is generally increased due to crystallization . Elongation and strength values increased accordingly as the distance increased. This is due to the fact that there is less crystalline structure at low distances.

REFERENCES

1. Alin, C. (2008). Polyesters and Polyamides. England: Woodhead publishing, (Pp: 62-96).

2. Alves, N.M. , Mano, J.F. (2002). Glass transition and structural relaxation in semi-crystalline poly(ethylene terephthalate). DSC study, Polymer, 43(15),(4111-4122).

3. Ajji, A. (1996). Orientation and structure of drawn poly(ethylene terephthalate). Polymer, 37(16), (3707-3714).

4. Jabarin, S. A. (1984). Orientation studies of poly(ethylene terephthalate). Polymer Engineering & Science, 24(5),(376-384).

5. Demirel B., Yaraş A., Elçiçek H. (2011). Crystallization Behavior of PET Materials. BAÜ Fen Bil. Enst. Dergisi Cilt 13.

6. Yoshihara, N., Shibaya, M., Ishihara, H. (1997).Cold crystallization behaviors of polyethylene terphtalate. J.of Polymer Engineering 25(2).

7. Youssefi,M., Morshed, M., Kish,M.H. (2007).Crystalline structure of poly ethylene terphtalate,wiley interscience. J.Applied Sciences 106,(2703-2709).

8. Abbasi , M.,.Mojtahedi, R.M., Kotek,R.(2018). Effect of melt spinning variables on the structural changes ofrecycled and bottle grade filament yarn PET. J. of Textiles and Polymers,6(2), (67-75).

9. Dumbelton, J.H., Bell, J.P., Murayama,T. (1968). The effect of structural changes on dye diffusion in poly(ethylene terephthalate). J.Applied Sciences, 12(11), 2491-2508.

10. Toda,T.,Yoshida, H.,Fukunishi K.(1997). Amorphous structure changes in poly(ethylene terephthalate) induced by annealing under dry and wet conditions and its dye uptake properties. Polymer, 38(21),(5463-5469).

11. Sakai, T., Miyasaka,K., İshikawa, K. (1978).Sorption of disperse dye on crystallite surfaces of polyethylene terephthalate. J-Stage, 34(11), (475-480).

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

MODANIN ÇEVRESEL, SOSYAL VE EKONOMİK BOYUTTA OLUMSUZ ETKİLERİ VE İYİLEŞTİRME ÖNERİLERİ

Hatice Kübra GÜNERİ
Marmara Üniversitesi, Teknoloji Fakültesi, Tekstil Mühendisliği Bölümü
ORCID: 0009-0009-0515-6534

Assoc. Prof. Dr. Mahmut KAYAR
Marmara Üniversitesi, Teknoloji Fakültesi, Tekstil Mühendisliği Bölümü
ORCID: 0000-0002-0862-6900

Lect. Dr. Nuray CEVİZ
Marmara Üniversitesi, Teknik Bilimler Meslek Yüksekokulu, Tekstil Giyim Ayakkabı ve Deri Bölümü
ORCID: 0000-0002-9670-6176

ÖZET
Hızlı modanın bir sonucu olarak sezon değişimleri kısalmakta ve üretilen ürün sayısında müşterilerin talepleri doğrultusunda inanılmaz artışlar görülmektedir. Bu talep, dünyanın küreselleşmesi ve teknoloji ile etkilerinin artması doğrultusunda milletler arasında etkileşimin çoğalmasına ve giyim kültürünün ulusallıktan uluslararası bir hale bürünmesine neden olmaktadır. Dünya çapında üretilen tekstil ürünlerinin çevreye %5 zararlı etkilerinin olduğu bilinmekte, üretim ve tüketim arttıkça bu zarar katlanmaktadır. Aynı zamanda hızlı moda, kullanım ömrü çok kısa ürünlerin üretimini esas aldığından daha fazla ürün üretimini ve daha fazla atık oluşumunu beraberinde getirir. Dolayısıyla, gereğinden fazla üretilen ürün sayısı ve bu ürünlerin üretilirken ki süreçlerinde harcanan enerji, su ve doğal kaynaklar ile, oluşan talepleri karşılamak ve siparişlere yetişmek, termin sürelerini yakalamak için yapılan aşırı mesailer hem olumsuz çevresel etkilere hem de çalışan açısından uygun olmayan iş süreçlerine sebep olmaktadır. Tekstil ve hazır giyim sektörü içinde var olan moda sektörünün de küresel iklim değişikliğinin sebep olduğu su kıtlığı ve çevre kirliliği gibi etkenlerde doğrudan veya dolaylı olarak rol oynadığı görülmektedir. Tekstil fabrikalarında ve atölyelerinde çalışan işçilerin çalışma ortamlarının elverişsiz hale gelmesi ve adil olmayan ücret politikaları ile çalıştırılması gibi işçi haklarının ihlaline açık bir sektör olması moda sektörünün karanlık yüzü olarak karşımıza çıkmaktadır. Bu çalışmada modanın sebep olduğu negatif çevresel, sosyal ve ekonomik etkilerine değinilerek göz ardı edilen sosyal uygunluk politikaları ile çevresel, sosyal ve ekonomik boyuttaki olumsuz etkileri ve yapılabilecek iyileştirme çalışmalarına yer verilmektedir.
Anahtar Kelimeler: Moda, Çevresel Etki, Kaynak Tüketimi, Temiz Üretim, Döngüsel Ekonomi, Sosyal Uygunluk

NEGATIVE EFFECTS OF FASHION ON THE ENVIRONMENTAL, SOCIAL AND ECONOMIC DIMENSIONS AND IMPROVEMENT SUGGESTIONS

ABSTRACT
As a result of fast fashion, seasonal changes are getting shorter, and the number of products produced has increased tremendously in line with customer demands. This demand causes the interaction between nations to increase and the clothing culture to become international national to international in line with the globalization of the world and the increase in its

effects on technology. It is known that textile products produced worldwide have a 5% harmful environmental impact, and this damage increases as production and consumption increase. At the same time, since fast fashion is based on producing products with a very short lifespan, it brings about more product production and waste generation. Therefore, the energy, water and natural resources spent in production processes cause negative environmental effects, and excessive working hours to meet demands and deadlines cause inappropriate work processes for employees. It is seen that the fashion industry, which exists within the textile and ready-made clothing industry, also plays a direct or indirect role in factors such as water scarcity and environmental pollution caused by global climate change. The fashion industry's dark side is that it is open to violations of workers' rights, such as unfavourable working environments for workers in textile factories and workshops and employing them with unfair wage policies. This study includes the negative environmental, social and economic effects caused by fashion, the ignored social compliance policies, the negative effects on the environmental, social and economic dimensions, and the improvement works that can be done.
Keywords: Fashion, Environmental Impact, Resource Consumption, Clean Production, Circular Economy, Social Compliance.

1. INTRODUCTION

The concept of fashion is derived from the word "modus" and has many definitions. In its most general definition, fashion is a phenomenon that expresses change. This phenomenon covers every area of humanity and is usually associated with clothing. The clothing sector, constantly caught in the cycle of change under the influence of fashion, has given birth to fast fashion. Fast fashion is a business model concept that emerged in the USA in the 1980s and refers to the rapid completion of the process from the product's design process to its delivery to the final customer in the store (Ertürk, 2011). In the 1990s, it was seen that the concept of fast fashion spread all over the world and rapidly spread with globalization. Companies like ZARA, GAP, and H&M quickly adopted and implemented this business model. Thus, they developed a trade model by producing products in large quantities in a short time with low prices and quality. Although fast fashion enables the production of affordable products for large masses, the damage caused by the workflow processes in the textile sector in terms of resource usage and consumption amounts has brought the concept of fast fashion to the centre of criticism over time (Mangır, 2016). The fashion and textile industry, which continues to use resources irresponsibly, is now the second most damaging sector to the environment after the oil industry (Altındal & Eroğlu, 2021).The environmental, social and economic effects of the resources spent on the fast fashion trend and especially the polluted agricultural lands have started to be destructive. Therefore, these destructive effects question the concept of sustainability and become mandatory by creating a constructive approach in the sector. However, the concept of sustainability also contradicts the profit policies of companies in some ways, and this change cannot be fully implemented for many worlds giant brands. In these processes, which are under the initiative of the brands, it is seen that the “Sustainable Development Goals” are violated and not implemented in various ways (Altındal & Eroğlu, 2021) and that brands are eye-catching with strategies such as “greenwashing” (İTKİBHedef, 2022). However, the fashion sector, which has some negative effects on the environment and society in every process from raw material production to the delivery of the final product to the user and its mixing into nature as waste after use, is a sector waiting to be improved (Foundation, 2017).

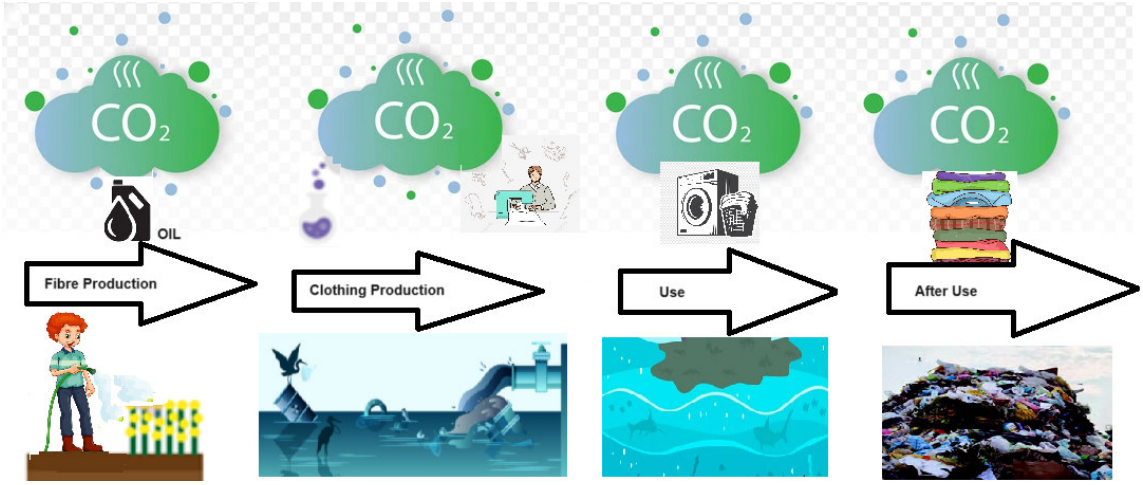


Figure 1. Product cycle and results from field to end use

The textile industry contributes to the world's carbon emissions throughout its entire life cycle, from production to disposal (Tran et al., 2022).

2. ENVIRONMENTAL AND SOCIAL IMPACTS OF FASHION

The fashion sector ranks fourth in terms of negative environmental impact, right after housing, transportation and food. The textile industry is expected to remain dominated by the ready-to-wear and fashion sector, which accounts for over 60% of the market. It is noteworthy that between 1975 and 2018, the per capita textile production increased from 5.9 kg to 13.0 kg annually, contributing 10% of global carbon emissions (Sayın & Karaahmetoğlu, 2021), is a sign of advancing problems in the clothing sector (Soares et al., 2024). If the current rate of growth is maintained, fiber production is expected to reach 20 million tons by 2038. With this level, the industry will account for 0.8% of worldwide greenhouse gas emissions, 1.4% of global energy consumption, and 7.5% of global water demand (because of cotton production and processing) (Boschmeier et al., 2024). It is seen that different chemicals and dyes used in textile production processes pose a great danger to the health of workers working in this sector, and at the same time, child labour, long working hours, harassment and violence, which are frequently encountered in the clothing production phase, cause serious social problems (Acar, 2020).

2.1. RESOURCE USE

According to Loetscher et al. (2017), the textile industry requires 98 million tons of non-renewable resources per year. These resources include oil for synthetic fiber production, fertilizer and dye production for growing cotton, and chemicals for fiber and textile processing. 2.7 tons of water is used for a T-shirt and 7 tons for a dress. The production of a 1.5 kg cotton garment uses 180 litres of water, 13.8 kWh of electricity, 0.63 m3 of natural gas, 647 grams of chemicals, and the product creates 11 tons of waste (Dikbaş & Mezarcıöz, 2019).

2.1.1. Raw Material

While raw materials produced from nature were used in fabric production until the mid-20th century, with the increasing population and developing textile technology, today a large part of the raw material need is met by synthetic fibres such as polyester, which have lower production costs (Kativa, 2016).

According to research, 63% of textile products are obtained from the processing of petrochemical raw materials, while only 37% are obtained from natural fibres (Binczarski et al., 2024). Natural fibres such as cotton, wool, and linen and synthetic fibres such as polyester, polyamide, and polyacrylic used in textile production cause negative impacts on the environment by using large amounts of water, energy and chemicals during the production phase. The fact that the most commonly used fibres in textiles are synthetic means that textile wastes remain in landfills for a long time (Soares et al., 2024). According to 2019 data, the total production volume of textile fibres exceeded 100 million tons, leaving behind the production of aluminium (65 million tons), the second most important metal. From 1970 to 2020, fiber production has increased fivefold (Boschmeier et al., 2024).

Cotton fibre, which ranks second among the most produced raw materials, has reached an annual production of around 25,106 tons in the last 15 years (Soares et al., 2024). The chemical fertilizers, pesticides, diesel fuels for vehicles and electrical energy used for processing cotton raw material used during its production and cultivation cause great damage to the environment (Dikbaş & Mezarcıöz, 2019). In our country, 29% of pesticides are used during cotton production (Altun, 2010). When the effects of diesel fuels used by agricultural machinery during cultivation and harvesting processes on global warming are examined, it is seen that they have a large share in the GWP (Global Warming Potential) impact category (Dikbaş & Mezarcıöz, 2019).

The annual emission of microplastics from textiles comprised of synthetic fibers derived from plastic, like acrylic, polyester, and nylon, is estimated to be at least 500,000 tons. These microplastics endanger aquatic life, contaminate the food chain, and are harmful to human health if they are discharged into the environment. Current studies even show that microplastics have been found in human blood (Soares et al., 2024).

2.1.2. Chemicals

The textile industry produces harmful chemical waste during finishing processes (Dikbaş & Mezarcıöz, 2019). These chemical wastes, which are left untreated in water resources, create significant pollution and pose a great threat to aquatic life. 20% of industrial water pollution worldwide is caused by the dyeing and processing of textiles (Loetscher et al., 2017).

2.1.3. Water

A large amount of water is consumed in the dyeing and chemical use processes. The amount of water used to produce one kilogram of textile varies between 95 and 400 litres, depending on the characteristics of the fabric produced (Demirer & Alkaya, 2018) and is responsible for an annual water consumption of approximately 93 billion m^3 (Soares et al., 2024). This situation causes the problems in water-scarce regions to grow and creates a water crisis in many cotton-producing countries, including Türkiye (Loetscher et al., 2017).

2.7 tons of water is consumed in just one t-shirt from the field to the factory. Considering the clothes in an average wardrobe, the amount of water used to produce these clothes is equivalent to about 1 years' worth of drinking water for 400 people (EU-Assets, 2020).

2.1.4. Energy

Electricity consumption is a significant contributor to global warming throughout the entire life cycle of textile products (Dikbaş & Mezarcıöz, 2019). To keep this impact to a minimum, it is predicted that companies' use of renewable energy sources will provide a 60% reduction in carbon emissions (Berg & Magnu, 2020; LeviStrauss&Co., 2015).

2.2. ATTITUDE OF BRANDS

2.2.1. Destroy

Some fashion brands dispose of their remaining and unsold products with the destroy method, which is shown the last resort in the waste hierarchy. They state that the reason for resorting to this method is to protect brand value and intellectual property rights. Especially brands identified with luxury consumption state that they do not want their products to be sold at affordable prices and that it is more appropriate to destroy them rather than their brand value decrease. For example, it was revealed in recent years that the famous British brand Burberry destroyed its remaining products worth 28 million euros in this way. Although the brand stated that this process was carried out by experts, not by spending energy, environmental activists stated a healthier and friendlier recycling process would be a more suitable solution. It is known that the brand in question has destroyed products worth more than 90 million euros in the last 5 years. H&M, one of the world's retail giants that publishes a sustainability report every year and expresses its sensitivity on this issue, has also been found to have burned its product stocks and the company has been accused of hypocrisy by environmental activists (Euronews, 2018).

2.2.2. Employee Rights

The clothing industry, worth 1.3 trillion USD globally, employs more than 300 million people (Loetscher et al., 2017). The employment of many child workers in cotton farming brings with it serious social effects. At the same time, it is seen that different chemicals and dyes used in textile production processes pose a great danger to both worker and consumer health (Acar, 2020). Child labour, long working hours, harassment and violence during the clothing production phase cause serious social problems. In addition, in most cases, workers' wages are below a "liveable wage."

2.2.3. The Concept of Sustainability

Since the 1970s, ecological concerns have increased with the increasing production of textile products. This situation has also increased the action of returning to nature. With the concept of sustainability that has emerged since the 90s, an environmental, social and economic development model has been designed. Within the framework of this model, it is planned to transfer resources to future generations with a correct and fair use, and it is thought that the damage to the environment will be minimized, and the existing population will have better living standards. It is also aimed to increase economic contribution with the innovative products to be produced (Metlioğlu & Yakın, 2021).

The fashion industry has had a significant impact on society and the environment; hence sustainability has gained importance within the sector. Water, carbon, chemical consumption, responsible resource use, longer product lifetimes, waste regulation, transparency, traceable supply chains, occupational safety and health, and wage-compensation policies are just a few of the environmental and social aspects of the industry's sustainability initiatives.

One of the most important steps taken by the industry in the field of sustainability has been the transition from a linear structure to circularity. It is clearly seen that the linear structure that operates with the "produce-consume-dispose" logic of the textile and fashion industry is not sustainable. Circularity, which emerged as a criticism of this linear structure, emphasizes the value of using a product to the fullest, then goes one step further and eliminates the concept of waste because it is reused for another purpose (EU-Assets, 2020).

Thus, with the circular economy, in addition to eliminating the negative effects of the linear economy, a systematic change is being designed that provides long-term benefits and provides jobs and economic opportunities.

On the other hand, the industry needs to fundamentally transform itself to meet future challenges. Some pioneering companies have already accepted this fact and are starting to create innovative processes, products and business models that could allow them to significantly reduce their environmental footprint (Loetscher et al., 2017). However, these sustainability initiatives fail to create the desired effect due to the misleading marketing strategy of brands, "greenwashing" (İTKİBHedef, 2022).

2.2.4. Greenwashing

This concept, first introduced by environmental activist Jay Westerveld in 1986, was defined to reveal the financial concerns of brands behind their fake environmentalist appearances. Although brands do not reduce the environmental damage they cause while producing their products, they publish sustainability reports and market their products to consumers who are sensitive in this regard. This marketing tactic is among the deceptive advertising strategies. As sustainability becomes an increasingly important concept, brands that are concerned about losing customers claim to be sustainable with environmentalist and innovative commitments. The number of brands making these promises is also increasing day by day.

Consumers who realize that these positive transformation claims, which do not always reflect the truth, are a marketing strategy, complain about brands for greenwashing, and it is seen that brands investigated by the relevant institutions are penalized due to their deceptive advertising activities. It is very important for the awareness levels of increasingly conscious consumers to increase in this direction. Consumers now want to know that brands are transparent, questionable and open to inspection. It is thought that the concept of greenwashing can be prevented by controlling the content and processes of the products produced and by using programs, software or explanatory texts that provide this flow. Thus, questioning the processes that brands claim to produce with natural content or sustainable methods will also form a solid foundation for trust in customers. Data in this direction of many brands or companies operating in the sector still cannot be accessed (İTKİBHedef, 2022).

3. SUGGESTIONS FOR IMPROVEMENT

The supply chain for the textile and ready-to-wear industries is extensive, and a wide range of participants are involved in its operations, including producers of raw materials, manufacturers of fiber and fabric, wet finishing processors, clothing manufacturers, brands, retailers, end users, and disposal/recycling businesses (Loetscher et al., 2017). Considering all these actors, the studies that can be done to make the textile and fashion sector more sustainable in the future can be examined under three headings: Production, consumption and transformation processes. The explanations of the improvement studies that can be done within the scope of this study are called ***"clean cycle of textile".***

3.1. PRODUCTION

3.1.1. Pre-production Stage

It includes textile manufacturers choosing raw materials by considering environmental impacts. In producing the product to be used as raw material, a production condition that complies with clean production principles (responsible use of water, chemicals, energy and raw materials) should be considered. Priority should be given to using biodegradable, recycled, recyclable and responsibly sourced sustainable raw materials.

Organic cotton production should be adopted in cotton cultivation. In cases where organic cotton production is difficult to achieve, studies should be developed as alternatives to reduce chemical fertilizers or pesticides, and to use agricultural waste or biodiesel in agricultural machinery instead of spent diesel fuel (Dikbaş & Mezarcıöz, 2019).

3.1.2. Production Stage

Textile companies need to adopt clean production principles at every stage of production. Increasing the rate of renewable resource use, reducing energy consumption, using environmentally friendly products as alternatives to chemicals and dyes, and using innovative methods such as waterless dyeing technologies that can keep water consumption at a minimum level (Odabaşoğlu et al., 2013) can significantly improve the negative impact of production on the environment (Ceviz & Kayar, 2024). At the same time, awareness and classification studies should be carried out to evaluate various wastes generated at every stage of the production of textile products, and businesses should be able to continue their production by performing optimum waste control. Sustainability projects should be developed within this scope. If in-company evaluation opportunities are limited, sharing and cooperation should be made with different sectors (Dikbaş & Mezarcıöz, 2019). Innovation and digitalization, which are critical factors for making production clean, and the research of material flow opportunities from other sectors as inputs to clothing manufacturing can be used to develop designs that do not create excess fabric when produced and to develop garments that can be used for a long time and adapt to changing styles (Loetscher et al., 2017)

3.1.3. Post-production

During the supply phase of manufactured products to customers, suppliers should be classified according to distance rates, orders located at the same distance should be grouped and sent, or close suppliers should be worked with to ensure fuel reduction (Dikbaş & Mezarcıöz, 2019).

3.2. CONSUMPTION

The textile, ready-to-wear and, fashion sectors have a great impact on the stages of product meeting with consumers, usage and post-usage. To reduce the negative impact that may occur here, it is of great importance to examine the consumption stages and understand consumer attitudes and behaviours. In this context, consumers have a key role in the development and implementation of sustainable and long-lasting fashion.

3.2.1. Pre-consumption

One of the most important points that cause the negative impact created by consumers is their purchasing behaviour. With the doubling of clothing production in the last 15 years (Loetscher et al., 2017), the decrease in product prices and the emergence of the over-consumption trend, consumers have started to shop more frequently and more. Shopping according to need, choosing sustainable products (resistant to tearing, fading, shrinking, pilling, etc., biodegradable and/or recyclable raw material content), buying fewer but high-quality products instead of more and poor-quality products and adopting a minimalist clothing/lifestyle and therefore becoming a conscious consumer are important.

3.2.2. Consumption Stage

The responsibility for the products belongs to the consumers who start using the product. Activities such as wearing, washing and drying the garment from purchased to disposed of refer to this stage. The energy used during washing and drying constitutes 50% to 80% of the energy spent in the garment life cycle (Yasin et al., 2016). Consumers must care for their clothes properly. Consumers should use clean clothes they buy, air them instead of washing them frequently, wash them less, use quality detergents, avoid unnecessary ironing and cleaning, and follow washing instructions. In addition, carrying out these activities will reduce energy and water consumption (LeviStrauss&Co., 2015). Thus, since negations such as wear and fading will decrease, the life of the clothes will also be extended.

3.2.3. Post-consumption

Includes the process after consumers dispose of their clothes. According to various studies examining the factors that change the lifespan of clothes; the most important reason for the clothes' disposal is that the clothes wear out or are damaged in some way, followed by changes in size and form, changes in fashion tastes, and inadequacy in storage areas (Laitala et al., 2018). It is important for sustainability that the consumer correctly evaluates the product they want to dispose of. At this stage, if the product is a wearable condition, they can evaluate it as second-hand, donate it, rent it or consider the exchange options (Ceviz et al., 2022). Thrown-away clothes cause an average of $460 billion in waste each year (Loetscher et al., 2017). Increasing the use of second-hand clothing saves 3% of carbon for every ton of clothing (Berg & Magnu, 2020). If the product is not wearable, repair and upcycling opportunities can be considered. By applying modification or upcycling techniques, it is possible to extend the life of the clothes and obtain original clothes that are new and more valuable (EU-Assets, 2020). Although repair and alteration opportunities have been widely used from the past to the present, users may sometimes think that this can only be done by those with the necessary skills, interests and resources. Consumers should be made aware that this stage can be done with very little time, skills and resources. In this way, it is possible to extend the garment's life for 3 months, prevent 3 million tons of carbon emissions, 590 million tons of water consumption and 150,000 tons of waste production (EU-Assets, 2020). Business models related to the processes in the fashion sector can reduce approximately 143 million tons of greenhouse gas emissions in the clothing and fashion sector by 2030 (Berg & Magnu, 2020).

3.3. TRANSFORMATION

Approximately 20% of clothing is gathered worldwide for recycling or reuse. But only 1% of the clothes that have been collected for recycling are turned into new clothes; the remaining 73% are either burned or thrown away. To re-integrate textile waste into production, the collection, classification and subsequent recycling must be done correctly (Soares et al., 2024). At this point, the development of innovative recycling technologies is critical.

3.3.1. Pre-transformation

Textile waste should be collected, classified and separated according to fibre types to be included in the recycling system. Waste management systems need to function well to collect waste effectively. Waste should be separated at the source, in homes, and collected by waste collectors to be included in the system. At the same time, thanks to the product IDs placed on the product while it is still in the production phase, clothes containing different materials such

as cotton, polyester, nylon, wool, and elastane should be easily separated according to fibre types.

3.3.2. Transformation Stage

Textile waste can be recycled with two different methods. These are chemical and mechanical recycling. In chemical recycling, the waste material is reduced to its building blocks and the first quality raw material is produced again. In mechanical recycling, the waste is mechanically broken down to obtain second-quality fibre raw material and these products are mostly used as filling and composite materials (Stubbe et al., 2024). To provide infinite recycling in textiles and to implement a fully circular economy, it is necessary to invest in fibre-to-fibre chemical recycling technologies, which are still in the development phase.

3.3.3. Post-transformation

The recycled fibers are given a product identity, and the fibers are supplied to the sectors where they will be used.

4. CONCLUSION

In this research study, environmental, social and economic negative effects of the textile, ready-to-wear and fashion sectors were explained, and it was predicted that the improvement of these negative effects of the sector could be provided with the framework called “clean cycle of textile”, which is specified with the production, consumption and transformation stages.

Starting from the raw material stage of the material to be used in the sector, clean production and zero waste principles should be worked on at every stage. Textile products that have completed their life should be brought back to the economy with an effective recycling system. In this context, investments should be made in innovative recycling technologies, digitalization studies should be given priority, the awareness level of consumers should be increased, and states need to make regulations in waste management systems.

REFERENCES

Acar, B. (2020). Tekstil ve hazır giyim atölyelerinde çalışan genç yetişkin kadın işçilerin çalışma koşulları ve deneyimledikleri çok boyutlu sorunlar. *Çalışma ve Toplum*, *1*(64), 89-116.

Altındal, Y., & Eroğlu, S. (2021). Tüketimin Kirli Fotoğrafı: The True Cost Belgeselinin Sosyolojik İncelemesi. *İmgelem*, *5*(9), 381-418.

Altun, Ş. (2010). Türkiye’deki tekstil ve hazır giyim atıklarının ve geri kazanım imkanlarının genel profilinin çıkarılması. *Mühendislik Mimarlık Fakültesi, Uludağ Üniversitesi, Bursa, Türkiye, TÜBİTAK Proje Raporu*, *55*.

Berg, A., & Magnu, K.-H. (2020). *Fashion on Climate*.

Binczarski, M. J., Zuberek, J. Z., Cieciura-Wloch, W., Borowski, S., Cieslak, M., Baranowska-Korczyc, A., Witczak, E., & Witonska, I. A. (2024). Textile waste subjected to acid hydrolysis as raw materials for biogas production. *Renewable Energy*, *227*, 120428.

Boschmeier, E., Ipsmiller, W., & Bartl, A. (2024). Market assessment to improve fibre recycling within the EU textile sector. *Waste Management & Research*, *42*(2), 135-145.

Ceviz, N., Altın, E., Yazıcı, R., & Konyalı, Z. Z. (2022, 10 Eylül). *Kıyafet Seçiminde ve Satışında Tüketici Davranışları: Etek Örneği* 1st International Conference on Innovative Academic Studies, Konya, Türkiye.

Ceviz, N., & Kayar, M. (2024, 19 - 20 Temmuz). *Use And Importance Of Sustainable Auxiliary Materials Within The Concept Of Fast Fashion* 1. Uluslararası Üsküdar Bilimsel Araştırmalar Kongresi (ISARC), İstanbul, Türkiye.

Demirer, G., & Alkaya, E. (2018). Tekstil Sektöründe Temiz Üretim Rehberi. In: WWF.

Dikbaş, F., & Mezarcıöz, S. (2019). Tekstilde yaşam döngüsü analizi. *Çukurova Üniversitesi Fen ve Mühendislik Bilimleri Dergisi*, *38*, 107-113.

Ertürk, N. (2011). Moda kavramı, moda kuramları ve güncel moda eğilimi çalışmaları. *Art-e Sanat Dergisi*, *4*(7), 1-32.

EU-Assets. (2020). *Uzun Ömürlü Moda Raporu*. https://eu-assets.contentstack.com/v3/assets/blt9ca8222b5acaa556/bltbcc067621047401e/661d18a0cd33dc0de263793f/Uzun_Omurlu_Moda_Raporu_compressed_final.pdf

Euronews. (2018). Lüks tüketim markası Burberry satılmayan ürünlerini yaktı. https://tr.euronews.com/2018/07/20/luks-tuketim-markasi-burberry-satilmayan-urunlerini-yakti#:~:text=L%C3%BCks%20t%C3%BCketimle%20%C3%B6zde%C5%9Fle%C5%9Fmi%C5%9F%20marka%20Burberry,kalan%20%C3%BCr%C3%BCnleri%20imha%20etti%C4%9Fini%20belirtti.

Foundation, E. M. (2017). *A new textiles economy: Redesigning fashion's future*. https://emf.thirdlight.com/file/24/uiwtaHvud8YIG_uiSTauTlJH74/A%20New%20Textiles%20Economy%3A%20Redesigning%20fashion%E2%80%99s%20future.pdf#page=50.46

İTKİBHedef. (2022). Sürdürülebilirliğe Gölge Düşüren Tuzak: Greenwashing. *İstanbul Tekstil ve Konfeksiyon İhracatçı Birlikleri Aylık Dergisi*, (347), 44 - 49.

Kativa, H. S. (2016). Synthetic threads. Distillations. In.

Laitala, K., Klepp, I. G., & Henry, B. (2018). Does use matter? Comparison of environmental impacts of clothing based on fiber type. *Sustainability*, *10*(7), 2524.

LeviStrauss&Co. (2015). *The Life Cycle of a Jean* https://ceowatermandate.org/resources/the-life-cycle-of-a-jean-2015/

Loetscher, S., Starmanns, M., & Petrie, L. (2017). Changing fashion The clothing and textile industry at the brink of radical transformation. *WWF Switzerland*, *43*.

Mangır, A. F. (2016). Sürdürülebilir kalkınma için yavaş ve hızlı moda. *Selçuk Üniversitesi Sosyal Bilimler Meslek Yüksekokulu Dergisi*, *19*(41. Yıl Özel Sayısı), 143-154.

Metlioğlu, H. H., & Yakın, V. (2021). Tekstilde sürdürülebilirlik: Hızlı moda markalarının sürdürülebilirlik stratejileri. *OPUS International Journal of Society Researches*, *18*(Yönetim ve Organizasyon Özel Sayısı), 1883-1908.

Odabaşoğlu, H. Y., Avinç, O. O., & Yavaş, A. (2013). Waterless textile dyeing. *Journal of Textiles and Engineer*, *20*(90), 62-79.

Sayın, E., & Karaahmetoğlu, C. (2021). *Hızlı moda akımı dünyayı hızla kirletiyor* https://www.trthaber.com/haber/cevre/hizli-moda-akimi-dunyayi-hizla-kirletiyor-635673.html

Soares, B., Ramos, M., & Martinho, G. (2024). Factors to consider for the implementation of a municipal scheme for the separate collection of textile waste. *Sustainable Futures*, *7*, 100203.

Stubbe, B., Van Vrekhem, S., Huysman, S., Tilkin, R. G., De Schrijver, I., & Vanneste, M. (2024). White Paper on Textile Fibre Recycling Technologies. *Sustainability*, *16*(2), 618.

Tran, N. P., Gunasekara, C., Law, D. W., Houshyar, S., Setunge, S., & Cwirzen, A. (2022). Comprehensive review on sustainable fiber reinforced concrete incorporating recycled textile waste. *Journal of Sustainable Cement-Based Materials*, *11*(1), 28-42.

Yasin, S., Behary, N., Rovero, G., & Kumar, V. (2016). Statistical analysis of use-phase energy consumption of textile products. *The International Journal of Life Cycle Assessment*, *21*, 1776-1788.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

PSİTTASİN KUŞLARININ SOLUNUM SİSTEMİ HASTALIKLARI

Süleyman KOZAT
Department of Internal Medicine, Faculty of Veterinary Medicine, Van Yuzuncu Yil University
ORCID: 0000-0001-5089-2623

Özet
Son yıllarda evcil hayvanların bakımında artış olmuştur. Bu artış Psittasinler kuşlarında küçüksenmeyeceyecek düzeydedir. Psittasinler 92 cins ve üç familyaya ait 393 türden oluşur. Psittasinler; papağanlar, Amerika papağanı, kakadular ve lori oluşturmaktadır. Kuşların solunum sistemi hakkında bilgi sahibi olmak için doğru bir veteriner hekimlik yaklaşımı sağlamak son derece önemlidir. Bu derlemede Psittasinler kuşlarında görülen solunum sistemi hastalıkları hakkında bilgi verilecektir.
Anahtar Kelimeler: Psitassin, Alt, Üst, Solunum, Sistem

RESPIRATORY SYSTEM DISEASES OF PSITTACINE BIRDS

Abstract
There has been an increase in the care of pets in recent years. This increase is at a level that cannot be underestimated in Psittacine birds. Psittacines consist of 393 species belonging to 92 genera and three families. Psittacines; parrots, macaws, cockatoos and lorikeets. It is extremely important to provide a correct veterinary approach to have knowledge about the respiratory system of birds. In this review, information will be given about respiratory system diseases seen in Psittacine birds.
Keywords: Psitassin, Lower, Upper, Respiratory, System

Giriş
Psittasinler 92 cins ve üç familyaya ait 393 türden oluşur (Gibson ve ark., 2019). Psittasinler (papağanlar, Amerika papağanı, kakadular ve lori), hayvanat bahçelerinde ve özel yetiştirme koleksiyonlarında da tutulan yaygın evcil hayvanlardır (Harcourt-Brown, 2000 ; Gibson ve ark., 2019). Kuşların solunum sistemi hakkında bilgi sahibi olmak için doğru bir veteriner hekimlik yaklaşımı sağlamak son derece önemlidir. Kuşların yaşamsal döngülerinin kökten farklı yapıya sahip olmasına rağmen son derece kapsamlı akciğerlere sahiptir. Kuşların solunum sistemi ikili bir sistemdir. Gaz değişimi için akciğerlere ve vantilatör görevi gören çok sayıda hava kesesine sahip olmalarından dolayı omurgalılar dünyasında yapısal olarak en karmaşık solunum sistemi sahiplerdir. Solunum problemleri, papağanlarda yaygın görülen bir durumdur. Klinik belirtiler nedene bağlı olarak değişir ve hapşırma, öksürme, burun ve göz akıntısı, ses değişiklikleri ve gürültülü nefes almayı, taşipne, nefes darlığı, ağızdan nefes alma, ses değişikliği ve egzersiz intoleransıdır ve bunlara genellikle genel hastalık belirtileri eşlik eder (Clippinger, 1997; Jenkins, 1997; Dorrestein, 2009). Parazitler, bakteriler, mantarlar ve virüsler gibi farklı bulaşıcı ajanlar kuşların üst ve alt solunum yolu hastalıklarına neden olabilir (Arca-Ruibal, 2016). Psitasin üst solunum yolu hastalıklarının araştırılması

Psittasin Kuşların Üst Solunum Sistemi Hastalıkları
Papağanlarda (psittaciformes) en yaygın görülen solunum hastalıkları; bulaşıcı, bulaşıcı olmayan, sistemik, metabolik ve beslenme sorunları dahil olmak üzere çeşitli olası nedenler rol oynamaktadır.

Bu etkenleri tümü yanlış ortam sıcaklığı ve nem nedeniyle daha da kötüleşebilir (lawton, 1999). Psitasin kuşlarında solunum sistem hastalıklar anatomik yerleşimlerine göre üst ve alt solunum sistemi hastalıklar olarak sınıflandırılır. Üst solunum sistem hastalıklarında klinik olarak konjuntivitis, sinusitis ve obstruksiyonlar gözlenir. Konjunvitis olarak yabancı cisim, bakteriyel, virus, aspergillosis, *Trichomoniasis, Cnemidocoptes pilae* ve *Syngamus trachea* kokenli olabilir. Sinusitis; bakteriyel ve hipovtaminozis A kaynaklı olabilinir. Bunlara ek olarak bazende doğal olarak neoplasia kaynaklı olabilir

Tablo 1.: Papağanlarda Solumun Sistem Hastalıklarında Rol Oynayan Patojenler (lawton 1999)

Bakteriyel		*Pseudomonas aeruginosa, Proteus vulgaris, Escherichia coli Klebsiella species, Pasteurella multocida, Pasteurella septicaemia, Yersinia pseudotuberculosis, Streptococcus pyogenes, Staphylococcus aureus, Chlamydia psittaci, Mycoplasma gallisepticum*
Viral		*Paramyxovirus, Orthomyxovirus type A, poxvirus, coronavirus, herpesvirus*
Fungal		*Aspergillus fumigatus, Aspergillus flavus, Aspergillus niger, Candida albicans, Mortierella hygrophila, Absidia species*
Paraziter	Akarlar	*Sternostoma tracheacolum, Cytodites nudus*
	Nematodlar	*Syngamus trachea, Syngamus bronchialis*
	Mikrofilarya	*Spledidofilaria species, Paraprocta species*
	Haemosporidia	
	Protozoa	

Rinolitler

Rinolitler; burun deliklerinde (burun delikleri) biriken katı yapılar veya döküntü oluşumlarıdır. Yetersiz beslenme ve ardından gelen skuamöz metaplazi ve kronik solunum yolu enfeksiyonlarından kaynaklanabilirler. Ayrıca burun deliklerinin gerektiğinde temizlenememesinin bir sonucudur. Enkaz biriktikçe, burun delikleri ve kapakçıkta erozyonlar meydana gelir ve bu da burun deliklerinin kalıcı olarak şekil bozukluğuna neden olur. Rinolit oluşumunda A vitamini eksikliği ve bakteriyel ajanlar rol oynamaktadır. Özellikle papağanın çere, gaga veya göz kapaklarının etrafındaki topaklanmış (kekleşmiş) tüyler akıntının göstergesidir. Hipovitaminoz A sıklıkla ya tek neden olarak ya da katkıda bulunan bir faktör olarak söz konusudur. Kronik bir A vitamini eksikliği varsa, solunum mukozası aşırı miktarda seröz veya mukoza materyali salgılama eğilimindedir (Altman 1979).




Resim 1. : Afrika gri rengindeki rinolitlerden etkilenen burun delikleri (görüntü Julie Burge'nin izniyle; kullanılmış).
Resim 2. : Aynı gri renkte rinolitin çıkarılması (görüntü Julie Burge'nin izniyle; ile birlikte kullanılmıştır).

Rinolitler çoğunlukla A hipovitaminozu ile ilişkilendirilir. Burun deliklerinde herhangi bir burun akıntısının fark edilmesini önleyebilen keratin birikimleridir. Bu birikintiler en iyi şekilde hipodermik bir iğne veya küçük bir küret kullanılarak çıkarılır, ancak diyet değiştirilmediği veya uygun bir takviye sağlanmadığı sürece tekrarlayacaklardır (Lawton 1999).
Cryptococcus türleri aynı zamanda esaret altında tutulan papağanların üst solunum sisteminde istilacı hastalıklara da neden olabiliyor. Bu, mikotik rinite atfedilebilecek klinik belirtilerle sonuçlanabilir veya retrobulbar boşluk, damak, koana, sinüsler ve gaga gibi burun boşluğu ile yakından bağlantılı anatomik alanları içerebilir. Bazı durumlarda enfeksiyon, kemiklerde osteomiyelitise neden olmaktadır (Galosi ve ark., 2022).

Psittasin Kuşların Alt Solunum Sistemi Hastalıkları
Kanatlılarda alt solunum yolu hastalığı, bronşiyal, akciğer parankimi ve hava kesesi sistemi hastalığını ifade eder. Üst veya alt solunum yollarının herhangi bir bölgesindeki solunum hastalığı, solunum sisteminin bitişik bölgelerini etkileyebilir (Clippinger, 1997). Evcil kuşların respiratorik hastalıkları; bronş hastalığı (yabancı cisim), akciğer hastalığı (neoplastik, viral, bakteriyel, fungal, parazitik, immün aracılı, yabancı madde solunması ve havayla taşınan toksinler) ve hava kesesi hastalığı (hava kese iltihabı, hava kesesi yırtılması) hastalıklar olarak sınıflandırılır.
Kuşların diyaframı yoktur. Karın bölgesindeki kas kasılmaları, hava keselerinin körük gibi hareket etmesine ve havanın ikinci kez akciğerlere geri üflenmesine neden olur. Hava keseleri solunan havanın hacimsel kapasitenin yüzde 80'ini tutar. Abdominal ve posterior torasik hava keseleri arasında ve anterior ve klaviküler hava keselerine doğru bir miktar hava sirkülasyonu ve ayrıca pnömatize olmuş kemiklerle bağlantılar vardır (Lawton, 1999).
Gaz değişiminin büyük kısmı havanın akciğerlerden ikinci geçişi sırasında gerçekleşir. Kuş akciğerlerinin gaz değişiminde memeli akciğerlerine göre 10 kat daha hızlı ve verimli olduğu düşünülmektedir. Serttirler ve genişlemezler ve memelilerin akciğerlerinin aksine loblara bölünmezler.

Akut Alt Solunum Yolları Hastalığının Yaygın Nedenleri
Evcil psittasin kuşlarında akut alt solunum yolu hastalığının yaygın nedenleri şunlardır:
Trakeal/syrinks Hastalığı. Trakea veya sirenksin tıkanması akut, ciddi solunum sıkıntısına neden olabilir. Kuş, özellikle ilham alırken havayı hareket ettirmekte zorluk çekecektir. En yaygın nedenler sirenkste Aspergillus enfeksiyonu ve yabancı bir cismin solunmasıdır (örn. tohum).

Syrinx'i radyografik olarak görüntülemek zor olduğundan tanı en iyi şekilde glottis yoluyla trakeaya bir endoskop yerleştirilerek yapılır. 200 gramın üzerindeki kuşlarda kılıfsız standart 2,7 mm'lik bir dürbün kullanılabilir. Daha küçük kuşlar için 1,9 mm'lik küçük, yarı esnek bir dürbün kullanılabilir. Kapsam belirlemenin ardından lezyon seviyesine uygun bir kırmızı kauçuk veya polietilen kateter geçirilebilir ve materyalin çıkarılması ve ileri tanı testleri (örn. sitoloji ve kültür) için aspire edilebilir. Psittacine'de parazit hastalıkları nadirdir ancak hava kesesi akarları (kanaryalar/ispinozlarda Sternostoma tracheacolum ve galliformlar ve su kuşlarında esneme kurtları (Sygnamus)) ile trakeal belirtiler görülebilir.

Aerosol Toksisitesi: Çeşitli aerosol haline getirilmiş maddeler solunum sıkıntısına ve ölüme neden olabilir. Halı spreyleri, saç spreyi, kokulu mumlar, duman, yemeklik yağ, yanmış yiyecekler ve kapalı bir alanda yanmalı ısıtıcıların kullanımı, hepsi kuşlarla ilişkilendirilmiştir.

Hastalık.500+ dereceye kadar ısıtılan yapışmaz yüzeyler, oldukça toksik olan ve kuşlarda akciğer kanamasına neden olan politetrafloroetilen (PTFE) gazının açığa çıkmasına neden olabilir. PTFE yüzeyleri tencere ve tavalarla sınırlı değildir; ütü masası örtüleri, yapışmaz fırınlar ve diğer yüzeyler ayrıca Teflon benzeri kaplamalara da sahip olabilir. Akut solunum sıkıntısı ve ardından ölüm görülebilir. PTFE zehirlenmesi olan kuşlar kanlı öksürebilir veya hapşırabilir.

Aspirasyon Pnömonisi/Hava Kese iltihabı: Aspirasyon, kuşları elle beslerken, ilaç verirken veya tutarken iyatrojenik olarak tetiklenebilir. Yetersizliğin ardından kendiliğinden de ortaya çıkabilir. Aspirasyon, bağırsaktan ve ağız farenksinden mikrobiyal florayı getirir ve mikrobiyal büyüme için uygun alanlar yaratabilecek akciğer kısımlarını duvarlayan inflamatuar bir reaksiyona neden olur. Orta ila büyük miktarda sıvı aspire edilirse akut belirtiler görülecektir. Küçük miktarlardaki malzemenin tekrar tekrar aspirasyonu başlangıçta fark edilmeyebilir ve kronik hastalık belirtileri yaratabilir.

Solunum Sarcocystis: *Sarcocystis faculata* psittacine kuşlarında akut pnömoniye neden olabilir. Hamamböceklerinin opossum ve muhtemelen diğer memeliler tarafından dökülen yumurtaları taşıması sırasında maruz kalmanın meydana geldiği düşünülmektedir. Genellikle otopsi sırasında akciğer dokusundaki parazitin tanımlanmasıyla teşhis edilir.

Dekompanse Kuş: Kronik olarak etkilenen kuşlarda solunum belirtileri, kuşun strese girmesi, egzersiz yapmaya zorlanması veya daha uzun süre bunu telafi edebilmesi durumunda aniden fark edilebilir. Bu kuşlar genellikle zayıf vücut kondisyonu gösterirler.

Kronik Alt Solunum Yolları Hastalığının Yaygın Nedenleri

Akciğerlerin ve hava keselerinin kronik alt solunum yolu hastalığının yaygın nedenleri şunlardır: Aspergilloz. Bu mantar enfeksiyonuna Aspergillus sp. neden olur. Diğer misel mantarları da zaman zaman benzer hastalıklara neden olur. Enfeksiyon, bağışıklık sistemi baskılanmış kuşlarda (örneğin, kortikosteroidlerle tedavi edilenler) veya çok sayıda spora maruz kalan kuşlarda (örneğin, ıslak yuva kutularına, enfekte yer fıstığına veya mısıra veya bitki saksı toprağına maruz kalan kuşlar) en yaygın olanıdır. Sultan papağanları, Afrika gri papağanları ve Amazon papağanları sık görülen konakçılardır.

Bakteriyel enfeksiyonlar

Yaygın solunum yolu patojenleri arasında *E. coli, Klebsiella, Past*urella ve *Pseudomona*s bulunur. *Chlamydophila psittaci*, hava keseleri ve akciğerlerde sıklıkla enfeksiyona yol açan pansistemik bir hastalığa neden olabilir. Akciğerde mikobakteri enfeksiyonu zaman zaman görülmektedir.

Kronik Aspirasyon: Bu durum elle beslenen yavrularda zayıf büyümenin sık görülen bir nedenidir.

Göze çarpan solunum belirtileri mevcut olabilir veya olmayabilir.

Pulmoner aşırı duyarlılık: Bu durum bazen kakaduların, Afrika gri papağanlarının ve tüy tozu üreten sultan papağanlarının yakınında barındırılan bazı Amerika papağanlarında görülür. Tüy tozuna karşı aşırı duyarlılık reaksiyonu olduğu düşünülmektedir. Polisitemi yaygın bir bulgudur.

Sölomik Kütle/Obezite: Hava keselerine çarpan kitleler veya sıvılar da solunum belirtilerine neden olabilir.

Mycobacterium spp etkenleri özellikle evcil kuşlarda hala en iyi bilinen patojenler olup ve önemli ekonomik kayıplara neden olmaktadır (Hoop, 2002; Hoop ve ark., 1996). *Mycobacterium avium* intracellüler kompleksi ve *Mycobacterium genavense* kuşlar için en sık patojenik olduğu bildirilen türlerdir (Hoop ve diğerleri, 1996; Tell ve diğerleri, 2003a,b). *Mycoplasma galliceptum*'un neden olduğu enfeksiyon, tavuklarda kronik solunum yolu hastalığına, hava kesecik iltihabına ve hindilerde bulaşıcı sinüzite (*Meleagris gallopavo*) neden olur. *Mycoplasma synoviae*, tavuklarda ve hindilerde akut ve kronik artritin etkendir. Mikoplazma türleri tercihen solunum ve genital yolların mukozasında kolonize olur (Gerlach 1994). Psittacine kuşlarında klamidiyazis hastalığına zorunlu hücre içi bakteri *Chlamydia psittaci* tarafından mononükleer fagositlerin yaygın enfeksiyonu neden olur. Klinik bulgular olarak anoreksi, depresyon, solunum sıkıntısı veya ishal gibi klinik belirtilerdir. Klamidyal organizma insanlara kurumuş dışkı ve burun akıntısı yoluyla bulaşarak klinik psittakoz hastalığına neden olabilir. Psittakoz klinik belirtileri arasında grip benzeri semptomlar yer alır ve enfeksiyon ciddi zatürreye veya diğer solunum dışı durumlara yol açabilir (Elder ve Brown, 1999).

Papağanlarda, yırtıcı kuşlarda ve ötücü kuşlarda alt solunum yolu hastalığı (LRTD) yaygın görülmektedir (Chitty ve Monks, 2018). Akciğerlere kılcal kan akışı memelilerdekinden daha fazladır. Hava, arteriyel kan akışının tersi yönde kılcal damarlara yayılır, karşıt akımlar üretir ve son derece etkili bir gaz değişim sistemi ortaya çıkar. Psittasinlerde toz soluma, tahriş edici gazlar, virüsler, bakteriler ve mantar sporları gibi mikroorganizmalar solunum sistemi rahatsızlıklarına veya hastalarına neden olan ajanlardır. Bu etiyolojik faktörler akciğerlerde ve hava keselerinde hasara neden olur ve devam eden irritasyonlar sonunda fibrozis ve granülomların gelişmesine yol açar. Bazen solunum sistemindeki fibrozis ve ödem oluşumları dolaşım ve kalp hastalığından da kaynaklanabilinir.

Yaşlanmanın memelilerde solunum sistemi üzerindeki etkileri diğer organlarda meydana gelenlere benzemekte olup maksimum fonksiyon giderek azalmaktadır. Akciğerlerde yaşa bağlı değişiklikler arasında tepe hava akışında, gaz değişiminde ve yaşamsal kapasitede (maksimum bir nefes almanın ardından dışarı atılabilen maksimum hava miktarı) azalmalar yer alır. Solunum kaslarının zayıflaması ve akciğer savunma mekanizmalarının etkinliğinde azalma görülür. Yaşlanan psittasinlerde, solunum sisteminde bulunan problemler çoğunlukla tozların, tahriş edici gazların ve virüsler, bakteriler ve mantar sporları dahil mikroorganizmaların solunması gibi tekrarlanan hakaretlerle (ve bunun sonucunda ortaya çıkan inflamatuar yanıtlarla) ilişkilidir. Bu tekrarlanan "yaralanmalar" sonuçta kronik skar dokusuna (fibrozis) ve granülomatöz değişikliklere yol açar. Ayrıca dolaşım ve kalp sorunları, tekrarlayan minimal fibrotik reaksiyonlara neden olan (geçici) interstisyel ödemlere yol açar. En sık görülen patolojik değişiklikler kronik pulmoner interstisyel fibrozis ve toz yüklü makrofajların (pnömokonyoz veya antrasilikozis) birikimiyle birlikte fokal granülomlardır.

Alt solunum sistem hastalıklar, pneumonia ve airsaccuitis (hava kesesi) olarak sınıflandırılır. Hipovitamin A, Aspergillozis, yabancı cisim, viral ve bakteriyel etkenler psitasin kuşlarında pneumonia neden olabilir. Hava kesesi yangısı, candida, aspergillos ve bakteriyel kaynaklı olabilir.

Klinik Bulgular

Belirgin sternum hareketleri, kuyruk sallaması, egzersiz ve stres toleransında azalma, ağızdan nefes alma, taşipne, nefes darlığı, ses değişikliği, öksürük ve duyulabilir nefes sesleri ile birlikte genel halsizlik belirtileri alt solunum yolu hastalıklarıyla ilişkili yaygın klinik belirtilerdir.

Tanı

Fizik muayene, teşhis testleri ve solunum yolunun görselleştirilmesi (röntgen görüntüsü) hastalığın teşhisine yardımcı olabilir.

Tedavi

Alt solunum yolu hastalığı olan kanatlı hastaların tedavisine ilişkin hususlar arasında oksijenasyon ve ventilasyon, hava yolu hidrasyonu, destekleyici bakım ve cerrahi müdahale yer alır. Ayrıca bakteriyel pnömoniler ve hava kesecik iltihabı kanatlıların sıklıkla enfeksiyon alanlarını duvarla kapatması nedeniyle uzun süreli tedavi (örneğin 3-8 hafta) gerektirebilir. *Chlamydophila psittaci* enfeksiyonundan şüpheleniliyorsa doksisiklin tercih edilen ilaç olmalıdır.

Kronik Pulmoner İnterstisyel Fibrozis

Kronik pulmoner interstisyel fibrozis, Avrupa'daki yaşlı psittasin popülasyonunda daha sık tanımlanmış olmasına rağmen, Amerika Birleşik Devletleri'nde de bazı psittasinlerde görülmüştür (Drury R. Reavill, DVM, PhD, kişisel gözlemler). Bu sendrom yaşlı Amazon papağanlarında tanımlanmış olup, egzersiz intoleransı ile sonuçlanan kronik bir solunum yolu hastalığı olarak nitelendirilmektedir. Patolojik incelemede fonksiyonel akciğer dokusu kaybı, pulmoner interstisyel fibrozis ve sağ kalp yetmezliği saptandı. Hematoloji, eritrosit boyutundaki artışın ve eritrosit başına hemoglobin kütlesinin artmasının bir sonucu olarak yüksek paketlenmiş hücre hacmini ortaya çıkardı. İki hastada hipoksi ve hiperkapni görüldü. Bu sendromun nedeni belirlenememiştir ancak kuşlarda kronik pulmoner interstisyel fibrozun patogenezinde toksik maddelerin, bakteriyel ve kimyasal toksinlerin, alerjinin veya viral enfeksiyonların rol oynayabileceği öne sürülmüştür. Canlı kuşlarda, kuşun tamamının bilgisayarlı tomografisi, akciğer fibrozisi ile uyumlu genel akciğer değişiklikleri gösterdi.

Akciğer biyopsileri alındıktan sonra, pulmoner interstisyel fibrozun geçici bilgisayarlı tomografi tanısı doğrulandı.

Enfeksiyöz pnömonilerin etiyolojisi akarlar *Sternostoma tracheac*olum (aşk *kuşları (agapornidler)) helmintler Filaria Protozoa toksoplazmozu mantarlar Aspergillus* fumigatus, Allavus*, A. Niger* Bakteriler: *E. coli, Salmonella* spp.(çoğunlukla S. typhimurium), *M. avium* (nadir), Haemophilus paragallinarum (Afrika gri papağanında) (Psittacus erithacus)). mikoplamalar, benzer büyüklükteki ortalama bir memeliden yaklaşık 3 kat daha uzun yaşarlar. Yüksek vücut ısısı, hızlı metabolizma hızı ve yüksek kan şekeri gibi özelliklerine rağmen, yaşlanmanın dejeneratif süreçlerine karşı olağanüstü bir direnç sergiliyorlar; bu da onların özellikle kısa ömürlü olmasını bekleyebilir. Kuşlar yavaş yaşlanıyor gibi görünse de yaşa bağlı bozulma ve hastalık gelişimi birçok açıdan insanlar gibi memelilerinkine paraleldir. Bu nedenle kuşlar yaşlanmaya karşı yeni direnç mekanizmaları ortaya çıkarabilir.

Kuşların modern biyomedikal araştırmalarda kullanılmasının önündeki bir engel, diğer model türlerin kullanımında devrim yaratan, hedefe yönelik genetik manipülasyonların gerçekleştirilememesiydi.

Kriptosporidiosis

Klinik önemi tam olarak anlaşılamamıştır, ancak kriptosporidiyozun kanaryalar ve ispinozlar da dahil olmak üzere birçok kuş türünde ciddi bir hastalık tehdidi olarak ortaya çıktığı görülmektedir. Endojen sporülasyon nedeniyle otoenfeksiyon meydana gelebilir. Gastrointestinal, solunum ve idrar yollarının mukozal epitel hücrelerini enfekte edebilir ve hastalığa neden olabilir. Dışkı flotasyonlarında 4 sporozoit içeren çok küçük ookistler (4 x 8 µm) bulunabilir. Atılan ookistlerin boyutlarının küçük olması ve sayılarının az olması tanıyı zorlaştırmaktadır. Ek teşhis yöntemleri arasında asit hızlı boyama, doğrudan immünofloresan boyama veya dışkı numunelerinin ELISA'sı bulunur. Ayırıcı tanılar arasında mide-bağırsak ve solunum yolu hastalığının diğer nedenleri yer alır.

Toksoplazma

Kediler ve diğer kedigiller tek kesin konakçıdır. *Toksoplazma gondii.* temel olarak herhangi bir sıcakkanlı hayvan, kedilerin salgıladığı ookistlerin yenmesi yoluyla ara konakçı olarak enfekte olabilir. Kuşlardaki enfeksiyonların çoğu subklinik ve asemptomatiktir. Enfeksiyonun akut evresinde kuşlarda ciddi solunum belirtileri görülebilir. Kronik enfeksiyonlarda tipik belirtiler arasında körlük, ataksi ve tortikolis bulunur. Antemortem tanı zordur ve artan antikor titresine dayanır.

Korunma

Kedilerle doğrudan ve dolaylı temasın ortadan kaldırılmasına dayanır. Açıklanan tedavi, 14 ila 28 gün boyunca her 12 saatte bir oral olarak 0,5 mg/kg pirimetamini veya 0, 1, 2, 4, 6, 8 ve 10. günlerde her 24 saatte bir oral olarak 10 mg/kg diklazuril içermektedir.

Tanı Testleri

Fizik Muayene: Solunum yolu hastalığı olan bir kuşun fizik muayenesi dikkatle yapılmalıdır. Kuşun dik tutulması ve stresin önlenmesi için muayenenin hızlı bir şekilde tamamlanması gerekir. Zaten sorunlu olan solunumunu engellememek için kuşa nazikçe dokunulmalıdır. Muayenenin düşük ışık altında, sessiz bir ortamda, hatta sedasyon veya hafif anestezi altında yapılması kuşta oluşan stresi en aza indirecektir.

Solunum yolu hastalığı olan bir kuşta anestezi ve sedasyon mutlaka kontrendike değildir ve hatta muayeneyi daha güvenli hale getirebilir. Anestezi sadece muayenenin stresini azaltmakla kalmaz ve taşımanın yanı sıra, nefes darlığı çeken bir kuş için tedavi edici olabilecek ve başlı başına kuş için zararlı olan hızlı nefes almayı azaltan, oksijen açısından zengin bir ortam da sağlar. Pediatrik bir stetoskop kullanarak ventral ve dorsal toraksı askülte edin. Hızlanan sesleri, tıklamaları, patlamaları, kabarcıklanma seslerini ve kalp üfürümlerini/aritmilerini dinleyin. Normal kuşun çok az sesi vardır; Anormal solunum sesleri en sık dorsal torakstadır. Eğer güvenliyse, hafif egzersiz, duyulabilir sesleri artırabilir ve egzersiz toleransını gösterebilir. Solunum sistemini etkileyebilecek sölomik genişleme için karnı palpe edin. Kuşun elleçlendikten sonra ne kadar çabuk iyileştiğini unutmayın (Lawton,1999)

Kan alma Tekniği

Küçük kanatlı hastada kan alımı için sağ vena jugularis damarı tercih edilen bölgedir. Kuşta kan almak 26, 27 veya 30 çaplı bir iğne veya 27 veya 30 çaplı bir iğnenin takıldığı bir insülin şırıngası kullanılarak 0,3 ila 1 mL'lik kadar kan alınabilinir. Sağ ven jugularis dışında alternatif kan almalar Vena *median metatarsal Vena ulnar Vena basilica* veya tırnak uçu bölgelerinde kan alımı yapılır. Ancak bu durum küçük türlerde yetersiz kan örneği hacmine, kontamine örneklere veya büyük hematomlara neden olabilir. Alternatif olarak, damara bir iğne yerleştirilebilir ve kan doğrudan iğnenin göbeğinden mikro-hematokrit tüplerine alınabilir. Bu açık toplama tekniği, düşük tansiyonu olan veya damarları kolayca hasar gören hastalarda işe yarar çünkü damara yerleştirilen iğnenin hareketi minimum düzeyde kalır (de Matos ve Morrisey, 2005).

Tam Kan Sayımı: Bir kuşta herhangi bir sorun olup olmadığı araştırılırken çok önemlidir. Anemi birçok kronik hastalıkta yaygındır; Pulmoner aşırı duyarlılık sendromu olan kuşlarda polisitemi görülebilir. Lökositoz varlığı enfeksiyon/enflamasyonu gösterir. Monositoz, klamidya, aspergilloz ve mikobakteriyoz gibi kronik enfeksiyonlarla ilişkili olabilir.

Biyokimya Paneli: Yaygın analitlerin hiçbiri solunum sistemini değerlendirmez. Diğer sağlık faktörlerini değerlendirmek için kullanın.

Protein Elektroforezi: Bazı fraksiyonların yükselmesi spesifik değildir ancak akut veya kronik bulaşıcı hastalığı işaret edebilir. Örneğin, aspergillozlu kuşlarda β globulinlerde artış, albüminde azalma ve albümin/globulin oranında azalma kaydedilir.

Radyografi/Görüntüleme: Solunum yolu hastalıkları sorunları üzerinde çalışırken gerekli olan görüntüleme, stresi ve hareket artefaktını azaltmak için en iyi şekilde anestezi altında yapılır. Hem VD hem de lateral tüm vücut görüntüleri alınmalıdır. Ayrıntı tekniğe bağlıdır, bu nedenle makinenizin ve film/ekran kombinasyonunun normal görünümünü öğrenin. Akciğerler, hava keseleri ve trakea değerlendirilebilir; ancak radyografi hafif lezyonları tespit edecek kadar hassas değildir, dolayısıyla radyografik değişikliklerin olmaması alt solunum yolu hastalığını dışlamaz. Trakeal lümendeki kitleler büyükse tanımlanabilir. Syrinks'in radyografik değerlendirmesi zordur. Kuşların akciğerleri genişlemez ve çok farklı tübüler anatomiye sahiptir; dolayısıyla memelilerin radyografik desenleri kuşlar için geçerli değildir. Akciğerlerde normal retiküler düzende değişiklik olup olmadığına bakın: kalınlaşmış veya düzensiz parabronşiyal düzen ve konsolidasyon veya granülomlara işaret edebilecek radyo-yoğun alanlar. Hava keselerindeki değişiklikler arasında kalınlaşma (hava kesesi kenarlarında grimsi bir çizgi şeklinde görünebilir) ve katı maddeyle dolma (granülomlar) yer alır. Hiperenflasyon ve "fıçı sandığı"nın varlığı da alt solunum yolu hastalığına işaret edebilir. Bilgisayarlı otomatik tomografi ve manyetik rezonans görüntüleme çalışmaları akciğer ve hava kesesi kitlelerinin belirlenmesinde daha duyarlı tekniklerdir**.**

Endoskopi/Biyopsi: Trakea ve alt sistem standart teleskoplar kullanılarak görüntülenebilir. Trakeaya glottis yoluyla yaklaşılır ve sirinks seviyesine kadar ulaşılabilir. Kaudal torasik ve abdominal hava keseleri standart sol yan yaklaşımla görüntülenebilir. Akciğerin yalnızca kaudal ventral yüzeyi görülebilir; ostia her iki hava kesesinde de görüntülenebilir. Küçük veya yaygın hava kesesi lezyonlarından biyopsi alınması kolaydır.

Büyük granülomlardan kalın bir dokuya sahip olmaları durumunda biyopsi yapılması zor olabilir.

kapsül. Akciğer biyopsisi mümkündür; ancak kuş akciğeri oldukça damarlıdır, dolayısıyla bu rutin bir teknik değildir.

Trakeal Yıkama: Akciğerleri veya trakeayı etkileyen mikrobiyal bir hastalıktan şüpheleniliyorsa yıkama endikedir. Hastaya izofluran veya sevofluran ile maske anestezisi yapılır ve maske çıkarılır.

Hızla hareket ederek, glottis içerisine steril bir kateter sokulur ve yavaşça torasik giriş seviyesine kadar geçirilir. Steril salin (bakteriostatik maddeler içermeyen!) hızla infüze edilir ve ardından aspire edilir. 0,5–1,5 mL/kg salin hacimleri kullanılabilir ve geri kazanım, infüze edilen hacmin ~%25–50'sidir. Numune hem bakteri hem de mantarlar için kültürlenmelidir. Aspirasyon pnömonisinden şüphelenilmesi durumunda anaerobik kültürler de endike olabilir. Sitoloji, hücreleri yoğunlaştırmak için yerçekimi veya santrifüj kullanılarak yapılabilir, ancak çoğu zaman tanısal değildir.

Hava Kesesi Yıkama: Bu teknik yapılabilir; ancak endoskopi tercih edilir. Sol yan kesi yoluyla kaudal torasik veya abdominal hava kesesine bir tüp sokulur. Az miktarda salin verilir ve ardından aspire edilir. Bazı klinisyenler daha fazla miktarda salin kullanılmasını ve aspirasyondan önce kuşun rotasyonunu savunmaktadır.

Belirli Hastalıklara Yönelik Testler. Belirli hastalıklardan şüpheleniliyorsa (örneğin, klamidya, aspergilloz) çeşitli serolojik ve PCR testlerine başvurulabilinir.

PAPAĞANLARIN SOLUNUM SİSTEMİ HASTALIKLARINDA TEDAVİSİ

Antibiyotikler

Solunum hastalıklarının tedavisi için önerilen antibiyotik dozajları ve uygulama yolları tablo 2 de özetlenmiştir ((Clubb 1986, Quesenberry 1988, Lawton 1993).

Tablo 2: Papağanların Solunum Sistemi Hastalıklarında Kullanılan Antibiyotikler

İlaç	Doz	Kullanım Şekli	Kullanım Sıklığı
Amikacin	10-20 mg/kg	İm (intramusculer)	Günde iki kez
Amoxycillin	200 mg/kg	PO (peros)	Günde iki kez
Amoxycillin LA	250 mg/kg	SC (subcutan)	Günde bir kez
Amoxycillin+ clavulanate	14 mg/kg	PO (peros)	Günde iki kez
Amphotericin B	0-75 mg/kg 25 mg/15 ml Alevire 3 ml seyrelticide 1 mg/kg	PO (Peros) Nebülizasyon IT (Intratracheal)	Günde bir kez Günde iki kez Günde bir kez
Ampicillin	100-200 mg/kg	po, sc veya im	Günde iki-üç kez
Bromhexine	1.5 mg/kg	IM	Günde bir kez
Carbenicillin	100-200 mg/kg	IM	Günde iki kez
Cephalexin	50 mg/kg	PO veya SC	Günde iki-üç kez
Doxycycline	10-20 mg/kg 100 mg/kg	PO veya IM IM	Günde bir kez Haftada bir kez
Enrofloxacin	15 mg/kg	IM	Günde bir kez
Gentamicin	5-10 mg/kg	IM	Günde iki kez
Itraconazole	5 mg/kg	PO	Günde bir kez
Metronidazole	5-10 mg/kg 40 mg/kg 160-260 mg/kg	IM PO PO	Günde iki kez Günde bir kez (4 gün boyunca) Bir kere
Nystatin	100,000 IÜ	PO	Günde bir kez
Oxytetracycline LA	50 mg/kg	IM	Günde bir kez
Tobramycin	2-10 mg/kg	SC veya IM	Günde bir kez
Tylosin	50 mg/kg	PO, IM veya nebulizasyon	Günde üç kez

Vitaminler

Tüm solunum yolu hastalığı vakalarında A vitamini tedavisi önerilir. Şu anda papağanlara verilen diyetlerin çoğunluğu vitamin ve mineral bakımından yetersizdir ve en yaygın eksiklik A vitaminidir (Lawton 1988). Diyete koyu yeşil ve turuncu sebzeler eklenerek provitamin A karotenoidleri verilebilir. Ancak başarı, kuşun sebze yeme isteğine bağlıdır ve bu da çoğu zaman gerçekleşmez. A vitamininin terapötik dozları günlük 5 ila 50 iu/g vücut ağırlığı arasında değişir; idame dozu günlük 0.25 ila 1 iu/g vücut ağırlığıdır.

Diğer terapötik ajanlar

* Kortikosteroidler bazen toksemili veya hava yolu tıkanıklığı olan veya şoktaki kuşlarda endikedir (Lawton ve Cooper 1988).

Bağışıklığın baskılanması bazı enfeksiyonları, özellikle de aspergillozu şiddetlendirebileceğinden, kortikosteroidlerin rutin olarak kullanılmasına dikkat edilmelidir.

* Doxapram (Dopram; Fort Dodge) gibi 0-5 ml/kg solunum uyarıcıları ciddi solunum sıkıntısı vakalarında faydalıdır.
* İyot eksikliğine bağlı hipotiroidi tedavisinde iyot takviyesi gerekir. Bir ölçü Lugol iyotunun 14 ölçü suya dönüştürülmesiyle stok iyot çözeltisi hazırlanır. Üç hafta boyunca her 30 ml içme suyuna günde bir damla stok solüsyonu eklenir (Blackmore ve Cooper 1982).
* Bağışıklık sistemini uyarmak amacıyla 2 mg/kg levamizol kullanımı (Redig 1983) tartışmalı olmaya devam etmektedir.

Antibiyotik Tedavisinin Uygulama Yolları

Topikal

Burun deliklerine, gözlere veya ağza antibiyotik damlaları uygulanabilir. Bu, rinit veya konjonktivit tedavisi için etkili bir yoldur.

İntrasinüs enjeksiyonu

Kuş baş aşağı tutulduğunda 23 çaplı (numaralı) bir iğne sokulur ağız açısının dorsalinde, burun deliği ile medial kantusun ortasında (Coles 1988). Hartmann solüsyonu sinüsleri temizlemek ve burun deliklerinden, ağızdan veya gözlerden drenaj yapmak için kullanılabilir. Bu yolla antibiyotikler doğrudan sinüslere de enjekte edilebilir.

Su içinde uygulama

Bu rota yalnızca sürülerin tedavisi için tavsiye edilir. Su alımı olabilir tat veya rengin değişmesi nedeniyle azalır. Bu nedenle dozlamanın 'doğru ya da eksik' olmasına yol açar.

Yemeğin içinde uygulama

Bu, gıda olarak ilaç vermenin en az tatmin edici yöntemidir. Hasta kuşların alımı sıklıkla azaltılır ve ilaç tedavisi yemeğin tadını değişebilir. Bu nedenle dozajın isabet etmesine veya kaçırılmasına yol açar. Ayrıca yiyecek ilacın emilimini etkileyebilir.

Krop tüp aracığla uygulama

Krop hortumu pratikle kolaydır. Yemek borusundan kursağa doğru bir dozda ilaç verilmesini sağlayan bir tüp geçirilir. Dezavantajı ise oral yolların daha fazlasını gerektirmesidir.

Parenteral injeksiyon

Hastanede yatan bir kuşun tedavisi için önerilen yol parenteral uygulamadır. Uzun etkili preparatların yalnızca günlük olarak uygulanması gerekebilir. Kas içi enjeksiyonlar kuadriseps veya pektoral kaslara yapılabilir.

intratrakeal enjeksiyon

İntratrakeal enjeksiyon tekniği antibiyotiklerin uygulanmasına izin verir. Doğrudan solunum yollarına uygulanır. Aspergilloz için olası bir tedavi rejiminin parçası olarak steril suda amfoterisin B kullanılması önerilmiştir (Altman 1979, Redig 1983). Ancak bu yol kuşlar için stresli olabilir ve solunum sıkıntısı yaşayanlarda dikkatli kullanılmalıdır.

Nebülizasyon

Antibiyotikler salin, Alevaire veya dimetilsülfoksit ortamında verilir. Parçacık boyutu, hava keseleri boyunca sirkülasyona izin vermek için 0,3 ila 6 µm arasında olmalıdır. Nebülizasyon, özellikle mikoplazmal enfeksiyonla ilişkili vakalarda pnömoni ve hava kese iltihabı için iyi bir tedavi yöntemidir.

KAYNAKLAR

Altman, R. B. (1979) Respiratory diseases of caged birds. Ed W. J. Boever. Veterinary Clinics of North America: Small Animal Practice 9, 391-403.

Arca-Ruibal, B. (2016). Disorders of the respiratory system. *Avian medicine*, 385-395.

Blackmore, D. K. & Cooper, J. E. (1982) Diseases of the endocrine system. In Diseases of Cage and Aviary Birds, 2nd edn. Ed M. L. Petrak. Philadelphia, Lea & Febiger. pp 478-490

Chitty, J., Monks, D. (2018). Lower respiratory tract disease. In BSAVA Manual of Avian Practice. BSAVA Library. pp. 324-333.

Clippinger, T. L. (1997, October). Diseases of the lower respiratory tract of companion birds. In Seminars in Avian and Exotic Pet Medicine (Vol. 6, No. 4, pp. 201-208). WB Saunders.

Clubb, S. L. (1983) Viscerotropic velogenic Newcastle disease in pet birds. In Current Veterinary Therapy VIII: Small Animal Practice. Ed R. W. Kirk. Philadelphia, W. B. Saunders. pp 628-629

Clubb, S. L. (1986) Therapeutics (individual and flock treatment regimes). In Clinical Avian Medicine and Surgery Including Aviculture. Eds G. J. Harrison and L. R. Harrison. Philadelphia, W. B. Saunders. pp 327-355

de Matos, R., & Morrisey, J. K. (2005, April). Emergency and critical care of small psittacines and passerines. In Seminars in Avian and Exotic Pet Medicine (Vol. 14, No. 2, pp. 90-105). WB Saunders.

Dorrestein, G.M. Respiratory Disease. In Handbook of Avian Medicine; Tully, T.N., Dorrestein, G.M., Jones, A.K., Eds.; W.B. Saunders Ltd.: Philadelphia, PA, USA, 2009; pp. 97–98.

Elder, J., Brown, C. (1999). Review of techniques for the diagnosis of Chlamydia psittaci infection in psittacine birds. Journal of veterinary diagnostic investigation, 11(6), 539-541.

Galosi, L., Falcaro, C., Danesi, P., Zanardello, C., Berardi, S., Biagini, L., Rossi, G. (2022). Atypical mycosis in psittacine birds: A retrospective study. Frontiers in Veterinary Science, 9, 883276.

Gibson, D. J., Nemeth, N. M., Beaufrère, H., Varga, C., Eagalle, T., Susta, L. (2019). Captive psittacine birds in Ontario, Canada: a 19-year retrospective study of the causes of morbidity and mortality. Journal of Comparative Pathology, 171, 38-52.

Harcourt-Brown, N. H. (2000). Psittacine birds. Avian Medicine. Edinburgh: Butterworth-Heimann, 1, 12-143.

Hoop, R.K. (2002). Mycobacterium tuberculosis infection in a canary (Serinus canaria L.) and a blue-fronted Amazon parrot (Amazona amazona aestiva). Avian Diseases, 46, 502-504.

Hoop, R.K., Bo¨ ttger, E.C. Pfyffer, G.E. (1996). Etiological agents of mycobacterioses in pet birds between 1986 and 1995. Journal of Clinical Microbiology, 34, 991-992.

Jenkins, R.J. Avian critical care and emergency medicine. In Avian Medicine and Surgery; Altman, R.B., Clubb, S.L., Dorrestein, G.M., Quesenberry, K.E., Eds.; W.B. Saunders Ltd.: Philadelphia, PA, USA, 1997; pp. 839–863.

Kingsley, E. P., Eliason, C. M., Riede, T., Li, Z., Hiscock, T. W., Farnsworth, M., Clarke, J. A. (2018). Identity and novelty in the avian syrinx. Proceedings of the National Academy of Sciences, 115(41), 10209-10217.

Lawton, M. (1999). Management of respiratory disease in psittacine birds. In Practice, 21(2), 76-88.

Riede, T., Thomson, S. L., Titze, I. R., Goller, F. (2019). The evolution of the syrinx: An acoustic theory. PLoS biology, 17(2), e2006507.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

PAPAĞANLARDA TÜY YOLMA: ETİYOLOJİ-TANI- TEDAVİ

Süleyman KOZAT
Department of Internal Medicine, Faculty of Veterinary Medicine, Van Yuzuncu Yil University
ORCID: 0000-0001-5089-2623

Özet
Günümüzde evlerde barındırılan papağan sayılarında artış olmaktadır. Papağanlarda solunum, sindirim ve dolaşım sistemi hastalıkların yanı sıra deri ve deri hastalıkları da gün gittikçe önem kazanmaktadır. Kanatlı vakalarında tüy yolma en yaygın görülen durumlardan biri olup ve aynı zamanda en sinir bozucu olanlardan biridir. 'Tüy yolma bir hastalıktan ziyade bir sendrom olarak tanımlanmalıdır. Veteriner hekimler, papağanlarda tüy yolmaya rahatsızlığına uygun terapötik tedavi yapabilmek için tüy yolmanın nedenini doğru teşhis etmeyi amaçlamalıdır. Bu araştırmada papağanlarda görülen tüy yollama hastalığının etiyolojisi ve tedavisi hakkında bilgi verilecektedir.
Anahtar Kelimeler: Papağan. tüy, yolma

FEATHER PLUCKING IN PARROTS: ETIOLOGY -DIAGNOSIS-TREATMENT

Abstract
Nowadays, there is an increase in the number of parrots kept in homes. In addition to respiratory, digestive and circulatory system diseases in parrots, skin diseases are also becoming increasingly important. Feather plucking is one of the most common occurrences in poultry and is also one of the most annoying. Feather plucking should be defined as a syndrome rather than a disease. Veterinarians should aim to accurately diagnose the cause of feather plucking in order to provide appropriate therapeutic treatment for feather plucking in parrots. In this study, information will be given about the etiology and treatment of feather picking disease in parrots.
Keywords: Parrot, feather, plucking

Giriş

Son yıllarda evcil hayvan olarak papağanlara olan talep arttı ve bu da onları, örneğin Amerika Birleşik Devletleri'nde köpek ve kedilerden sonra en popüler üçüncü evcil hayvan haline getirdi (Acharya ve Rault, 2020). Psittasinlerdeki deri problemleri, özellikle tüylere zarar veren davranışlar veteriner kliniklerine en sık görülen durumlarda biridir (Mahdavi ve ark. 2023). Kafes ortamında barınan papağanların tüylerine zarar verme veya tüy yolma olarak da adlandırılan durum sıklıkla karşılaşılan bir davranış bozukluğudur (Van Zeeland ve ark., 2009). Kafes papağan popülasyonunun yaklaşık %10'unun tüy yolmada muzdarip olduğu veriler bildirmiştir (Van Zeeland ve ark., 2009; Costa ve ark., 2016). Bu davranış bozukluğuna çeşitli faktörler (tıbbi, fiziksel ve/veya davranışsal, çevresel, genetik ve nörobiyolojik) değişik derecelerde rol oynamaktadır. Tüy yolmada rol oynayan faktörler Tablo 1 de özetlenmiştir.

Tablo1.: Papağanlarda tüy yolmada rol oynayan etiyolojik faktörler

Medikal **nedenler**	**Psikolojik (davranışsal) nedenler**	**'Sosyal' amaç**
• Endoparazitler • Solunum/temas/gıda alerjisi • Ektoparazitler • Deri irritasyonu • Deri kuruması • Hipotiroidizm • Ağrı • Üreme hastalıkları • Sistemik hastalıklar özellikle karaciğer • Hipokalsemi • Proventicular dilatasyon • Sancı • Klamidofiloz • Hava kesesi iltihabı • Ağır metal toksikozu • Bakteriyel/mantar foliküliti • Genetik (örneğin tüy şekil bozuklukları) • Yetersiz beslenme • Neoplazi	• Dikkat çekme çabası • Ayrılık kaygısı • 'Can sıkıntısı' • Obsesif kompulsif bozukluk • Endişe • Fobi • Genetik • Alışkanlık/pekiştirilmiş davranış • Üreme ile ilgili	• Düzeltme davranışları öğrenilememesi. • 'Aşırı yorgunluk' ve uygunsuz günlük rutin • latrojenik, özellikle zayıf kanat kesiminin ardından • Üreme ile ilgili

Teşhis ve Tedavi yaklaşımı

Veteriner hekimlik mesleği kafes kuşlarında tüy yolma bozukluğunun etiyolojisine ilişkin anlayışı henüz emekleme aşamasındadır. Pek çok araştırmada, tüy yolmanın gelişimi için varsayılan sosyal, çevresel ve tıbbi risk faktörlerini listelenmiştir. Ancak bu bilgilerin çoğu bilimsel araştırmalardan ziyade klinik deneyimlere dayanmaktadır (Jayson ve ark., 2014). Esaret altında papağanlar; ısırma, çığlık atma, tüy yolma, kendine zarar verme, insanın yönlendirdiği cinsel davranışlar ve fobiler veya basmakalıp davranışlar sergileme gibi çok çeşitli davranış sorunları geliştirmeye eğilimlidir (Meehan ve ark., 2004; Lightfoot ve Nacewicz, 2006).

Papağan tüy yolma ve çiğnemesi hakkında sağlıklı bilgilerin elde edilmesi için belirli bir protokol çerçevesinde aşağıda özetlenen aşamalardan ve kapsamlı özelleştirilmiş form hazırlanarak muayeneye başlanılmalıdır (Chitty, 2003).

- Tüy yolma tespit edilen kuşun yalnız mı yoksa birde fazla kuşla aynı kafeste yaşayıp yaşamadığı tespit edilmeli.
- Herhangi bir klinik muayeneden önce tam ve ayrıntılı bir öykü (tür, cinsiyet ve yaş, yetiştirme ayrıntıları, yetiştirme ve barınma, beslenme ve davranış, sahibi ve türdeşleriyle etkileşim ve kanat kırpma dahil) alınmalıdır.

- Normal tüy düzeltme davranışı, içsel tüy kaybı (kendi kendine neden olmayan veya anormal tüylerin normal şekilde taranmasının sonucu olmayan) ve tüy yıkıcı davranışın (etiyolojiden bağımsız olarak kendiliğinden oluşan tüy kaybı, hasar veya tahribat) ayırt edilmesi gerekir (Rubinstein ve Lightfoot, 2014; Van Zeeland ark., 2009).
- Temizleme, bireysel olarak (derinin ve tüylerin korunması için) veya sürüdeki kuşlar arasında karşılıklı bağları güçlendirmek için gerçekleştirilebilecek önemli bir sosyal davranıştır (Van Zeeland ve diğerleri, 2009; Kubiak, 2015).
- Bununla birlikte, kendini rahatlatan temizleme işlemi kontrolden çıkabilir ve önemli ölçüde yüksek dışkı kortikosteron düzeyleriyle desteklendiği gibi, stres zamanlarında bir başa çıkma stratejisi olarak rapor edilmiştir (Garner ve ark., 2003).
- Kuşların bir arada barındırıldığı durumlarda, kendi kendine yolma ile başkaları tarafından yapılan yolma arasında ayrım yapmak da önemlidir (Chitty, 2003; Lightfoot ve Nacewicz, 2006).
- Psikojenik tüy yolma ile karşılaştırıldığında stereotipler (orijinal bağlamlarının dışında, belirgin bir amaç olmadan gerçekleştirilen tekrarlayan davranışlar) üzerindeki belirgin şekilde farklı genetik ve çevresel etkileri tanımlanmalıdır.

Veteriner hekim bu kapsamlı protokol muayenesinden sonra tüy yolma davranışına neden olan nedenlere ilişkin bir tedavi stratejisi geliştirmelidir. Mümkün olduğunda deri ve tüyün tam bir fiziksel muayenesi yapılmalıdır. Bu muayenede tüy kaybı ve dağılım şekli (yalnız kafadaki, yalnızca gövdedeki veya baş ve gövdedeki tüy kaybı), tüylerin ve derinin görünümü ilgili bulguları dikkatle değerlendirilmelidir. Afrika gri papağanlarında kanat altı piyoderması tüy kaybına neden olabilecek cilt bozuklukları arasında yer alırken, Agapornis cinsi muhabbet kuşlarında veya psittacine gagası(kukla papağanı ve Avustralya ot muhabbet kuşları gibi daha küçük papağanlarda polyomavirüs gibi viral enfeksiyonlar tüy hastalığına yaygın olarak neden olmaktadır (Van Zeeland, 2009; Kubiak, 2015).Tüy yolma hastalığının psikojenik kökenli olup olmadığı mutlak belirlenmelidir (Rubinstein ve Lightfoot, 2014). Psikolojik kökenli olmayan vakalardan hematolojik ve biyokimya parametreler, dışkı parazitolojisi ve sitolojiyi içeren minimum bir veri tabanı toplanmalıdır. Ayrıca tıbbi sorunları (nedenleri) ekarte etmek için tüm vücut radyografileri görüntülenmeli ve *Chlamydophila psittaci* testi yapılmalıdır.

Hem tıbbi/sağlıksal hemde çevresel açıdan ilişkili olduğu düşünülen kronik beslenme bozukluklarında çeşitli tüy distrofileri görülebilinir. Daha az sıklıkla viral enfeksiyonlar *(Circovirus*, *Polyomavirus*) ve parazit istilaları tüy folikülüne ve gövdesine tutunmaları sonucu tüyleri gövdelerini zayıflatarak tüyün kolayca dökülmesine neden olmaktadır (Rubinstein ve Lightfoot, 2014). Bunun mümkün olmadığı durumlarda, klinisyen hastanın geçmişini, semptomlarını ve klinik belirtilerini göz önünde bulundurarak bilgilendirici olma olasılığı daha yüksek olan testleri seçmelidir (Rubinstein ve Lightfoot, 2014). Tıbbi bir sorun tespit edilirse spesifik bir tedavi hedeflenebilir. Bununla birlikte, sahiplerine, fiziksel bir sorun ele alınıp çözüldüğünde bile hayvanın alışkanlıktan dolayı tüylerini yolmaya devam edebileceğini belirtmek her zaman önemlidir.

Tüylere zarar verme davranışı, yani biyolojik bir ihtiyaç olmaksızın tüylerin kasıtlı yolunması ya yuva kaplama, üreme gösterimi, tüylerinin taranması maksadıyla yapılır ya da esaret altındaki papağanlarda sıklıkla görülen karmaşık bir sendromdur. Papağanların tüylerine zarar verme davranışı çoğunlukla sistemik sağlık veya psikolojik sorunlardan kaynaklanmaktadır. Bazen psikolojik nedenlere bağlı olarak kendi tüylerine zarar veren vakalarda başarılı bir şekilde tedavi edilse bile tedavi yanıt vermeyebilir.

Beşeri hekimlikte Lityum, 100 yılı aşkın sürede insanlarda depresyonu tedavi etmek için kullanılmakta ve aynı zamanda kuş türleri için de gerekli bir mikro besin maddesi olabilir. Kendine zarar verici davranışlar sergileyen veya kendine zarar veren kuşlarda bir tür depresyon veya beslenme eksikliği olabileceği göz önünde bulundurulması gerektiği vurgulanmıştır (Cruser,2019). Papağanlarda psikolojik neden dışında tüy dökülmesine neden olan durumlar aşağıdaki belirtilen durumlardan kaynaklana bilinir:

✓ Dermatit (yaygın olmayan, alerjik, paraziter, bakteriyel veya kontakt toksisite olabilir)
✓ Tüy travması (aynı türlerden, uygunsuz barındırmadan, yakalama travmasından veya pençelemeden kaynaklanan)
✓ Üreme hastalıkları (yumurta tutulması, yumurtalık kistik hastalığı, neoplazi)
✓ Endokrin patolojisi (hipotiroidizm, gonadal ve endokrin neoplazmlar)
✓ Kardiyovasküler hastalıklar (ateroskleroz, kardiyomiyopati)
✓ Beslenmeye bağlı sekonder hiperparatiroidizm dahil ortopedik ağrı
✓ Dahili inflamasyon veya ağrı (çoğunlukla hepatit, böbrek patolojisi, enterit veya hava kesesi iltihabına bağlı)
✓ Nöropatiler (ağır metal intoksikasyonu, klamidya, proventriküler dilatasyon sendromu, böbrek veya üreme hastalıklarıyla birlikte siyatik sinir sıkışması)
✓ Beslenme eksikliği (hipovitaminoz A, obezite, hipokalsemi, amino asit ve eser mineral eksiklikleri)
✓ Genetik nedenler (örneğin; muhabbet kuşlarında tüy silgi sendromu, kanaryalarda tüy kistleri ve lutino sultan papağanlarında kafa tüylerinin bulunmaması)
✓ Toksikozlar (kronik çinko veya aflatoksin alımı, fenbendazol uygulaması, ekzojen hormon uygulaması, juvenillerde klortetrasiklin uygulamasını takiben depigmentasyon)

Günümüzde kuşlarda tüy kaybı problemleri nedenleriyle ilgili yaygın nedenin psikolojik kaynaklı olduğu belirtilmektedir. Bu vakalarda etiyolojik faktörlerin çok çeşitli olması tüy dökülmesinin tedavisini zorlaştırmaktadır. Geçmişte evcil kuş türlerinde tüy kaybının altında yatan nedenlere ilişkin kontrollü çalışmaların göreceli olarak az olması, tüy kaybı ve tüy yıkıcı davranışlara ilişkin mevcut veteriner hekimlik bilginin azlığında kaynaklanmaktadır. Evcil kuşlarda tüy yıkıcı/bozukluğu davranış ile ilgili psikolojik sorunları çözmeye yönelik zorlu arayışta, altta yatan nedenleri belirlemek için tüy yolmasının/dökülmesinin tüm olası tetikleyicilerin titizlikle değerlendirilmesi gerekmektedir.

Herhangi bir klinik muayeneden önce tam ve ayrıntılı bir öykü (tür, cinsiyet ve yaş, yetiştirme ayrıntıları, kaynak, yetiştirme ve barınma, beslenme ve davranış, sahibi ve türdeşleriyle etkileşim kanat kırpma dahil) olup olmadığı dikkatte alınmalıdır. Normal tüy düzeltme davranışı, içsel tüy kaybı (kendi kendine neden olmayan veya anormal tüylerin normal şekilde taranmasının sonucu olmayan) ve tüy yıkıcı davranışın (etiyolojiden bağımsız olarak kendiliğinden oluşan tüy kaybı, hasar veya tahribat) ayırt edilmesi gerekir (Rubinstein ve Lightfoot, 2014). Temizleme, bireysel olarak (derinin ve tüylerin korunması için) veya sürüdeki kuşlar arasında karşılıklı bağları güçlendirmek için gerçekleştirilebilecek önemli bir sosyal davranış olduğu unutulmamalıdır (Van Zeeland ve diğerleri, 2009; Kubiak, 2015; Garner ve diğerleri, 2003). Veteriner Hekimin karşılaştığı ilk klinik ikilem, tüy kaybının içsel mi yoksa tüy yıkıcı davranıştan mı kaynaklandığını belirlemektir.

1-**Davranışsal nedenleri yönetmek**

Davranışsal bozuklukları düzeltmenin çözümü papağanın sahibi evde bulunduğu sürece papağanın yalnızca bir saat kadar değil, günün her saatinde meşgul etmelidir. En sevdiği yiyeceği kafesin veya standın tepesinden asılmalıdır, böylece kuşun onu yakalamak için çalışması gerekir.

Papağanın yiyecek bulmak için çalıştığı ya da herhangi bir şekilde meşgul olduğu her an, tüylerini yolmak için harcamadığı zamandır. Papağanı meşgul etmek genellikle zor bir iştir, ancak tüy yolma döngüsünü kırmaya çalışmanın tek yolu budur. Papağanın sahibi, kuşun zekasını ve kişiliğini geliştirmeye ve zorlamaya odaklanmayı tercih etmelidir (Roy, 2016).

İşe yaramayacak tedaviler ve çözümler şunlardır:

- Başka bir kuş almak, Yeni kuşun, mevcut kuşun gördüğü şekilde hiyerarşi sistemine yerleştirilmesi gerekecektir ve bu genellikle sorunu karmaşık hale getirecektir.
- Kuşa daha fazla veya yeni oyuncaklar vermek – kuşların çoğu kafeslerindeki yeni şeylerden hoşlanmaz ve her halükarda kuş, sahibiyle iletişim kurmayı tercih eder.
- Papağanın gagasını vücudundan uzak tutmak için bir tasma takmak – bu muhtemelen biraz acımasızdır ve tasma çıkarılır çıkarılmaz papağan tüyleri yolmaya devam edecektir.
- İlaçlar – davranışın nedeni kuşun depresif hali değildir ve bu durumda kuşun duyularının köreltilmesi uygun bir tedavi değildir.

Stres faktörlerini ortadan kaldırmak

Papağan için strese neden olan durumaları ortaya çıkarırken sağduyulu davranmak önemlidir Davranış sorunlarına neden olabilecek stres faktörleri ve herhangi bir şey tüy hasarı olayını tetikleyen bir olay olarak değerlendirilmeli ve bu nedenle ortadan kaldırılmalıdır. Bunun için aşağıdaki durumların olup olmadığı tespit edilmelidir.

a) Evde yırtıcı hayvanların varlığı

Herhangi bir düşmanlığın tanımlanamadığı durumlarda bile evdeki evcil hayvanlar da dahil olmak üzere yırtıcı hayvanların varlığı veya bir pencereden veya kafesin çatısından yırtıcı yabani hayvanların (diğer kuşlar dahil) bulunması, kronik bir stres etkeni olabilir (Luescher 2006). Hastanın yönetimi ve sağlığı (organ fonksiyon değerlendirmesi dahil) kapsamlı bir şekilde değerlendirilmeden veya diğer nedenler ele alınmadan hiçbir farmakolojik tedavi başlatılmamalıdır.

Trisiklik antidepresanlar

Klomipramin gibi trisiklik antidepresanlar (TCA'lar), ek dopamin antagonizması olan serotonin-noradrenalin geri alım inhibitörleridir (Gillman 2007). İnsan hekimliğinde kompulsif bozuklukları, fobileri, narkolepsiyi ve depresyonu kontrol etmek için kullanılır (Starkey ve diğerleri 2008 ; Seibert 2007). Klomipramin, serotonin için daha fazla seçiciliğe sahiptir ve TCA da tercih edilmektedir ve altı haftalık bir süre boyunca kakadularda tüy yolma bozukluğunu azda olsa düzeltiğini rapor edilmiştir (Seibert ve diğerleri 2004), ancak diğer çalışmalarda psittasinlerdeki etkiler görülmüştür. tutarsızdı (Ramsay ve Grindlinger 1994). Kullanımı ayrıca nörolojik yan etkilerle de ilişkilendirilmiştir, bu nedenle klomipramin dikkatli ve düşük başlangıç dozlarında kullanılmalıdır (Seibert ve ark., 2004 ; Seibert 2007).

Seçici serotonin geri alım inhibitörleri

Seçici serotonin geri alım inhibitörleri (SSRI'lar) serotoninin sinaptik yeniden emilimini bloke ederek etki göstermektedir (Gartside ve diğerleri 1995). Paroksetin ve luoksetin, kuşlarda nadiren kullanılan iki seçici serotonin geri alım inhibitörleridir. Paroksetinin güvercinlerde dürtüsel davranışı azalttığı (Wolff ve Leander 2002) ve papağanlarda paroksetin farmakokinetiğinin değerlendirilmesi, paroksetinin potansiyel bir ajan olarak rolünü desteklemektedir (Van Zeeland ve ark., 2013).

Fluoksetinin uygulanan kuşlarda başlangıçta tüy yolmayı azalttığı ve tedavi edilenlerin kuşların büyük bir kısmınıda tüy yolma hastalığı sonradan tekrarladığı belirtilmektedir (Mertens 1997). Fluoksetinin tedavi etkilerinin tam olarak ölçülebilmesi için birkaç hafta süreyle tedaviye devam edilmelidir (Seibert 2007).

Dopamin antagonistleri

Haloperidol, merkezi katekolamin ve dopamin reseptörlerini antagonize ettiğini ve kompulsif bozuklukların tedavisinde yardımcı olduğuna inanılan bir bütirofenon narkoleptik antipsikotik ajandır (Andén ve ark., 1970). Haloperidol enjeksiyonundan sonra SSRI'larla tedavi edilen mavi ve altın rengi papağanda (Ara ararauna) belirgin ekstrapiramidal etkiler kaydedilmiştir ve kombine tedavi önerilmemektedir (Starkey ve ark., 2008).

Benzodiazepinler

Benzodiazepinler belirli bir benzodiazepine bağlanarak reseptörün inhibitör kullanılabilirliğini artırarak nörotransmiter glisin ; sedasyona, anksiyolize ve kas gevşemesine neden olur (Dzikiti ve ark., 2009). Benzodiazepinler, tüy yolma bozukluğu vakalarında etkiler sınırlı olup ve vakaların iyileşmeleri genellikle altta yatan psikolojik faktörlerin iyileştirilmesinden ziyade sedasyona bağlıdır. Bu nedenle benzodiazepinler sadece sakatlanma, anksiyete veya fobi durumlarının kısa süreli tedavisinde kullanılmalı ve obez hastalarda birikim nedeniyle daha düşük dozlarda kullanılmalıdır (Seibert 2007).

Opioid antagonistleri

Endojen endorfinler bazı durumlarda rol oynadığından kompulsif FDB tedavisinde opioid antagonistleri önerilmiştir. Bu ilaçlar analjezik etkileri ve endorfin salınımıyla elde edilen pozitif geri bildirimi ortadan kaldırır (Barrera ve diğerleri 1994). Bir çalışma, naltrekson tedavisine olumlu yanıt sağladığı ve bu, vakaların çoğunda yaka yerleştirmeyle birlikte kullanılması önerilmektedir (Turner 1993).

KAYNAKLAR

Chitty, John. (2003): "Feather plucking in psittacine birds 1. Presentation and medical investigation." In practice 25 (8): 484-493.

Acharya, R., Rault, J. L. (2020). Risk factors for feather-damaging behavior in companion parrots: a social media study. Journal of Veterinary Behavior, 40, 43-49.

Costa, P., Macchi, E., Tomassone, L., Ricceri, F., Bollo, E., Scaglione, F. E., . Schiavone, A. (2016). Feather picking in pet parrots: sensitive species, risk factor and ethological evidence. Italian Journal of Animal Science, 15(3), 473-480.

Jayson, S.L., Williams, D.L., Wood, J.L. (2014). Prevalence and risk factors of feather plucking in African grey parrots (Psittacus erithacus erithacus and Psittacus erithacus timneh) and cockatoos (Cacatua spp.). *Journal of Exotic Pet Medicine*, 23(3), 250-257.

Mahdavi, I., Abdi-Hachesoo, B., Ansari-Lari, M., Haddad-Marandi, M. R. (2023). Prevalence and risk factors of feather damaging behavior in companion parrots: A cross-sectional study in Iran. *Applied Animal Behaviour Science*, *266*, 106028.

Cruser, E. M. (2019). Effects of Lithium Chloride on Feather Damaging Behavior in Parrots. Doctoral dissertation.

Earle, R. (2016). Feather-plucking parrots: what every veterinarian should know.

Kubiak, M. (2015). Feather plucking in parrots. In Practice, 37(2), 87-95. Meehan, C.L., Garner, J.P., Mensch, J.A., 2004. Environmental enrichment and development of cage stereotypy in Orange-winged Amazon Parrots (Amazona amazonica). Dev. Psychobiol. 44, 209–218.

Lightfoot, T., Nacewicz, C.L., 2006. Psittacine behaviour. In: Bradley-Bays, T., Lightfoot, T., Mayer, J. (Eds.), Exotic Pet Behavior: Birds, Reptiles and Small Mammals. WB Saunders, St. Louis, Missouri, pp. 51–102.

Rubinstein, J., Lightfoot, T. (2014). Feather loss and feather destructive behavior in pet birds. Veterinary Clinics: Exotic Animal Practice, 17(1), 77-101.

Van Zeeland YR, Spruit BM, Rodenburg TB, Riedstra B,Van Hierden YM, Buitenhuis B, Lumeij JT. (2009). Featherdamaging behavior in parrots: a review with considerationof comparative aspects. Appl Anim Behav Sci. 121:75–95.

Van Zeeland, Y. R., Spruit, B. M., Rodenburg, T. B., Riedstra, B., Van Hierden, Y. M., Buitenhuis, B., Lumeij, J. T. (2009). Feather damaging behaviour in parrots: A review with consideration of comparative aspects. Applied Animal Behaviour Science, 121(2), 75-95.

Van Zeeland, Y. R., Spruit, B. M., Rodenburg, T. B., Riedstra, B., Van Hierden, Y. M., Buitenhuis, B., Lumeij, J. T. (2009). Feather damaging behaviour in parrots: A review with consideration of comparative aspects. Applied Animal Behaviour Science, 121(2), 75-95.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

TRANSGEN BİTKİLƏR, ONLARIN KƏND TƏSƏRRÜFATINDA İSTİFADƏSİNİN ƏHƏMİYYƏTİ

İbrahimova Xoşqədəm Qonaq qızı
Azərbaycan Dövlət Pedaqoji Universitetinin dosenti
ORCID: 0000-0002-5987-3346

Xülasə
Bitki hüceyrələrində xarici orqanizmin genini daşıyan, xromosomlarına yeridilmiş canlılar transgen canlılar adlanır. Transgen bitkilər genetikası modifikasiya olunmuş orqanizmlərin bir növüdür. Yəni bu zaman ənənəvi bitki sortlarına digər canlı orqanizmlərdən təcrid edilmiş bir və ya bir neçə genlərin köçürülməsi nəticəsində transgen bitkilər əldə olunur. Genetik modifikasiya olunmuş bitkilərin yeni sortlarının əldə edilməsi və ticarət-vasitəçilik fəaliyyəti, ticarət xidmətinin marketinqi məqsədləri ilə geniş sahələrdə becərilməsinə nail olunmuşdur. İstehsal edilmiş məhsulların bir çoxu ərzaq məhsullarının tərkib hissəsini təşkil etmişdir. Hər mövzuya olduğu kimi bu mövzuya da münasibətlər bir mənali olmayıb, çoxlu müzakirələrə səbəb olmuşdur.
Uzun illər insanlar təbiətin bizə verdiyi möcüzələrdən həzz alaraq yaşamış, müdaxilə etməyə gərək duymamışlar. Lakin illər keçir, elm sahələri inkişaf edir və bunun paralelində biz insanların müxtəlif kəşflərinin şahidi oluruq. İnsan həyatının ən önəmli hissəsi bioloji müxtəlifliyin fərqinə varıb və bununla qalmayıb onda dəyişiklik etmək qərarına gəldiyi andır. Hələ əkinçilik mədəniyyətinə ilk başlayan insanlar öz təcrübələrində məhz yeni bitki sortları yaratmağa cəhd etmişlər. Lakin insan yalnız XIX əsrin sonlarında təbiətin gen mühəndisliyi qabiliyyətinin mahiyyətini başa düşmüş, elmin gücünə söykənərək özü gen mühəndisliyi ilə məşğul olmağa başlamışdır.
Gen mühəndisliyi Mendelin təcrübələri ilə başlasa da, onların real nəticəsi XX-əsrin 80–ci illərinə dayanır. Molekulyar biologiya metodlarından istifadə edərək ilk genetik cəhətdən dəyişdirilmiş orqanizmlər kəşf edilmişdir. Gen mühəndisliyi genlərlə manipulyasiya edərək, onların bir orqanizmdən digərinə köçürülməsi deməkdir. Elm adamları, genləri yalnız eyni növlər daxilində deyil, həm də müxtəlif növlər arasında köçürməyi bacarmışdır. Məsələn, bitki hüceyrələrinin genomunu digər bitkilərin, heyvanların, balıqların və hətta insanların zəruri genlərini əlavə edərək dəyişdirə bilirlər. Bunların nəticəsində insan təbiətdən qabağa getməyə nail olmuşdur. Bəzən elə hallar müşahidə olunur ki, gen köçürməsi zamanı təbiətdə heç zaman rast gəlinməyən yeni orqanizmlər meydana gəlir. Genetik modifikasiya olunmuş orqanizmlər, onlardan əldə edilmiş məhsullar qisa zaman ərzində dünyada elə bir sürətlə yayıldı ki, alimlər və elm adamları onların zərərli və ya sərfəli olduqlarını araşdırmağa imkan tapmadılar.
İlk dəfə 1972-ci ildə ayrı–ayrı genlərin bir orqanizmdən digərinə transformasiyası həyata keçirilmişdir. 1982-ci ildə isə Kölndəki bitkiçilik institutunun və Monsanto şirkətinin əməkdaşlığı ilə ilk transgen bitkilər yaradılmışdır. Daha sonra 1986-cı ildə ABŞ-da tütün bitkisinin virusa qarşı davamlı formalarının açıq sahə şəraitində sınaqları uğurla başa çatmışdır. 1990-cı illərin əvvələrində Çin genetik cəhətdən dəyişdirilmiş tütün və pomidorun viruslara davamlı növlərinin ilk kommersiya sınağını keçirdi. Çində 1992-ci ildə aparılan analoji sınaqlar isə belə sortların davamlılığını bir daha sübut etdi.1994-cü ildə ABŞ-da yetişmə dövrü azaldılmış genetik modifikasiya edilmiş pomidorların meyvələri əvvəlcə qida paylama şəbəkəsinə daxil oldu.
Açar sözlər: *gen mühəndisliyi, bitki hüceyrəsi, modifikasiya*

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

TRANSGENIC PLANTS, THE IMPORTANCE OF THEIR USE IN AGRICULTURE

Abstract

Organisms that carry the gene of a foreign organism in plant cells and are injected into their chromosomes are called transgenic organisms. Transgenic plants are a type of genetically modified organisms. That is, at this time, transgenic plants are obtained as a result of the transfer of one or more genes isolated from other living organisms to traditional plant varieties. Cultivation of genetically modified plants in wide areas was achieved with the objectives of obtaining new varieties and trade-mediation activities, marketing of trade services. Many of the manufactured products were part of food products. As with any topic, the relationship to this topic has not been unambiguous and has led to many discussions.

For many years, people have lived enjoying the miracles that nature has given us, without needing to interfere. However, years pass, fields of science develop, and in parallel, we witness various discoveries of people. The most important part of a person's life is the moment when he becomes aware of biological diversity and decides to change it. Even the first people who started farming culture tried to create new varieties of plants in their experiments. However, only at the end of the 19th century, man understood the essence of nature's genetic engineering ability and began to engage in genetic engineering himself, relying on the power of science.

Although genetic engineering began with Mendel's experiments, their real results date back to the 80s of the 20th century. The first genetically modified organisms were discovered using molecular biology methods. Genetic engineering involves manipulating genes and transferring them from one organism to another. Scientists have managed to transfer genes not only within the same species, but also between different species. For example, they can modify the genome of plant cells by adding necessary genes from other plants, animals, fish and even humans. As a result of these, man managed to go ahead of nature. Sometimes there are cases when gene transfer results in new organisms that are never found in nature. Genetically modified organisms and products obtained from them have spread around the world at such a speed in a short period of time that scientists and scientists have not had the opportunity to investigate whether they are harmful or beneficial.

For the first time in 1972, individual genes were transformed from one organism to another. In 1982, the first transgenic plants were created with the cooperation of the plant breeding institute in Cologne and the Monsanto company. Later, in 1986, field tests of virus-resistant forms of the tobacco plant were successfully completed in the United States. In the early 1990s, China conducted the first commercial trials of virus-resistant varieties of genetically modified tobacco and tomato. Similar tests conducted in China in 1992 once again proved the durability of such varieties. In 1994, the fruits of genetically modified tomatoes with a shortened ripening period were first introduced into the food distribution network in the United States.

Keywords: genetic engineering, plant cell, modification

Bitki hüceyrələrində xarici orqanizmin genini daşıyan, xromosomlarına yeridilmiş canlılar transgen canlılar adlanır. Transgen bitkilər genetikası modifikasiya olunmuş orqanizmlərin bir növüdür.Yəni bu zaman ənənəvi bitki sortlarına digər canlı orqanizmlərdən təcrid edilmiş bir və ya bir neçə genlərin köçürülməsi nəticəsində transgen bitkilər əldə olunur. Genetik modifikasiya olunmuş bitkilərin yeni sortlarının əldə edilməsi və ticarət-vasitəçilik fəaliyyəti, ticarət xidmətinin marketinqi məqsədləri ilə geniş sahələrdə becərilməsinə nail olunmuşdur .İstehsal edilmiş məhsulların bir çoxu ərzaq məhsullarının tərkib hissəsini təşkil etmişdir.

Hər mövzuya olduğu kimi bu mövzuya da münasibətlər bir mənalı olmayıb, çoxlu müzakirələrə səbəb olmuşdur.

Uzun illər insanlar təbiətin bizə verdiyi möcüzələrdən həzz alaraq yaşamış, müdaxilə etməyə gərək duymamışlar. Lakin illər keçir, elm sahələri inkişaf edir və bunun paralelində biz insanların müxtəlif kəşflərinin şahidi oluruq. İnsan həyatının ən önəmli hissəsi bioloji müxtəlifliyin fərqinə varıb və bununla qalmayıb onda dəyişiklik etmək qərarına gəldiyi andır. Hələ əkinçilik mədəniyyətinə ilk başlayan insanlar öz təcrübələrində məhz yeni bitki sortları yaratmağa cəhd etmişlər. Lakin insan yalnız XIX əsrin sonlarında təbiətin gen mühəndisliyi qabiliyyətinin mahiyyətini başa düşmüş, elmin gücünə söykənərək özü gen mühəndisliyi ilə məşğul olmağa başlamışdır.

Gen mühəndisliyi Mendelin təcrübələri ilə başlasa da, onların real nəticəsi XX-əsrin 80–ci illərinə dayanır. Molekulyar biologiya metodlarından istifadə edərək ilk genetik cəhətdən dəyişdirilmiş orqanizmlər kəşf edilmişdir. Gen mühəndisliyi genlərlə manipulyasiya edərək, onların bir orqanizmdən digərinə köçürülməsi deməkdir. Elm adamları, genləri yalnız eyni növlər daxilində deyil, həm də müxtəlif növlər arasında köçürməyi bacarmışdır. Məsələn, bitki hüceyrələrinin genomunu digər bitkilərin, heyvanların, balıqların və hətta insanların zəruri genlərini əlavə edərək dəyişdirə bilirlər. Bunların nəticəsində insan təbiətdən qabağa getməyə nail olmuşdur. Bəzən elə hallar müşahidə olunur ki, gen köçürməsi zamanı təbiətdə heç zaman rast gəlinməyən yeni orqanizmlər meydana gəlir. Genetik modifikasiya olunmuş orqanizmlər, onlardan əldə edilmiş məhsullar qısa zaman ərzində dünyada elə bir sürətlə yayıldı ki, alimlər və elm adamları onların zərərli və ya sərfəli olduqlarını araşdırmağa imkan tapmadılar.

İlk dəfə 1972-ci ildə ayrı–ayrı genlərin bir orqanizmdən digərinə transformasiyası həyata keçirilmişdir. 1982-ci ildə isə Kölndəki bitkiçilik instutunun və Monsanto şirkətinin əməkdaşlığı ilə ilk transgen bitkilər yaradılmışdır. Daha sonra 1986-cı ildə ABŞ-da tütün bitkisinin virusa qarşı davamlı formalarının açıq sahə şəraitində sınaqları uğurla başa çatmışdır. 1990-cı illərin əvvələrində Çin genetik cəhətdən dəyişdirilmiş tütün və pomidorun viruslara davamlı növlərinin ilk kommersiya sınağını keçirdi. Çində 1992-ci ildə aparılan analoji sınaqlar isə belə sortların davamlılığını bir daha sübut etdi. 1994-cü ildə ABŞ-da yetişmə dövrü azaldılmış genetik modifikasiya edilmiş pomidorların meyvələri əvvəlcə qida paylama şəbəkəsinə daxil oldu.

Həmin dövrlərdən başlayaraq transgen bitkilərin əkin sahəsi sürətlə artıb, genişlənməyə başladı. Bütün dünyada 1997-ci ildə 1,7 mln hektar sahədə transgen bitkilər becərilirdisə, 1998–ci ildə onların sahəsi 30 mln, 1999 –cu ildə isə 40 mln hektar olmuşdur. İki ildə 95% -dən çox artım olmuşdur. Hər il bir öncəki ildən daha çox artımla qarşılaşırdıq. FAO-nun rəsmi məlumatlarına görə 2005–ci ildə dünyanın 21 ölkəsində artıq əkin sahəsi 90 mln hektar olmuşdur.

Transgen bitkilər arasında, herbisidlərə 71%, xəstəlik və zərərvericilərə 22%, herbisidlərə və xəstəliklərə davamlı 7% bitki sortlarının əkin sahələrini təşkil edir. 1999-cu ilə, əkin strukturunda, transgen növlərinin məhsulu soya bitkisi-54%, qarğıdalı-28%, pambıq və kolza-9% təşkil edirdi. Kartof bitkisi isə transgen bitkilərinin ümumi sahəsinin 0,01%-ni təşkil edir. Raps, günəbaxan, şəkər çuğunduru, çəltik kimi bitkilərdə kifayət qədər əraziyə malik idilər. Əlavə olaraq daha sonra, kiçik ərazilərdə pomidor, balqabaq, tütün, papaya, hindiba və kətan növlərinin genetiki dəyişdirilmiş növləri dəyişdirildi. Transgen düyü və buğda sortları artıq yaradılmış, sınaq və qeydiyyat proseduralarından keçir.

Artıq 1999-cu ilə daxil olmaqla 45 ölkədə 60-dan çox bitki üzərində 40 mindən artıq gen köçürülməsi əməliyyatı aparılmışdır. Hibridləşmə zamanı seçilmiş kombinasiyalardan 42 % ən müxtəlif xəstəliklərə, 17% zərərvericilərə, 18% herbisidə davamlılıq və 22 % keyfiyyətin daha da yaxşılaşdırılması istiqamətində aparılmışdır.

Gen mühəndisliyi metodlarını tətbiq etməklə seleksiyanın ənənəvi metodları vasitəsilə yaradılması mümkün olmayan və ya bunun üçün çox vaxt tələb olunan ən müxtəlif bitkiləri arzu olunan əlamət və xüsusiyyətə malik olan sortları qısa bir vaxtda əldə edə etmə mümkün olur, bu danılmaz bir faktdır.

XX əsrin ortalarından başlayaraq aqrar sənayenin intensivləşdirilməsi bir sıra çətinliklərlə üzləşdi. Dünyada əhalinin sürətlə artması, yeni tələbatların yaranması genetik modifikasiya edilmiş orqanizmlərə ehtiyac yaranmasına səbəb oldu. Bu səbəbdən ətraf mühit amillərinə, o cümlədən kimyəvi preparatlara davamlı transgen bitkilər yaradılması zəruri hal aldı. Təbii yolla aparılan seleksiya işləri bu tələbatı ödəmirdi. Çünki bu yolla alınan bitki sortları ətraf mühit amillərinə davamlılığı artdıqca onların məhsuldarlığı aşağı düşürdü. Gen mühəndisliyi yolu ilə alınan transgen bitkilər yüksək məhsuldarlığa sahib olmaqla yanaşı, həm də ətraf mühit amillərinə davamlıdır. Dünyada hər il aclıqdan və qida çatışmamazlığından 15 milyon adam dünyasını dəyişir. İllər keçdikcə dünya əhalisinin sayı qat-qat artır. Fərziyyələrə görə 2050 –ci ildə dünya əhalisinin sayı 9-11 milyarda çatacaq. Bu da o deməkdir ki, kənd təsərrüfatı məhsullarının iki və üç dəfə artmasını tələb edir.

Kənd təsərrüfatında geniş şəkildə transgen bitkilərdən istifadə olunur. Bunun əhəmiyyəti böyükdür. Çünku az vaxt ərzində çox məhsuldarlıq yalnız transgen bitkilərlə mümkündür. Geni dəyişdirilmiş transgen bitkilərdən alınan qida məhsullarının dadı yaxşı, görünüşü göz oxşayan olur və uzun müddət saxlanıldıqda keyfiyyəti dəyişmir, korlanmır. Transgen bitkilər digər təbii bitkilərə, təbii analoqlarına nisbətən zəngin və davamlı məhsul verir.

Genetiki dəyişdirilmiş transgen bitki almaq üçün laborotoriya şəraitində müəyyən bir orqanizmdən götürülmüş gen digər orqanizmin hüceyrəsinə köçürülür. Məsələn, təbii halda becərilmiş pomidor və çiyələyin şaxtaya davamlılığını artırmaq üçün onların hüceyrələrinə şimal dənizlərində yaşayan balıqların genləri köçürülür. Pomidor bitkisi istər istixana, istərsə də tarla şəraitində özünə xas vegetasiya dövrü keçirir. Bitkinin becərilməsində aqrotexniki qaydalara uyğun olaraq gübrələrdən, boy tənzimləyici preparatlardan, zərərli orqanizmlərə qarşı istifadə olunan pestisidlərdən istifadə olunur. Qarğıdalını ziyanvericilərdən qorumaq üçün onun hüceyrəsinə ilan zəhərindən alınmış aktiv gen köçürürlər.

Hər il soya bitkisinə tələbat artır. Tərkibində 35-42 % zülal, 20%-dən yuxarı yağ var. Soyaya tələbat respublikamızda bu gün tamamilə idxal heabına ödənilir. Bu isə soya bitkisinin kənd təsərrüfatında becərilməsinə ehtiyac yaradır. Bu zaman gen mühəndisliyi üsullarından istifadə edərək soyanın məhsuldarlığını artırdılar. Soya bitkisini zərərvericilərdən qorumaq üçün petuniya adlı çox zərərli bitkinin genini, bəzi viruslar və bakteriyaları onun hüceyrəsinə vururlar. Soya qaramal yeminin və qida məhsullarının 60%-ni təşkil edir. Bu səbəbdən kənd təsərrüfatı üçün çox əhəmiyyətlidir.

Hazırda modifikasiyalaşdırılmış soyadan gen köçürülməsi yolu ilə bir çox növ ərzaq alınır. Buna misal olaraq, fitopendiri, quru süd əvəzediciləri,7 növ soya unu, 8 növ soya zülal məhsulları, yağsızlaşdırılmış soya yarması, idmançılar üçün xüsusi ərzaqları göstərmək olar. Hal-hazırda istifadə etdiyimiz bir çox ərzaqların geni dəyişdirilmişdir.

Alimlərin yetişdirdikləri geni dəyişdirilmiş bitkilər, məhsullar böyük maraq doğurur. Yaponiya alimləri laboratoriya şəraitində apardıqları eksperimentlər sayəsində xüsusi üzüm hasil etmişlər. Əlbətdə ki, bu üzümün geni dəyişdirilmişdir. Bu üzümün dadında heç bir dəyişiklik olmasa da, üzümün bir giləsi ilə doymaq üçün kifayətdir.

Digər bir genetiklər üzümü alma ilə calaq etmək qərarına gəlmişlər. Bu calağın nəticəsində üzüm-alma deyilən qəribə hibrid almışlar. Həmin meyvə öz ölçüsünə və formasına görə almaya, qabığına görə üzümə oxşayır. Meyvə həm alma, həm də üzüm dadı verir. Böyük miqdarda C vitaminli bu meyvə mağazalarda satışa buraxılmışdır.
Gen dəyişməsi yolu ilə alınmış digər bir hibridin adı gavərikdir. Adından da göründüyü kimi ərik və gavalını calaq etməklə əldə edilmişdir. Bu meyvənin tərkibində yetərincə C vitamin olduğu halda, xolesterin və natrium yoxdur.
Heydarın adlı hibrid şirin mandarinlə acı təhər qreyfrutu gendəyişmə yolu ilə calaq etməklə almışlar. Cuzi acı dadı olsada, şirinliyi ilə də seçilir. Heydarın həmçinin sellüloza və C vitamin ilə zəngindir.
İsrail alimləri limonun və pomidorun genlərini calaşdırmaqla xalis genetik məhsul olan Limodor adlı hibrid almışlar. Digər bir alimlər kahıya insulin genini tətbiq etməyi bacarmışlar. Daxil edilmiş insulin kahının hüceyrələri ilə həzm traktından birbaşa mədəyə keçərək təbii insulin istehsalı mexanizmini işə salır. Bu kəşf həmişə insulin inyeksiyası məcburiyyətində qalmış şəkərli diabet xəstələrinə çox kömək edə bilər.
Yaponiya genetikləri şəkərli diabet xəstələrini dərman aslılığından qurtarmaq üçün düyü sortu yaratmışlar. Genetik modifikasiyalı həmin düyü mədəaltı vəzinin məxsusi insulinini istehsal etmək imkanını stimullaşdırır.
Transgen məhsullarının tərəfdarları təsdiq edirlər ki, insan orqanizminə hər gün yeməklə birlikdə yad dezoksiribonuklein turşusu daxil olur. Lakin qida ilə birlikdə orqanizmə düşən insan genotipinə daxil ola bilmir və buna görə də indiyəcən transgen qidanın ziyanı barədə sübuta yetirilmiş heç bir dəlil yoxdur.
Genetiki dəyişdirilmiş orqanizmlərə qarşı çıxanların və onların törətdikləri fəsadları sübut edən araşdırmaların sayı getdikcə artır. Dünya ictimaiyyəti bu məsələyə ciddi yanaşır, çünki elmi təcrübələrin səviyyəsi bəzi hallarda yüksək olur. Bəzi əsaslara dayanaraq elm adamları düşünürlər ki, genetiki dəyişdirilmiş orqanizmlər sağlamlıqdan başqa, ətraf mühitə, torpağa, su hövzələrinə, biomüxtəlifliyə böyük ziyan verə bilər. Əlbətdə ki, bunların tam olaraq elmi təsdiqi izah olunmamışdır. Lakin onlar, yəni gen mühəndisliyi ilə məşğul olan insanlar terminator bitkilər və intihar edən toxumlar, terminator ağaclar və susmuş meşələr kimi fantastik ideyaların yaxın gələcəkdə reallığa çevriləcəyinə tam əmindirlər.
Ətraf mühit amillərinə davamlı və məhsuldarlığı yüksək olduğundan ilk dövrlərdə yalnız bircə dəfə nəsil verən, bircə dəfə məhsul verən bitkilər–terminator bitkilər və intihar edən toxumlar (tibdə işlədilən birdəfəlik iynələr kimi) çox cəlbedici ola bilər. Terminator ağaclar da çiçəkləmirlər, onların yarpaqlarında toksik maddələr əmələ gəlir. Ətrafında olan həşaratları, mikroorqanizmləri məhv edirlər. Bu ağaclar susmuş meşə əmələ gətirirlər. Lakin sonradan onların biomüxtəlifliyi necə dəyişəcəkləri, ekosistemlərə necə ziyan vuracağı böyük maraq doğurur. Bu baxımdan alimlərin bir neçə fərziyyələri meydana çıxır.

GMO-ların insan sağlamlığına təsiri. Məşhur bioloqlardan olan Dr.Pushpa Bhargavanın apardığı araşdırmalara görə amerikalıların sağlamlığı GM edilmiş məhsulların və qidaların yaranmasından keçən dövr ərzində pisləşməyə doğru getmişdir. Hətta Amerika alimlərindən olan Na Han Batalion GM edilmiş orqanizmlərin və onların məhsullarının 50 zərərli effekti haqqında kitab da yazmışdı. Alimlərin fərziyyələri bir-birindən fərqli olsada hər kəsin fikri maraq doğurmuşdu.
GM edilmiş soyamil zərərli olduğunu siçanlarla apardığı ciddi elmi təcrübələrlə bəzi faktları sübut etmişdir. Və o bunu Rusiya alimi İrina Yermakova 2005-ci ildə The National Association for Genetic Security Nags təşkil etdiyi konfransda məruzə etmişdir. Onun bu çıxışı bir sıra alimlərdə stimul yaratmışdır.

Bəzi mühüm təhlükəli effektlərlə nəzər salsaq görərik ki, həqiqətən XX-əsrin ən ümid verici texnologiyalarından biri olan biotexnologiya nələrə qadirdir.
Ölüm hadisələri. Qidaların tərkibinə qatılan və Eosinofiliamialgiya sindromuna (EMS) qarşı işlədilən L-triptofanın genetik modifikasiya edilmiş variantının ərzaq məhsullarının tərkibində işlədilməsi səbəbindən onlarca amerikalı ölmüş, minlərlə insan əlil olmuşdur.

Öldürücü və yüksək allergiya reaksiyalarının müşahidə olunması. Brazilya qozunun geninə metionin zülalının miqdarını artırmaq üçün soya bitkisinin genini köçürdü. Bu qoza qarşı bəzi insanlar şok vəziyyətinə düşmə dərəcəsinə qədər allergikdirlər. Bu hətta arı sancması zamanı yaranan şokdan daha təhlükəlidir. Amma daha sonra soyadan alınan məhsullar bazarlardan tezliklə yığışdırıldı və yaşana biləcək bədbəxt hadisələrin qarşısı alındı. Müəyyən edilmişdir ki, Amerika əhalisinin 25%-i ərzaq məhsullarına qarşı çox həssas olmuşlar, onlarda daha tez-tez qaşınmalar və qırmızı səpkilər olur, 4%,yəni 12 milyon əhali ciddi allergiya xəstəliyindən əziyyət çəkir, onların qanında Immunoglobulin və yağ yüksəkdir.Buda ciddi fəsadlarla qarşılaşmağın qaçınılmaz olduğunu göstərir. İlbəil artan nəticələr göstərir ki, 6%, 7%, üç yaşına qədər olan uşaqlarda qidadan allergiyanın səviyyəsi çox yüksəkdir. Məsələn, soya çiçəyinin elementləri və pomidorda balıq genləri (1990-cı ildə DNA Plant Technology Corporation tərəfindən yaradılmışdır) daxil olan kimi allergiya riski böyük olan insanlarda ciddi fəsadlar yaranır və bu maddələr insanların pəhrizlərində rast gəlinməyən maddələrdir. Bu, xüsusilə balıq geni yeridilmiş pomidorlardan alınan məhsullarda daha çox müşahidə olunur. Dərin və ətraflı elmi təcrübələr və qarğıdalı ilə məşğul olan insanlarda aparılan yoxlamalar sübut edir ki, qarğıdalıda GMO B taller gendir. GMO kartof, noxud və soyalar allel genlərlə zəngindir. Siçanlar üzərində aparılan təcrübələrdə GM edilmiş noxudun yüksək allel gen olduğu sübut edilmişdir. 1999-cu ildə York laboratoriyasında GM edilmiş soyadan alınan məhsulların allel gen olduqları sübut edilmiş və soyanı ilk on allel gen siyahısına daxil etmişlər.
Superviruslar. HİV virusu digər virusların və retro virusların genlərinə qarışa bilir. Yayılma sürəti ağla gəlməz dərəcədə böyük olan viruslar əmələ gəlir. Bu tip virusun 8 həftəyə əmələ gəldiyi araşdırmalar nəticəsində göstərilir. Bu təcrübələrin nəticələrinə əsaslanaraq demək olar ki, genlərin qarışması nəticəsində onların elə kombinasiyaları əmələ gələ bilər ki, nəticədə yeni, heç kimə məlum olmayan çox təhlükəli virus yarana bilər. Gen mühəndisliyi zamanı məhz genlərin qarışdırılması prosesi baş verir və belə qarışmış genlər GMO-da külli miqdarda olur. Odur ki, bir-birinə qohum olmayan genlərin qarışması böyük riskdir. Kanadada aparılan araşdırmaların birində belə bir prosesin şahidi olmuşlar. Bitkini hüceyrələrarası hərəkəti təmin edən geni zədələnmiş xiyar mozaikası virusuna yoluxdurmuşlar. İki həftə keçməmiş yoluxmuş bitkidə genləri qarmaqarışıq olmuş, gen çatışmazlığı baş vermişdir. Bu, bitkinin saf məhsul verməsi qabiliyyətini tamamilə pozmuşdur. Amerika Kənd Təsərrüfatı Departamentini 1997-ci ildə bu tip təcrübələrin nəticələri məcbur etmişdir ki, supervirusların törədəcəyi məsələləri ciddi müzakirə etsinlər, lakin onlar o zaman heç bir normativ aktlar qəbul etməmişdilər.

Ərzaq allergiyalarının artması. GMO-ların artması nəticəsində bio müxtəlifliyin itirilməsi prosesi ərzaq allergiyalarının artması prosesi ilə paralel baş verir. Biz həyat aktivliyimizi saxlamaq üçün qidalanırıq. Canlılar həmişə ətraf mühitlə təmasda olaraq dəyişir. Qida ilə orqanizmə daxil olan müxtəlif maddələr tələb edirki, immun sistemimiz onların hər birini tanısın və hər birinə qarşı uyğun reaksiya versin. Bir tərkibli GM edilmiş qida elementləri orqanizmdə yad element kimi tanınır və immun sistemi getdikcə təkcə bu element üçün işləyir.

Uzun müddət GMO ilə qidalanan orqanizmdə immun sistemi "tənbəlləşir" və müxtəlif maddələrə reaksiya vermir. Nəticədə, istənilən vaxt müxtəlif şəraitdə müxtəlif cür qidalanan orqanizmdə allergiya reaksiyaları çoxalır. Odur ki, bir cinsli GMO-larla qidalanma allergiya riskini dəfələrlə artırır.

Qidalanmanın azalması. Journal of Medicinal Food(Dr. MarcLapp, 1999) jurnalında verilmiş təcrübələrin nəticəsinə əsaslanaraq demək olarki, müəyyən GM edilmiş ərzaq məhsulların da həyati vacib qida elementlərinin miqdarı xeyli az olur. Məsələn, orqanizmi ürək xəstəliklərindən və xərçəngdən qoruyan fitoestrogen birləşmələri.Mosantonun analizlərindən görünür ki, anti-qidalanma maddələri və allergen olan Kunitz-tripsiningibitoru GM edilmiş məhsullarda 28% çox olur.

Təbii ərzaqlara əks olan ərzaqlar. Bir neçə il əvvəl Monsanto elan etmişdi ki, onların Roundup Ready adlanan soyalarında "gözlənilməyən genlər" meydana gəlmişdir. Məlumdur ki, GM edilmiş məhsullarda modifikasiya edilmiş zülallar olur, hansı ki, heç vaxt bizonlardan istifadə etməmişik. 1992-ci ildə FD Amikro bioloqu Dr. Louis Pribyl xəbardarlıq etmişdi ki, ənənəvi seleksiya yolu ilə alınan məhsullarla GM edilmiş məhsullar arasında dərin fərqlər var. Pleyotrop fəsadların yaranma tezliyi GM edilmiş məhsullarda 30% çox olur.

Super alaq otları. Müəyyən edilmişdir ki, GM edilmiş Bt endotoksin torpaqda 18 ay qala bilir və alaq otlarına keçir. Belə alaq otları həşəratlara və ziyanvericilərə qarşı çox davamlı olur. Bu alaq otlarını indi super alaq otları adlandırırlar. Danimarka və İngiltərə alimlərinin təcrübələrinə görə, super alaq otları yalnız bir nəsildə ömrünü başa vurur. Amerika alimlərinin təcrübələrində isə göstərilmişdir ki, bu super alaq otları glufosinate davamlıdırlar. Başqa bir təcrübələrdə super alaq otlarında gen axınları adi alaq otlarında olan gen dəyişmələrindən 20 dəfə çoxdur. Alimlər düşünürlər ki, super alaq otları Monsanto buğdaları ilə hibridləşə bilər və nəticədə qarşısı alınmaz yeni alaq otları yarana bilər. Amerika Milli Akademiyası xəbərdarlıq edir ki, GM edilmiş rezistent mədəni bitkilərdən genlər alaq otlarına keçə bilir və nəticədə çox təhlükəli alaq otu problemi meydana gələ bilər. Bu isə məhsuldarlığa güclü təsir edər və ekosistemlərin ekspressiyası baş verər. Fransa alimləri müəyyən etmişlər ki, GM edilmiş kanola bitkisindən genlər asanlıqla vəhşi turpa keçir və 4 nəsildə bu genlər qalır. Onu da qeyd etmək lazımdır ki, GM edilmiş bitkilərin tətbiqi ilə herbisidlərin istifadəsi heç də azalmamışdır.

Yoluxucu xəstəliklərin yüksəlişi. 1998-ci ildə The Microbial Ecology in Health and Disease jurnalında verilən məlumata görə, gen mühəndisliyi infeksion xəstəliklərin artmasında mühüm rol oynayır. Bu, bir neçə üsulla baş verir. Antibiotiklərə davamlılıq GMO-ların hesabına getdikcə artır, yeni və əvvəllər məlum olmayan virus ştamları yaranır və həmçinin, insanlarda immun sistemi zəifləyir. Bakteriyalarda transgen DNT-nin horizontal transformasiyası baş verir. Bir neçə təcrübədən aydın olmuşdur ki, ağız boşluğunda, udlaqda və bağırsaqlarda olan bakteriyalar heyvandarlıq məhsullarında olan transgen DNT-ləri özünə birləşdirə bilir. Nəticədə infeksion xəstəliklərin çoxalması riski artır.

Bilavasitə xərçəng yaradan kanserogenlər. Bir neçə il bundan əvvəl alimlərə məlum olmuşdur ki, qida məhsullarına əlavə edilən kimyəvi konservantların birlikdə göstərdiyi toksik effektonların ayrı-ayrılıqda toksikliyindən bir neçə dəfə çoxdur. Hətta toksik olmayan bir neçə kimyəvi maddənin kombinasiyası toksik effekt yaradır. Məsələn, sərinləşdirici içkilərdə tapılana skorbin turşusu və benzonat natrium birləşməsi benzene əmələ gətirdiyindən, bu

yüksək dərəcədə kanserogen hesab edilir və xərçəng yaradır. Kanserogen maddələr genetik mutasiyaların intensivliyini və xərçəng hüceyrələrinin əmələ gəlmə riskini artırır.

Transgen məhsullarının tərəfdarları təsdiq edirlər ki, insan orqanizminə hər gün yeməklə birlikdə yad dezoksiribonuklein turşusu daxil olur. Lakin qida ilə birlikdə orqanizmə düşən insan genotipinə daxil ola bilmir və buna görə də indiyəcən transgen qidanın ziyanı barədə sübuta yetirilmiş heç bir dəlil yoxdur.

Əleyhdarları güman edirlər ki, 5-6 il bundan əvvəl başlandığına görə transgen qidanın istifadəsinə genetik dəyişdirilmiş xammaldan yeyinti sənayesində cəmi heç kim onun otuz-qırx ildən sonra hansı fəsadlar törədəcəyini deyə bilməz. Məlum olduğu kimi, yeni-yeni tibbi və bioloji preparatlar heyvanlar üzərində illərlə yoxlandıqdan sonra onlardan insanların istifadəsinə icazə verilir. Cəmi bir neçə il bundan əvvəl yaradılmış yüzlərlə adda transgen məhsullar dərhal açıq satışa buraxılır. Buna görə də onlardan istifadənin nə ilə nəticələnəcəyini əvvəlcədən müəyyənləşdirmək mümkünsüzdür. Belə maddələr insan orqanizmində mutasiyaya səbəb ola, təbiətdəki tarazlığı poza və ekoloji bəlalar törədə bilər. Bunlar böyük fəsadlar doğura bilərlər

GM edilmiş bitki növlərinin son illərdə əkin sahələri sürətlə genişlənir və bu orqanizmlərdən alman məhsulların çeşidi çoxalır. Bu sürətli artım onu göstərir ki, sonrakı on ildə yeni GMO növləri yaradılması nəticəsində təkcə çarpazt ozlanma ilə bu sahə iki qat çoxalacaq. Odur ki, bütün dünya ölkələri öz etirazlarını artıq açıq şəkildə bildirməyə başlamışlar.

Bir sözlə, genetik modifikasiyalı məhsullar XX əsrin biologiyasının nailiyyətlərindən biridir. Həmin məhsulların adamlar üçün təhlükəli olub-olmaması hələ ki, tam olaraq məlum deyil. Vaxt vardı müxtəlif tərəvəzlərin və meyvələrin tərkibində zəhərli-kimyəvi maddələrin varlığı xalq arasında tam araşdırılırdı. Adamlar bir-birini kiminsə vaxtından əvvəl yetişdirilmiş qarpız yeyərək ölümcül zəhərlənməsi, şprislə dərman vurulmuş çiyələyin insan orqanizmində fəsadlar törətməsi barədə məlumatlandırırdılar,geniş dialoqlar aparırdılar. Genetik modifikasiyalı məhsullar meydana gələndən sonra həmin məlumatlar öz aktuallığını itirdi. İnsanlar XX əsrin 80-ci illərində genetik modifikasiyalı məhsullar haqqında elmi-fantastik hadisə kimi söhbət edirdi. Hazırkı dövrdə isə həmin məhsullara mağazaların piştaxtalarında, həyatımızın hər anında rast gəlmək mümkündür. Əvvəlki vaxtlarda adamlar təbiətin törətdiyi bədbəxtliklərdən, müharibələr olacağından əndişələnirdilər. İndiki zamanda genlərin dəyişdirilməsi əsasında əldə edilmiş ət və tərəvəz məhsullarını yemək də təhlükəli sayılır. Ona görə ki, texnologiya yüksəldikcə, risk də artır. Ancaq hər bir texnologiyanın müsbət və naməlum mənfi tərəflərinin olmasını da unutmaq lazım deyil. Zaman özü hər şeyi tənzimləyəcək. Ümid edək ki,hər şey aydınlığa çıxacaq.

ƏDƏBİYYAT

1. Щелкунов С.Н. Генная инженерия. Новосибирск. 2018. 496 стр.
2. Борис Альбертс. Молекулярная биология клетки. Москва, Мир Опикс. 21 век. 2022. 436 стр.
3. Лутова Л.А. Генетика развитя растений. Издательство Наука 2020. 432 стр.
4. Льюнин Б. Гены и растения. Москва. Наука 2022. 446 стр.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

HEYVANLARIN GEN MODİFİKASİYASININ ƏSAS İSTİQAMƏTLƏRİ

Abdullayeva Təranə Qeyis qızı
Azərbaycan Dövlət Pedaqoji Universitetinin dosenti
ORCID: 0000-0002-9151-8950

Xülasə
Gen nədir? Gen DNT-nin bir parçasıdır. Gen istiqamətləndirici bir molekul kimi bizim necə göründüyümüzü, bədənimizdə hansı proseslərin baş verdiyini bəzən də hansı xəstəlikləri keçirəcəyimizə meylli olduğumuzu bildirir. Başqa sözlə desək, gen DNT zəncirində müəyyən uzunluqda olan yığımdan ibarətdir.
Belə ki, C.Gerdon və onun rəhbərlik etdiyi qrupun tədqiqatları vasitəsilə göstərilmişdir ki, siçanın mayalanmış yumurta hüceyrəsinin pronukleusuna inyeksiya edilmiş genlər bütün hüceyrələrin xromosomlarına daxil olur. 1985-ci ildə bir sira genlərin dovşan, donuz və qoyun genomuna keçirilməsi mümkün olmuşdur. Transgen məməlilər insanın xəstəliklərinin tədqiqində ən əlverişli modeldir, bundan əlavə onlardan insana gərəkli olan biotibbi preparatların və zülalların sintezində istifadə oluna bilər. Hal-hazırda bununla bağlı aşağıdakı məsələlər işlənilməkdədir:
1.Genlərin və bütöv xromosom hissələrinin əvəzolunma imkanlarının öyrənilməsi ;
2. Onkogenlərin əvəz olunması ;
3. Boy hormonları genlərin insersiyası ;
4.İnsanın donor orqanlarının formalaşması üçün zəruri olan genlərin heyvan hüceyrələrinə keçirilməsi.
Bakteriyaların sintez etdiyi eukariot zülallarında bəzi çatışmazlıqların olmasına baxmayaraq, onlardan birinci nəsil rekombinat zülal məhsullarının sintezı üçün istifadə olunur. Bu çətinliklərin aradan qaldırılması və zülal məhsulunun çıxımını artırmaq üçün eukariot hüceyrələrdən istifadə olunur.
Uzun illər heyvan hüceyrələrinin ixtisaslaşmasının gələcəkdə onlara lazım olmayacaq genləri itirmələri ilə müşayiət olunub-olunmaması haqqında mülahizələr müzakirə olunmuşdur. Əgər "lazım olmayan genlər" itirilirsə, onda inkişaf zamanı geri dönməyən dəyişikliklər baş verməlidir. Bu fikirlərə əks olaraq göstərilir ki, hüceyrələrdə bütün genlər saxlanılır, lakin onların fəaliyyətinə ehtiyac olmadıqda bu genlər qeyri-fəal vəziyyətə keçir.
Bu fərziyyələrin hansının düzgün olduğunu müəyyən etmək üçün nüvələrin transplantasiyası aparılmışdır. Hüceyrələrin diferensiasiya mexanizmi 60-cı illərdə ingilis alimi C.Gerdon tərəfindən Xenopus laevis mahmızlı qurbağa üzərində eksperimental yolla müəyyən olunmuşdur. Tədqiqat zamanı mayalanmamış yumurta hüceyrələrinin nüvələri ultrabənövşəyi şüaların yüksək dozası ilə şüalandırılmaqla inaktivləşdirilmişdir. Mikrocərrahiyyə iynəsi vasitəsilə enukleasiya olunmuş yumurta hüceyrələrinə çömçəquyruğunun bağırsaq epitelisinin diferensiasiya olunmuş nüvələri köçürülmüşdür. Bu zaman marker kimi nüvədə nüvəciklərin sayı nəzərə alınmışdır: sahib-hüceyrələrin nüvəsində iki, köçürülən nüvələrdə isə bir nüvəcik olmuşdur. Təcrübə zamanı epiteli nüvələrinin köçürülmüş olduğu yumurta hüceyrələrinin yalnız 1%-dən normal qurbağalar inkişaf etmişdir. Bu zaman marker vasitasilə sübut olunmuşdur ki, heyvanlarda hüceyrələrin diferensiasiyası zamanı genlərin itirilməsi və ya geri dönməyən inaktivləşməsi baş vermir.
Açar sözlər: gen, xromosom, hüceyrə

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

MAIN DIRECTIONS OF GENE MODIFICATION OF ANIMALS

Abstract

What is a gene? A gene is a piece of DNA. As a guiding molecule, the gene tells us how we look, what processes take place in our body, and sometimes what diseases we are prone to. In other words, a gene consists of a set of DNA chains of a certain length.

Thus, through the researches of J. Gerdon and his group, it was shown that the genes injected into the pronucleus of the fertilized egg cell of the mouse enter the chromosomes of all cells. In 1985, it was possible to transfer a series of genes to the genome of rabbits, pigs and sheep. Transgenic mammals are the most convenient model for the study of human diseases, in addition, they can be used in the synthesis of biomedical preparations and proteins necessary for humans. Currently, the following issues are being processed:

1. Studying the possibility of replacement of genes and whole chromosome parts;
2. Replacement of oncogenes;
3. Insertion of height hormone genes;
4. Transfer of genes necessary for the formation of human donor organs to animal cells.

Although eukaryotic proteins synthesized by bacteria have some shortcomings, they are used for the synthesis of first-generation recombinant protein products. To overcome these difficulties and increase the yield of the protein product, eukaryotic cells are used.

For many years, it has been debated whether the specialization of animal cells is accompanied by the loss of genes that will not be needed in the future. If "redundant genes" are lost, then irreversible changes must occur during development. Contrary to these ideas, it is shown that all genes are stored in cells, but when their activity is not needed, these genes go to an inactive state.

To determine which of these hypotheses is correct, transplantation of nuclei was performed. The mechanism of cell differentiation was determined experimentally on the frog Xenopus laevis by the English scientist J. Gerdon in the 60s. During the study, the nuclei of unfertilized egg cells were inactivated by irradiation with a high dose of ultraviolet rays. Differentiated nuclei of the intestinal epithelium of the spoonbill were transplanted into the enucleated egg cells through a microsurgical needle. At this time, the number of nuclei in the nucleus was taken into account as a marker: there were two nuclei in the nucleus of the host cells, and one in the transplanted nuclei. During the experiment, normal frogs developed from only 1% of egg cells into which epithelial nuclei were transplanted. At this time, it was proved by means of markers that the loss or irreversible inactivation of genes does not occur during the differentiation of cells in animals.

Keywords: gene, chromosome, cell

Gen nədir? Gen DNT-nin bir parçasıdır. Gen istiqamətləndirici bir molekul kimi bizim necə göründüyümüzü, bədənimizdə hansı proseslərin baş verdiyini bəzən də hansı xəstəlikləri keçirəcəyimizə meyilli olduğumuzu bildirir. Başqa sözlə desək, gen DNT zəncirində müəyyən uzunluqda olan yığımdan ibarətdir.

Beləki, C.Gerdon və onun rəhbərlik etdiyi qrupun tədqiqatları vasitəsilə göstərilmişdir ki, siçanın mayalanmış yumurta hüceyrəsinin pronukleusuna inyeksiya edilmiş genlər bütün hüceyrələrin xromosomlarına daxil olur. 1985-ci ildə bir sıra genlərin dovşan, donuz və qoyun genomuna keçirilməsi mümkün olmuşdur. Transgen məməlilər insanın xəstəliklərinin tədqiqində ən əlverişli modeldir, bundan əlavə onlardan insana gərəkli olan biotibbi preparatların və zülalların sintezində istifadə oluna bilər. Hal-hazırda bununla bağlı aşağıdakı məsələlər işlənilməkdədir:

1.Genlərin və bütöv xromosom hissələrinin əvəzolunma imkanlarının öyrənilməsi;
2. Onkogenlərin əvəz olunması;
3. Boy hormonları genlərin insersiyası;
4. İnsanın donor orqanlarının formalaşması üçün zəruri olan genlərin heyvan hüceyrələrinə keçirilməsi.

Bakteriyaların sintez etdiyi eukariot zülallarında bəzi çatışmazlıqların olmasına baxmayaraq, onlardan birinci nəsil rekombinat zülal məhsullarının sintezi üçün istifadə olunur. Bu çətinliklərin aradan qaldırılması və zülal məhsulunun çıxımını artırmaq üçün eukariot hüceyrələrdən istifadə olunur.

Uzun illər heyvan hüceyrələrinin ixtisaslaşmasının gələcəkdə onlara lazım olmayacaq genləri itirmələri ilə müşayiət olunub-olunmaması haqqında mülahizələr müzakirə olunmuşdur. Əgar "lazım olmayan genlər" itirilirsə, onda inkişaf zamanı geri dönməyən dəyişikliklər baş verməlidir. Bu fikirlərə əks olaraq göstərilir ki, hüceyrələrdə bütün genlər saxlanılır, lakin onların fəaliyyətinə ehtiyac olmadıqda bu genlər qeyri-fəal vəziyyətə keçir.

Bu fərziyələrin hansının düzgün olduğunu müəyyən etmək üçün nüvələrin transplantasiyası aparılmışdır. Hüceyrələrin diferensiasiya mexanizmi 60-cı illərdə ingilis alimi C.Gerdon tərəfindən Xenopus laevis mahmızlı qurbağa üzərində eksperimental yolla müəyyən olunmuşdur. Tədqiqat zamanı mayalanmamış yumurta hüceyrələrinin nüvələri ultrabənövşəyi şüaların yüksək dozası ilə şüalandırılmaqla inaktivləşdirilmişdir. Mikrocərrahiyyə iynəsi vasitəsilə enukleasiya olunmuş yumurta hüceyrələrinə çömçəquyruğunun bağırsaq epitelisinin diferensiasiya olunmuş nüvələri köçürülmüşdür. Bu zaman marker kimi nüvədə nüvəciklərin sayı nəzərə alınmışdır: sahib-hüceyrələrin nüvəsində iki, köçürülən nüvələrdə isə bir nüvəcik olmuşdur. Təcrübə zamanı epiteli nüvələrinin köçürülmüş olduğu yumurta hüceyrələrinin yalnız 1%-dən normal qurbağalar inkişaf etmişdir. Bu zaman marker vasitasilə sübut olunmuşdur ki, heyvanlarda hüceyrələrin diferensiasiyası zamanı genlərin itirilməsi və ya geri dönməyən inaktivləşməsi baş vermir.

İlk dəfə heyvan hüceyrələrindən biotexnologiyada 1949-cu ildə Amerika alimləri istifadə etmişdilər. Amerika alimləri poliomielit virusunu insan rüşeyminin becərilən əzələ və dəri hüceyrələrində yetişdirməyə nail olmuşlar. Bu virusun insan rüşeymində yetişdirilməsindən sonra demek olar bütün dünyanın virosologiya laboratoriyalarında hüceyrə kulturalarından geniş şəkildə istifadə olunmağa başladı. Belə ki, insan rüşeyminin hüceyrələri, meymunun böyrək hücəyrələri və toyuq embrion hüceyrələri viruslara qarşı daha çox həssas olduğundan onların çoxaldılmasında tətbiq olunur. Hüceyrə kulturalarının tətbiqi məhz ondan ibarətdir ki, bu zaman virusların təmiz şəkildə alınması, virus xəstəlikləri diaqnostikası və vaksinlərin alınmasına səbəs olmuşdur. Bundan başqa heyvan və insanların müvafiq orqanlarının hüceyrələri vasitəsilə sənayədə hormonal dərman maddələrinin istehsalıda böyük əhəmiyyət kəsb edir. Hormonal dərmanlar orqanizmdə diferensiasiya olunmuş xüsusi hüceyrələr tərəfindən sintez edilir. Bu cür hüceyrələrin becərilməsi və onların fizioloji fəal maddələri sintez edən hüceyrə xətləri – produsentlər alınmasında bir sıra çətinliklər mövcuddur. Həmin bu çətinliklərə aşağıdakılar hesab edilir :

1. Diferensiasiya olunmuş hüceyrələr kultura mühitinə çox pis bitir və ya heç bitmir;
2. Becərilmə şəraitində hüceyrələr toxumaya xüsusi spesifik maddə ifraz etmə funksiyasını itirir;
3. Kultura mühitində spesifik funksiyalarını saxlamaqla bitən hüceyrələr bəd xassəli olur.

Sadaladığımız bu çətinliklər onların praktikada tətbiqini məhdudlaşdırır. Beləliklə, uzun müddət ərzində becərilən hüceyrələr kariotipik və fenotipik dəyişikliklərə məruz qalırlar. Lakin, bu sahədə müəyyən müvəffəqiyyətlərdə qazanılmış insan, donuz və öküzün mədəaltı vəzi hüceyrələrinin kulturasını almışdır.

Viruslara qarşı universal təsir xassəsinə malik qlikoproteid interferonu sintez edən hüceyrə kulturası yaradılmışdır ki, bu da insan və heyvan hüceyrələrini kultura mühitində becərməklə onlardan produsent kimi istifadə etməyin çətinliyi əsasən faydalı xassələrin itməsi ilə əlaqədardır. Faydalı xassələrin itməsi aşağıdakı kimi xarakterizə olunur:

1. İstifadə edilən qida mühitlərinin uyğunsuzluğu. Hüceyrə xətlərini becərmək üçün hazırlanan qida mühiti kiçik molekullu tərkib hissələrdən təşkil olunur və invitro şəraitdə tərkibindəki cüzi miqdarda spesifik əlamətin ekspressiyasını stimul edən nadir komponentlər olmur;
2. Tənzimləyici amillər təsirinin uyğunsuzluğu. Bioloji fəal maddələr (boy maddələri, hormonlar) mənbəyi kimi qan zərdabından istifadə edilir ki, bu da qarşılıqlı təsiri nəticəsində nəzərə alınmadan qida mühitinə əlavə edilir;
3. Becərilmə şəraitinin statikliyi. Hüceyrələrin becərilməsi uzun müddət qapalı sistem üzrə qida mühiti və qaz fazasının sabitliyi şəraitində aparılır. Bu şəraitdə qida mühiti maddələrinin mənimsənilməsi və və hüceyrə metobolitlərinin sintezi hesabına mühit komponentləri daimi olaraq dəyişir ;
4. Hüceyrələrarası qarşılıqlı təsirin itirilməsi. Hüceyrələri toxumadan ayırıb kulturaya köçürdükdə hücəyrəarası əlaqələr pozulur, fermentlərin təsirindən mexaniki zədələnmələrdən hüceyrə qılafı dəyişir. Yenidən, becərilmə zamanı bu təsirlərin gücü daha da artır, deməli hüceyrə kulturalarının orqanizmdəki şəraitdə uyğun şəkildə becərilməsi tələb olunur. Amma yenədə, bu biotexnologiyada həll olunmamış problem kimi qalır. Digər bir məsələ ondan ibarətdir ki, hüceyrə kulturalarının faydalı xassələrinin uzun müddət qorunub saxlanılması məqsədilə hibrid hüceyrələrdən istifadə olunur. Hibrid hüceyrələr normal diferensiasiya və transformasiya olunmuş hüceyrələrin birləşməsindən alınır. Hibrid hüceyrələrini ancaq eyni orqanizmdən deyil, müxtəlif orqanizm hüceyrələrindənda almaq olar. Məsələn, toyuq mioblastı və siçanın miogen toxuması hüceyrələrinin birləşdirilməsi nəticəsində alınan hibrid hüceyrələr diferensiasiya olunur və siçan hüceyrələrinə məxsus xassələri özündə saxlayır. Hibrid heyvan hüceyrələrinin vasitəsilə köməyi ilə müxtəlif fizioloji fəal maddələri (interferonlar, boy hormonu, insulin, somatastin və s.) alınması həyata keçirilir. Son illərdə isə fizioloji fəal maddələri sintez edən heyvan və insan hüceyrələri geniş araşdırılıb öyrənilməyə başlanılmışdır. Bu araşdırma ilk növbədə gen mühəndisliyi üsulu ilə fizioloji fəal maddələri sintez edən bakteriya hüceyrələrinin yaradılması ilə əlaqədardır. Fizioloji aktiv maddələr heyvan hüceyrələrinə nisabətən mikroorqanizmlərdən çox asan alınır.

Biotexnologiyada istifadə olunan monoklonal antitellər vardır ki, bu antitellər limfosit (ağ qan hüceyrələri) və bədxassəli miolem hüceyrələrin birləşməsindən alınan hibrid hüceyrələr tərəfindən sintez edilən yüksək təmizliyə malik olan antitellərdir. Antitellərdən ibarət antizərdabın alınması yüksək təmizlikli antigenlərin olmasını tələb edir. Antigenlərə homogen və heterogen antigenləri misal çəkmək olar. Beləki, homogen antigenin alınması çox çətin və mürəkkəb prosesdir. Heterogen antigen isə çox keyfiyyətsiz antizərdabların alınmasına səbəb olur. Bundan əlavə, hibrid hüceyrələrə kultural mühitdə yüksək böyümə sürətinə malik olub, təmiz spesifik antitellər sintez edir. Onların alınması üçün isə insan və siçan miolem hüceyrələri heyvan dalağı hüceyrələrinə birləşdirilir. Bu hüceyrələrin hər biri ayrılıqda invitro şəraitdə inkişaf etmək qabiliyyətinə malik olmadıqlarına baxmayaraq, onlardan alınan hibrid hüceyrələri çox asanlıqla kultura mühitində bitir. Kultura mühitində bitən və antitel sintez edən hibrid hüceyrələr seçilərək klonlaşdırılır, yenə həyat qabiliyyətinə və xüsusi spesiflikliyə malik antitel sintez edən hibrid alınır.

Antigenlər yad yaxud toksik təsirə elə malikdirlər ki,onlar orqanizmə ilk dəfə daxil olduğu zaman buradakı spesifik və həmin antigenlər üçün cavabdeh olan anticisimlərlə birləşirlər. Onlar orqanizmdə immunoiloji cavabı təmin edirlər.

Hər bir anticisimdə antigen birləşdirən sahə mövcüddur. Əgər orqanizm antigenlə məs: mikrobla ilk dəfə qarşılaşarsa bu vaxt ona qarşı immun sistemi tərəfindən 4-5 gün müddətində davam edən immunoloji cavab reaksiyası yaradılır. Buna ilkin immunoloji cavab deyilir. Antigenə qarşı yaradılan immunoloji reaksiyanın intensivliyi onun oqqanizmə daxil olmuş miqdarı ilə düz müntənasibdir. Antigen çox olduqda onun müvafiq klonların hüceyrələri tərəfindən tutulma ehtimalı da çoxalır. Bir antigenə qarşı orqanizmdə ancaq bir cür anticisim əmələ gəlir. Antigenin anticisimlə birləşməsi haqqında olan fikirlər P.Erlixə məxsusdur. O, toksinin antitoksinlə birləşməsi nəzəriyyəsini öyrənmiş və göstərmişdir ki, anticisimlə antigenin birləşməsi qüvvətli turşu ilə qələvi arasında gedən reaksiya şəklində baş verir. Antitellərin növlərini aşağıdakı kimi xarakterizə etmək olar:

1. Tam antitellər: 2 və daha artıq aktiv bölgəyə sahib antitellərdir.
2. Normal antitellər : Əsasən heyvan və insanlarda mövcud olan antitellərdir.
3. Natamam antitellər : 1 aktiv mərkəzi olan antitellərdir.

Antitellərdən təbabətdə xəstəliklərin diaqnostikasında və müalicəsində istifadə olunur. İnsanlarda yarana kəskin leykozun məqsədilə monoklonal antitellər klinikada artıq tətbiq olunur. Monoklonal antitellər vasitəsilə invitro şəraitində şiş hüceyrələri məhv edilmişdir. Hazırda bir çox viruslara qarşı monoklonol antitellər alınmışdır.

Modifikasiya edən genlər öz hərəkətlərini nümayiş etdirməyən, lakin digər genlərin təsirini artıran və ya zəiflədən genlərdir. Yoluxucu xəstəliklərə qarşı müqavimətin formalaşmasında rol oynayırlar. Məsələn: Hereford mal-qarasının ağ bir başı var və güclü günəş izolyasiyası şəraitində otlayarkən, toxunmamış və zəif piqmentli göz qapaqları olan heyvanlar göz xərçəngindən əziyyət çəkirlər. Göz qapaqlarının artan piqmentasiyası ilə xəstəliyin tezliyi azalır və eyni şərtlərdə intensiv piqmentasiya ilə xəstəlik baş vermir. Ağ başlı heyvanlarda göz ətrafındakı dərinin piqmentasiyasının intensivliyi irsi xarakter daşıyır, bu da genlərin - başın ağ rəngini təyin edən əsas genin dəyişdiricilərindən xəbər verir. Transgenlər heyvanların genomuna süni şəkildə daxil edilmiş, müəyyən bir genomdan təcrid olunmuş və ya süni şəkildə sintez olunan genlərdir. Belə heyvanlara transgenik deyilir. Xarici DNT-nin daxil olduğu bir zigotdan inkişaf edən siçanlar, bu DNT-nin tərkib hissələrini öz genomlarında saxlayır və bəzən xarici genləri də ifadə edirlər. Xarici DNT-nin zigotanın kişi pronuklyusuna mikroinjeksiyon üsulu bütün məmələlərdə istifadə olunur. Xarici DNT-nin quruluşunda öz aralarında fərqlənən transgen siçanların xətləri yaradıldı.

Yad genlərin heyvan hüceyrələrinə köçürülməsi genetik mühəndisliyin inkişafı ilə əlaqədar tədqiqatçıların diqqətini becərilən heyvani hüceyrələr cəlb etməyə başlamışdır. Bu cür hüceyrələrə yad genləri köçürmək və onun xassələrinə nail olmaq bütöv orqanizmə nibətən asandır. Əksər heyvani zülallar və onların virusları adətən yüksəkmolekullu ilkin maddələr şəklində sintez olunur. Sintez olunduqdan dərhal sonra spesifik proteolitik proseslər nəticəsində yetkin formaya çevrilirlər. Bu hüceyrələr ancaq heyvan hüceyrələrinə xasdır. Bəzi eukariot zülallar isə bakteriya hüceyrsində sintez olunduqda eukariot hüceyrələr üçün spesifik olan modifikasiyaya uğraya bilmirlər. Bu cəhətdən heyvan və insan hüceyrələrinin becərilməsi mühüm əhəmiyyət kəsb edir. Genetik mühəndisliyin möhkəmləndirilməsi ilə heyvan hüceyrələrinin alınması əsas mahiyyət kəsb edir. Bu tədqiqat sahələrinin aparılması bir neçə istiqamətdə baş verir. Bunlara aşağıdakıları misal gətirmək olar :

1. Ekzogen genin heyvan hüceyrələrinə daxil edilməsi.
2. Ekzogen genin mayalanmış heyvan yumurta hüceyrələrinə daxil edilməsi.
3. Ekzogen genin liposomlar tərəfindən heyvan orqanizminə daxil edilməsi.

Ekzogenin genin heyvan hüceyrələrinə daxil edilməsi prosesi ən çox daima orqanizmdə çoxalan hüceyrələrində keçirilir. Bu təcrübə siçanın sümük iliyi hüceyrələrində aparılmışdır.

Sümük iliyi hüceyrələrinə antibiotikə qarşı davamlı olan DNT hüceyrələri köçürülmüş və bu sümük iliyi yenidən siçan orqanizminə daxil edilmişdir.

Ekzogen genin mayalanmış heyvan yumurta hüceyrələrinə daxil edilməsi prosesi isə mikroinyeksiya yolu ilə DNT molekulu daxil edilir və sonra yenidən heyvan balalığına yerləşdirilir. Bu zaman ekzogen gen hüceyrə genomuna inteqrasiya olunur və belə halda yumurta hüceyrələr inkişaf edərək yaşlı orqanizmlərə çevrilir. Bu zaman daxil edilmiş yad gen heyvanların həm somatik həm cinsi hüceyrələrində olduğu üçün nəsilədən-nəsilə ötürülür.

Ekzogen genin liposomlar tərəfindən heyvan orqanizminə daxil edilməsi prosesi isə venasına proinsulin gen olan liposom daxil edilmiş siçanın qaraciyərlərində bir müddət sonra insulinin artdığı müşahidə olunur bu da onu bildirir ki, yad gen qarciyər və dalaq hüceyrələrinin genomuna daxil edilmişdir. Onu da qeyd etmək lazımdır ki, bu üsulu həm insan hüceyrələrinə həm də heyvan hüceyrələrinə tətbiq etmək olar.

Hüceyrəyə daxil olan ekzogen genetik hüceyrədə sərbəst və ya xromosoma inteqrasiya olunmuş halda daxil edilərsə, bu zaman yalnız hüceyrənin genotipi deyil həm də fenotipidə dəyişir. Bu proses həm morfoloji həm də biokimyəvi köçürülməsi yolu ilə aparılır. Bu halda biokimyəvi köçürülmə zamanı hüceyrə metabolizmində çox da böyük dəyişikliklərə yol verilmir. İlk biokimyəvi köçürülmə prosesini L. Kraus nümayiş etdirmişdir.

İnsanın ilk gen mühəndisliyi məhsulu terapevtik istifadəsinə icazə verilən insan insulini olmuşdur. İnsulin zülal hormonu olub, karbohidrat mübadiləsini tənzimləyir. Orqanizmdə insulin məhsulunun azalması, milyonlarla insanların əziyyət çəkdiyi şəkərli diabet xəstəliyinə səbəb olur. Hazırda insanın terapevtik əhəmiyyəti olan bəzi genlərini mikroorqanizmlərə daxil etməklə, onlarda interferon, interleykin-2, insanın boy hormonu, qanın laxtalanma faktoru, eritropoetin, B-hepatita qarşı vaksinin sintez olunmasına nail olmuşlar. 1980-cı ildən ABŞ-da nefti parçalayan mikroorqanizm ştamlarına ilk patent verilmişdir.

Sırf bu sahə ilə bağlı anlaşıqlı olmayan bi çox məsələlər vardır ki, bu məsələlərin həll yolunda biotexnologiyada bir çox dəyişikliklər baş verəcəkdir. Bunların həll edilməsi sayəsində tədqiqatçılar bir çox bağlı qalan məsələri aydınlığa gətirmiş olacaqlar.

Yuxarıda qeyd etdiyimiz kimi heyvan hüceyrələrinin genetik mühəndislik üsulu ilə möhkəmləndirilməsi vektor sisteminin yaradılması xüsusi əhəmiyyət kəsb edir. Bu vektor sisteminin yaradılması ilə bağlı ilk dəfə təmiz virus DNT-nin becərilən heyvan hüceyrəsinin köçürülməsinə tətbiq olunmuşdur. Hazırda, dünyada virus DNT-nin hüceyrəyə köçürülməsinin aşağıdakı üsulları vardır.

1. DEAEA – dekstran üsulu.
2. Kalsium – fosfat üsulu.
3. Liposomların köməyi ilə virus DNT-nin transformasiyası.
4. Virus DNT-nin heyvan hüceyrəsinə daxil olması.

DEAEA – dekstran üsulu: Bu üsulun mahiyyəti ondan ibarətdir ki, hüceyrə və virus olan DNT-si olan mühitə DEAEA ionunu əlavə etdikdə DNT köçürülməsi xeyli sürətlənir. Bu halda DEAEA-nın qatılığı və moekul çəkisi köçürülməyə təsir edir. Bu zaman kation DNT-ilə birləşir və hüceyrə daxilində nukleazaların parçalayıcı təsirindən qoruyur. Yeganə mənfi cəhəti ondan ibarətdir ki, bu üsul bəzi kulturalar üçün zəhərli olmasıdır.

Kalsium-fosfat üsulu: Bu üsulun mahiyyəti ondan ibarətdir ki, hüceyrə və ya adenovirus DNT-si fosfat və $CaCL_2$ olan mühitə daxil edildikdə köçürülmənin sürəti artır və bu sürət 10-100 dəfə artır.

Liposomların köməyi ilə virus DNT-nin transformasiyası üsulu: Bu üsul vasitəsilə isə liposomlardan heyvan hüceyrələrinə müxtəlif dərman maddələrinə daxil edilməsində istifadə olunur. Liposomlar vasitəsilə nuklein turşularını da hüceyrəyə daxil etmək olar.

Bu üsulun digər bir əsas mahiyyəti ondan ibarətdir ki , liposom hüceyrə membranı vasitəsilə ilə birləşdiyi üçün liposoma daxil olan DNT hüceyrəsi asanlıqla daxil ola bilir.

Virus DNT-nin heyvan hüceyrəsinə daxil olması üsulunu ilk dəfə alman alimi Qresman tərəfindən irəli sürülmüşdür. Xüsusi şüşə kapilyarların köməyi ilə içərisində DNT molekulu olan məhlul hüceyrəyə daxil edilir. Bu üsulun əsas üstünlüyü ondan ibarətdir ki, hüceyrənin istənilən nahiyyəsinə DNT molekulunu, çatışmıyan cəhəti isə ondan ibarətdir ki, onun vasitəsilə çoxda böyük olmayan DNT molekulunun hüceyrəyə daxil edilməsidir.

Heyvanlara yemlərin hazırlanması zamanı gövşəyən heyvanların toxumaları və orqanlarından istifadə edilmiş heyvan mənşəli yemlər verilməməlidir. Tərkibində gen mühəndisliyinin üsulları və ya digər genetik cəhətdən modifikasiya edilmiş mənbələr vasitəsilə istehsal edilmiş xammal tərkibli yemlərlə yemləndirilməmiş olmalıdır.

Heyvan gen modifikasiyasının əsas istiqamətlərindən başqa bitki biotexnologiyasının əsas istiqamətləri vardır ki, bunlar bir birilərindən fərqlənir. Beleki, bitexnologiyanın əsas istiqamətləri herbisidlərə, zərərli həşərata və patogen göbələklərə qarşı davamlı, böyümə sürəti və məhsuldarlığı yüksək, meyvələrinin saxlama müddəti uzun, keyfiyyəti yaxşılaşdırılmış olan formaların alınmasıdır. Hazırda bu cür bitkilər onlarla milyon hektarlarda becərilir. Belə ki Ştransgenez yolu ilə bitkilərin yaxşılaşdırılması müxtəlif istiqamətlərdə aparılır. Hazırda alaqlarla mübarizədə olduqca əhəmiyyətli olan herbisidlərə qarşı davamlı olan transgen bitkilər yaradılmışdır. Bunlardan pambıq, soya, qarğıdalı, raps, buğda və s. sortları yaradılıb istifadə olunmuşdur.

Həşərata qarşı bitkilərin davamlılığı problemi də transgen bitkilərin yaradılması ilə uğurla həll olunur. Bu problemlə bağlı işlərin böyük əksəriyyəti Bacillus thuringiensis bakteriya ştamlarının məhsulu olan delta-endotoksin zülalını daşıyan transgen bitkilərin alınmasına həsr olunmuşdur. Bu zülal bir çox həşərat növlərinə toksiki təsir göstərdiyi halda, məməlilər, o cümlədən insan üçün təhlükəli deyildir. Bakteriyalardan delta-endotoksinin sintezinə nəzarət edən genlər ayrılmış, spesifik genetik konstruksiyalara daxil edilməklə, bitki genomuna keçirilmişdir. Genlər onlar üçün yad olan genomda normal funksiyaya başlamış və həşərat tərəfindən yeyildikdə, bağırsaq hüceyrələrinin lizisinə səbəb olmaqla, həşərata öldürücü təsir göstərən toksin əmələ gətirmişdir.

Beləliklə, son olaraq bunu bildirmək olar ki, biotexnologiyada aparılan hər bir yeni tədqiqatlar, təcrübələr və müşahidələr bağlı qalan məsələlərin həllinə başlanğıc verəcəkdir.

ƏDƏBİYYAT

1. Кузнецов Л.М. и др. Прикладная экология. Москва, 2020. 629 стр.
2. Жимулёв И.Ф. Общая и молекулярная генетика. Новосибирск, Издательство НГУ. 2019, 470 стр.
3. Примроуз С. Геномика. Москва, 2018. 276 стр.
4. Сингер М. и др. Генная инженерия. Москва, Техносфера 2017. 894 стр.

SOY PRODUCTS PROCESSING AND FOOD ALLERGIES

Sabina Khanam
Department of Zoology, Maulana Abul Kalam Azad Faiz-e-Aam Mahavidyalaya,

Abstract
Soya also called soybean a legume which is low in saturated fat and rich in protein, vitamin C, calcium, potassium, iron, thiamin and healthful because it contains all the essential amino acids and isoflavones. Most of the places it is used as a food and as a protein supplements. Soy is also used to extract oil and this soy oil if used for various purposes such as engine lubricant, crayons, candles and ecologically friendly fuel. The nutritional value of soy and their products is based on how it is processed and what type of ingredients are added. Their are so many benefits of taking soy in our diet such as it reduces the risk of breast cancer, Diarrhea, Kidney diseases, High b good pressure, manages obesity, lower the risk of heart diseases, osteoporosis, diabetes.
Soy can be processed into many products such as soy milk, soy fiber and soy protein. A compound called isoflavone is present in the soy which changed to phytoestrogens in the body which is similar in structure to estrogen hormone. Phytoestrogens affects the normal functioning of the estrogen by blocking its effects because in some cases phytoestrogens mimics the effects of estrogen.
Soy has so many benefits but in some cases it causes side effects such as mild constipation, nausea, bloating and some allergic reactions such as itching, tightness in throat, stomach cramps, vomiting, rashes, dizziness, swelling and breathing problems because soy allergens affects immune system to overreact to soy proteins. Their are some allergenic proteins in soy which may cause allergy are: Gly m 1, Gly m 2, Gly m 3, Gly m 4, Gly m 5, Gly m 6, Gly m 7 and Gly m 8.
To attain the desirable properties soy ingredients are processed by various processes such as enzymatic hydrolysis and heat treatments which may leads to reduce the allergenicity in some cases but in most of the cases heat treatments increase the allergenicity.
Keywords: Soy, allergy, effects, processing

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

SOCIAL PARTICIPATION OF TURMERIC GROWERS IN ERODE DISTRICT OF TAMIL NADU

Dhivya C
Research Scholar (Agricultural Extension Education), Tamil Nadu Agricultural University, Coimbatore
ORCID: 0009-0004-8984-1812

R. Arunkumar
Research Scholar (Agricultural Extension Education), Tamil Nadu Agricultural University, Coimbatore

Abstract
Erode District in Tamil Nadu, India, is renowned for its turmeric cultivation, often referred to as "Turmeric City" due to its significant production and export of this spice. Social participation among turmeric growers in this region is crucial for improving agricultural practices, enhancing livelihoods, and strengthening community ties. This study examines the various forms of social participation among turmeric farmers in Erode, focusing on farmer associations, cooperatives, training programs, market participation, research collaborations, digital platforms, and community-based activities. The social participation of turmeric growers in Erode District is multifaceted, contributing to the resilience and growth of the turmeric sector. Strengthening these social networks and addressing prevailing challenges can significantly enhance the livelihoods of farmers and support the sustainable development of the region. The current study was conducted in the Kodumudi block of Erode District, which ranks first in both area and production of turmeric in Tamil Nadu. The main turmeric-growing regions included Vengampur, Punjai Kollanali, Unjalur, Kollathupalayam, and Kodumudi. A sample of 120 farmers was selected for this study. reveals that over half of the respondents (57.50 percent) exhibited a medium level of social participation, while 29.17 percent and 13.33 percent demonstrated high and low levels of social participation, respectively. This trend may be attributed to a lack of awareness about social organizations, an insufficient number of social organizations in the study area, and the farmers' lack of time.
Keywords: Social Participation, Turmeric Growers, Erode and Tamil Nadu

SPATIO-TEMPORAL EVOLUTION OF WATER SURFACES AT RAMSAR SITE 1017 (SOUTH-WEST OF BENIN)

DEGLA Marius Hugues
Doctorant, Ecole Doctorale des Sciences Agronomiques et de l'Eau, Université Nationale d'Agriculture de Porto-Novo

MOUZOUN Séraphin
Enseignant chercheur, Département de Géographie et Aménagement du Territoire, Faculté des Sciences Humaines et Sociales, Université d'Abomey-Calavi

HOUESSOU G. Laurent
Enseignant chercheur, Faculté d'Agronomie, Université de Parakou

Abstract
The anthropization of the Rasmar 1017 site has led to a profound modification of the wetlands, altering the capacity of the ecosystem to support certain ecological functions. This work aims to analyze the spatio-temporal dynamics of the water surfaces of this site of Biological and Ecological Interest (Ramsar site) since 2000 in Benin. Remote sensing tools were used to estimate changes over 34 years (1988-2022). Landsat 5 images from 1988, the reference image, Landsat 7 satellite images from 2005 and Landsat 8 from 2022 with a spatial resolution of 30 m. The images were classified and then analyzed using ENVI 5.2 and QGis 3.16 software. The results show at the scale of Ramsar site 1017, nine types of wetlands which represent 66,801.346 ha, 65,875.523 ha and 65,485.27 ha respectively in 1988, 2005 and 2022. Intertidal forested wetlands, brackish coastal lagoons /salt and permanent freshwater lake are the types most affected by the changes. Between 1988 and 2022, these areas experienced a regression of 9.37%, 24.98% and 16.78% respectively. These results provide scientific support to guide decision-makers towards sustainable management of the wetlands of Ramsar site 1017.
Keywords: wetlands, ecological functions, remote sensing, lndasat image, Ramsar site 1017, Benin.

THE EFFECTS OF GIBERRELIC ACID CONCENTRATION ON THE GROWTH AND YIELD OF THREE PEPPER IN TROPICAL AREAS OF INDONESIA

Usman Kris Joko Suharjo
Department of Agonomy, College of Agriculture, Bengkulu University

Fahrurrozi Fahrurrozi
Department of Agonomy, College of Agriculture, Bengkulu University

Tunjung Pamekas
Department of Agonomy, College of Agriculture, Bengkulu University

Isnaini Asdiyah
Department of Agonomy, College of Agriculture, Bengkulu University

ABSTRACT
Gibberrelic acid (GA_3) has been known to promote flowering in many horticultural crops. However, some reports suggested that GA_3 also reduced fruit yield. This conflicting phenomenon needs to be elucidate. A field experiment was conducted to evaluate the response of three hot pepper crops to foliar spray of gibberellic acid at different concentrations. The experiment was carried out from February to August 2021 using randomized complete block design (RCBD) arranged in single factorial and 5 replications. Three types of hot peppers were sprayed with GA_3 solutions (0, 50, 100, 150, and 200 ppm). The results showed that GA_3 significantly increased crop growth all of the variety, some of them showing linear response while the other showed quadratic curves. GA_3 also increased fruit length, fruit diameter, and fruit petiole, fruit fresh weight. However, it reduced fruit number. The fasted fruit flowering was found at 200 ppm for all of the variety tested. We concluded that spraying
Keywords: GA3, growth, hot pepper, yield.

MODELING OF HARVESTER DYNAMICS DURING LOGGING ON STEEP SLOPES

Prof. Dr. Alexander V. Lagerev
Bryansk State University, Faculty of Design and Technology
ORCID: 0000-0003-0380-5456

Prof. Dr. Igor A. Lagerev
Kuban State Technological University
ORCID: 0000-0002-0921-6831

Lecturer Anna V. Makulina
Bryansk State University, Faculty of Design and Technology
ORCID: 0009-0002-1698-2582

ABSTRACT
In modern conditions, the effective implementation of forestry work requires solving a number of organizational and technological tasks. One of the key tasks is related to the fact that the possibilities of logging in territories characterized by transport accessibility and favorable terrain have been practically exhausted. Therefore, the solution of this problem requires a transition to the development of forests in inconvenient, inaccessible and mountainous areas with swampy soils and terrain with steep slopes.
To analyze the features of the harvester's operation on a steep slope, a dynamic mathematical model of the six–component system "harvester – manipulator – sorting – anchor system – anchor tree - soil" was developed in relation to a three-axle wheeled harvester. Similar equipment is widely produced by manufacturers from Canada, Finland, Belarus and a number of others. The specified mathematical model is constructed for a fixed harvester with an uncut supporting frame fixed on a steep slope using a single-branch anchor rope and is designed to simulate its dynamics in the process of manipulating a sawn tree when moving from the place of cutting to the place of formation of a sorting bundle. To construct a system of 2nd-order differential equations characterizing the dynamics of a six-component system in generalized coordinates, an approach based on Lagrange equations of the second kind was used. In total, the model is characterized by 35 degrees of freedom and their corresponding 35 generalized coordinates. The system of differential equations is solved by the Runge-Kutta method, as a result of which the spatial positions, velocities and accelerations of characteristic points of the dynamic system, forces and stresses in the elements of the anchor system are determined at an arbitrary moment in time. It is advisable to use the information obtained when designing harvesters for operation on steep slopes in mountainous and hilly areas.
Keywords: Forestry, Harvester, Anchor system, Dynamics

AGRICULTURAL TOURISM IN THE STATE OF BISKRA THE GREEN TREASURE INGREDIENTS AND INVESTMENT OPPORTUNITIES

Dr. KHIARI Reguia
Scientific and Technical Research Center on Arid Regions (CRSTRA)
ORCID : 0000-0003-0136-401X

Dr. TAREK Mokhnane
Scientific and Technical Research Center on Arid Regions (CRSTRA)
ORCID: 0000-0003-2885-8685

Dr. ADJLANE Sabah
Scientific and Technical Research Center on Arid Regions (CRSTRA)
ORCID: 0000-0002-7191-9570

Abstract
Agricultural tourism, a contemporary form of tourism that has emerged recently in numerous countries worldwide and in certain Arab nations, stands out as a sustainable tourism model. Tourist farms, showcasing a variety of plant and animal products, play a pivotal role in attracting tourism investments aimed at fostering sustainable local development. Among the rich tapestry of historical, natural, and religious elements and resources found in Algeria and other Arab countries, Algeria has carved a niche for itself as one of the premier tourist destinations globally.
The region of Biskra holds significance as a major tourist hub due to its strategic geographical location and a plethora of tourism assets, encompassing natural wonders, historical sites, cultural landmarks, and religious sites. The area boasts attractions such as the Hamoua springs, ancient archaeological sites, traditional industries, and pathways winding through palm oases - a key agricultural asset concentrated mainly in the Western Zab region (Tulqa districts, Fugala, Ural). These resources present ample opportunities for the development of agricultural tourism ventures.
This research endeavor seeks to shed light on agricultural tourism, elucidating its significance and the critical success factors governing its operations. Furthermore, the study delves into the distinctive components of agricultural tourism that contribute to the allure of the state of Biskra. The findings underscore the readiness of numerous agricultural enterprises in the region, equipped with the essential prerequisites for engaging in this form of tourism activity.
Keywords: agricultural tourism, components of agricultural tourism, agricultural investments, investment.

CONSEQUENCES DUE TO TRANSMUTATİON OF AGRİCULTURE LAND TO AQUACULTURE LAND USİNG GOOGLE EARTH ENGİNE

Subhashish Dey
Civil Engineering Department, Gudlavalleru Engineering College

Abstract
The transmutation of agricultural land to aquaculture represents a significant shift in land use patterns with far-reaching ecological consequences. Using advanced geospatial tools such as Google Earth Engine (GEE), this study delves into the multifaceted impacts of this transition on terrestrial and aquatic ecosystems. Through a comprehensive analysis of satellite imagery, land cover classification, and spatial modeling techniques, we explore the alterations in land surface characteristics, water quality dynamics, and habitat fragmentation resulting from agriculture-to-aquaculture. The study focuses on several key ecological parameters, including land surface temperature, vegetation indices, water quality indicators, and landscape connectivity. By leveraging the vast archive of satellite data available through GEE, we track changes in these parameters over time and across spatial scales to elucidate the ecological consequences of land use transformation. Our findings reveal significant shifts in land surface temperature following the conversion of agricultural land to aquaculture. These changes are attributed to differences in surface reflectance properties between agricultural fields and aquaculture ponds, as well as alterations in land cover and land management practices. Increase land surface temperatures in aquaculture areas can have implications for local microclimates, influencing heat exchange processes and thermal regimes in surrounding landscapes. Furthermore, the transition from agriculture to aquaculture is associated with pronounced alterations in vegetation dynamics. Satellite-derived vegetation indices such as the Normalized Difference Vegetation Index (NDVI) and Enhanced Vegetation Index (EVI) are used to assess changes in vegetation cover, biomass, and productivity. Our analysis reveals a decline in vegetative cover in areas converted to aquaculture, reflecting the removal of terrestrial vegetation and its replacement with open water or aquaculture infrastructure. Furthermore, the expansion of aquaculture infrastructure can lead to habitat fragmentation and alterations in landscape connectivity. Using landscape metrics and spatial analysis techniques, we quantify changes in habitat patch size, shape, and distribution resulting from agriculture-to-aquaculture conversion. Our analysis reveals a fragmentation of terrestrial habitats and a loss of landscape connectivity, which can impede species movement, dispersal, and gene flow. These changes in landscape structure can have profound implications for biodiversity conservation, ecosystem resilience, and the provision of ecosystem services. Overall, this study underscores the importance of leveraging advanced geospatial tools such as Google Earth Engine to assess the ecological consequences of land use transformation.
Keywords: Google Earth Engine, Land use, Land Cover, Bio-diversity, Ecosystem, Water Quality, Integrating satellite imagery analysis and Spatial modeling techniques

IMPACT OF INDUSTRIAL WASTE POWDERS FROM DIFFERENT SOURCES ON THE PROPERTIES OF CEMENT MORTAR

Benyahia Amar
University of Saad Dahlabe, Civil Engineering department
ORCID: 0000-0001-6404-0173

Abstract
The study focuses on the utilization of industrial waste from different sources as cementitious materials and their influence on the characteristics of cement mortar. In order to achieve this goal, mortar mixes were formulated with a mixture of 10% quarry rock residue (QR) and 10% dredging sludge (DS) and compared to a control mortar.The impact of such waste materials on the effectiveness of mortars was investigated through experimental analysis in various stages: fresh state (slump flow table), hardened state (flexural and compressive strengths) at 7, 28, and 90 days, and bond at 28 days. It was concluded that the combination of 10% QR with 10% DS significantly improved long-term strength and bond. Nevertheless, this did not have a positive impact on workability.
Keywords: Quarry rock residue - Dredging sludge –Cement mortar-Compressive strength. Repair.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

MARŞ KONULU TEZ VE MAKALELER ÜZERİNE BİR İNCELEME

Dr. Öğr. Üyesi Serap Yağmur İLHAN
Kahramanmaraş Sütçü İmam Üniversitesi, Güzel Sanatlar Fakültesi, Müzik Bölümü
ORCID: 0000-0002-1383-3576

ÖZET
Marşlar, bireyleri ortak duygu ve düşüncede buluşturan önemli misyona sahip olan bir müzik türüdür. Bu araştırma ile marş konulu tez ve makalelerin çeşitli değişkenlere göre analizlerinin yapılarak çalışmaların bir arada görülmesi, literatürdeki boşluklarının doldurulması ve alan ile ilgili çalışmalar yapacak olan araştırmacılara yeni bakış açıları kazandırılması amaçlanmıştır. Yapılan çalışmaların incelenen alan ile ilgili yapılmış olan çalışmalara ışık tutması ve yapılacak olan çalışmalar için farklı perspektif geliştirilmesi için bir arada görülmesi açısından önem taşıdığı düşünülmektedir.
Araştırmada Türkiye'de 2006 ve 2024 yılları arasında müzik alanında yayımlanmış olan 6 tez (erişime açık) ve 24 makale çeşitli değişkenler (çalışma türü, tezlerin türleri ve tezlerin bağlı olduğu enstitüler, tezlerin üniversitelere ve anabilim dallarına, yıllarına, dergi adlarına, konu ile ilintili olan başlıklara, yöntemlerine göre dağılımları, amaçları ve sonuçlarına yönelik bulgular) açısından incelenmiştir. 3 tezin içeriğine ise erişim kısıtlamasından dolayı erişilememiştir. Yine de araştırmada bu çalışmaların isimleri belirtilmiş ancak çalışma kapsamına dahil edilememiştir. Araştırma bir durum çalışması olup nitel araştırma yöntemlerine dayalı olarak bir doküman incelemesi şeklinde tasarlanmıştır. Doküman incelemesiyle elde edilen veriler betimsel analiz ile çözümlenmiştir. Verilerin çözümlenmesinde frekans (f) ve yüzde (%) kullanılmış olup bulgular tablo ve grafiklerle gösterilmiştir.
Araştırmanın sonuçları incelendiğinde, bu konuda yayımlanan çalışmaların yıllara göre düzensiz bir dağılım gösterdiği, bununla birlikte yapılan çalışmaların büyük çoğunluğunun 2023 yılında olduğu sonucuna ulaşılmıştır. Bu durumun 2023 yılının Türkiye'nin kuruluşunun 100. yılı olmasından kaynaklandığından ileri geldiği söylenebilir. Bu durumla bağlantılı olarak konu ile ilgili çeşitli marşlar yazılmış olup pek çok akademik çalışma da yapılmıştır. 2023 yılından itibaren çalışma sayılarının artması ile marş konusuna yönelimin daha da arttığı görülmüştür. Özellikle müzikoloji ile ilgilenen araştırmacıların bu alana daha da eğilim gösterdiği sonucuna varılmıştır.
Anahtar Kelimeler: Marşlar**,** betimsel analiz, marşlar ve müzik

A REVIEW OF THESES AND ARTICLES ON MARCHES

ABSTRACT
Marches are a type of music with an important mission of bringing individuals together in common emotion and thought. This research aims to analyze theses and articles on the topic of marches according to various variables, to see the works together, to fill the gaps in the literature, and to provide new perspectives for researchers who will conduct studies related to the field. It is thought that the examination of the conducted studies is important to shed light on the studies related to the field and to develop different perspectives for future studies. In this research, 6 theses (with open access) and 24 articles published in the field of music in Turkey between 2006 and 2024 were examined according to various variables (type of study, types of theses and their affiliated institutes, distribution of theses by universities and departments, years, journal names, related topics, methods, purposes, and findings).

Access to the content of 3 theses was restricted; however, their titles were mentioned but not included in the study. The research is a case study and was designed as a document analysis based on qualitative research methods. Data obtained through document analysis were analyzed using descriptive analysis. Frequency (f) and percentage (%) were used in data analysis, and findings were presented with tables and graphs. When the results of the research were examined, it was found that the distribution of studies published on this topic was irregular over the years, with the majority of studies conducted in 2023. This can be attributed to 2023 being the 100th anniversary of Turkey's establishment. Various marches were written on this occasion, and many academic studies were conducted. It was observed that the interest in the subject of marches increased with the rise in the number of studies from 2023 onwards. It was concluded that researchers, especially those interested in musicology, have shown a greater inclination towards this field.
Keywords: Marches, descriptive analysis, marches and music

GİRİŞ
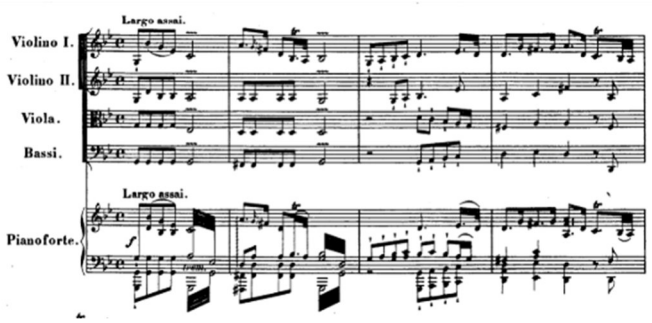
Marş, yürüyüş anlamına gelmekle beraber aynı zamanda yürüyüşte söylenebilecek ya da çalınabilecek müzik türü anlamına da gelmektedir. Marşlar dans ile bağlantılı bir tür olmakla beraber 2/2, 2/4, 4/4'lük ya da 6/8'lik gibi ölçü yapılarında bulunabilirler. Kökeni Batı'ya dayanan marş türü, 20. yüzyılın başlarında hayatımıza girmiştir. Marşların, insanların hareketlerini, bilhassa da beraber yürüyüşlerini senkronize etmek ve halkın savaşa olan azmini arttırmak gibi birtakım misyonları vardır (Cangal, 2004: 83; Şerifova, 2021: 53-54).

Marşların seslendirilişi ve içeriğinin, marşların türlerine göre değişim gösterdiği düşünülmektedir. Birçok marş çeşidi bulunmaktadır. Ulusal (milli) marşların literatürde en sık rastlanan marş türü olduğu görülmüştür. Ulusal marşlar, bir coğrafyaya ait olan tıpkı anıtlar, bayraklar ve semboller gibi toplumun sosyokültürel ve tarihsel yapısını yansıtan anlamlı dinamik sembollerdir (Abril, 2007: 73). Cerulo (1989: 77), ulusal marşların, ulusların kendilerini uluslararası olarak ilan etmelerini sağlayan müzikal semboller olduğunu ifade etmiştir. Cusack (2005: 239)'a göre özellikle bu marş türü, bir ulusun inşaasında önemli rol oynamaktadır. Basto (2013: 189) ise marşların, toplumların değerlerini yansıtan halkın biyografisi olduğundan söz etmiştir. Ulusal marş örnekleri incelenecek olduğunda Türk Milleti'nin ulusal marşının İstiklal Marşı (T.C. Kültür ve Turizm Bakanlığı, t.y.) Bulgaristan'ın ulusal marşının МИЛА РОДИНО (Ulu Vatan) (Kapıkıran, 2019), Azerbaycan'ın ise Azerbaycan Milli Marşı (Ülke Marşları, 2018) olduğu görülmüştür.
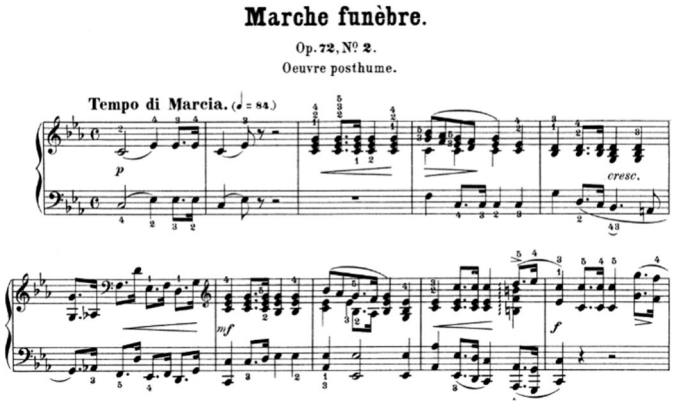
Bazı milli marşların içeriğinde birtakım dini sembollerin de olduğundan söz edilebilir. Topcu (2023), neredeyse tüm ülkelerin siyasi ve istiklal marşlarında dini sembollerin sıklıkla kullanıldığını ifade etmiştir. Bu marşlarda Tanrı'nın yüceltilmesi, vatanın kurtuluşu için dualar gibi çeşitli temaların sıklıkla kullanılan temalar olduğundan ve bir İngiliz marşı olan "*God Save the Queen*"in de bu marşlardan biri olduğundan bahsetmiştir. Daniel (1959)'e göre kilise marşları, Amerikan müzik kültürünün temel taşlarındandır. Aydın (2019) ise çalışmasında "islami marşlar" kavramını ele almıştır. Bu bağlamda İslami marşları marştaki tematik vurguların ve kavramların dini düşünceden etkilenmesi olarak tanımlamıştır. Bu kapsamda çeşitli dinler ve inançlardaki marşların ele alındığı çalışmalar ile marşların "dini marşlar" alt türüne göre de kategorizelendirilebileceği ortaya çıkmaktadır.

Birçok besteci çeşitli besteleri ile marş türüne katkı sağlamıştır. Bu bestecilerden biri marş türünde birçok bestesi olan George Frideric Handel'dir. Handel, "Peace Anthem" (Barış Marşı) (İSSUU, 2017) ve "Funeral Anthem (For Queen Caroline)" (Cenaze Marşı) (IMSLP, t.ya) isimli marşları bestelemiştir.

Marş literatürüne katkı sağlayan bir diğer bestecinin ise yine "Marche Funebre" (Cenaze Marşı) isimli bestesiyle Frédéric Chopin olduğu bilinmektedir (IMSLP, t.yb.). Bahsedilen besteciler dışında bu alt türe katkı sağlayan birçok besteci de bulunmaktadır. Tchaikovsky (IMSLP, t.yc.), Schubert (IMSLP, t.yd), Johann Strauss Sr. (IMSLP, t.ye), Luly, Jean-Baptiste (IMSLP, t.yf) bu türe katkı sağlayan diğer bestecilerdendir. Bu marş türü, tören marşları kategorisi altında toplanabilir. Bunun yanı sıra ulusal marşlar ve diğer birçok marş türü de törenlerde yer alabildiğinden dolayı tören marşları olarak sınıflandırılabilir. Karakuş (2021: 142) söyleşisinde, İstiklal Marşı'nın da bir tören marşına dönüştürüldüğünden bahsetmiştir.



Resim 1. IMSLP (t.ya) "Funeral anthem (For Queen Caroline)" HWV266



Resim 2. IMSLP (t.yb) "Marche Funèbre"

Okul marşları veya üniversite marşları gibi çeşitli isimlerle karşılaşılan marşlar genel itibari ile kurumsal marşlar başlığı altında toplanabilir. Bu marşlar herhangi bir kurumun kimliğini, misyonunu ve ideolojisini sergilemede önemli bir rol oynar (Ayoola, 2022: 33). Bu marş türü için kurumları tanıtmaya yardımcı olan marşlar da denilebilir (Lopes ve Avelino De França, 2022: 1417). Marşların kurum adları veya vizyonları hakkında dinleyenleri bilgi sahibi etmeleri dışında bireyleri aynı duyguda buluşturabilmek ve kuruma olan bağlılığı arttırmak gibi misyonlarının da olduğu düşünülmektedir. Kurum marşlarının tıpkı kurumların logoları gibi niteliklerini ifade eden müzikal araçlar olduğu söylenebilir. Sözleri ve müziği Taner Akansel'e ait olan Ankara Üniversitesi Marşı (Ankara Üniversitesi Web TV, t.y.), söz ve müziği Muammer Sun'a ait olan Atatürk Üniversitesi Marşı (Kürücü, 2023), sözü Mehmet Sarı, müziği ise Yusuf Mirişli'ye ait olan Afyon Kocatepe Üniversitesi Marşı (Afyon Kocatepe Üniversitesi, t.y.), sözleri Sinem Miraç Öztürk'e, bestesi Serhan Öztürk'e ait olan Bayburt Üniversitesi Marşı (Bayburt Üniversitesi, 2024), sözleri Tevfik Fikret, bestesi Zati Arca'ya ait olan Galatasaray Lisesi Marşı (tcoskun, 2012), sözleri Nezahat Somar, bestesi ise Hikmet Günsel'e ait olan Kadıköy Anadolu Lisesi Marşı (T.C. Milli Eğitim Bakanlığı, 2023),

sözleri İsmail Hakkı Ürdoğan, bestesi ise Halit Cevat Yavuz'a ait olan Maltepe Askeri Lisesi Marşı (Aytekin, 2016) kurum marşlarına örnek olarak gösterilebilir. DemirDöküm Şirket Marşı (SosyalMüzik, 2020) ise özel kurumlara ait olan marşlara örnek teşkil edebilir. Kurum marşları sözel ve müzikal açıdan incelendiğinde, kuruma aidiyet ve iş birliği duygularını uyandırması veya bu duyguları güçlendirmesi, kurumlar ve kurumların niteliklerini yansıtması gibi çok çeşitli özellikleri ile dikkat çekmektedir.

Marş türlerine verilebilecek örneklerinden biri de takım marşlarıdır. Takım marşları çeşitli spor türlerindeki takımlara uygun olarak yazılırlar. Bu marşlar, takım oyununun kendisi kadar eskidir (Aydoğdu, 2023: 341). Bir destek aracı olarak görülen futbol marşlarında amaç, farklılığı, tutkuyu, desteği ve birliği ifade etmektir. Diğer taraftarlarla birlikte söylenen marşlar ile birlik ve aidiyet duygusu yaratmayı amaçlamaktadır. Bu sayede ortak gururun etkisi yoğunlaşır, ego yok olur ve iş birliği içerisinde olma duygusu artar. Bu marşların, melodik, ezberlenmesi kolay ve ritmik yapısının güçlü olması gerekir. Bahsedilen müzikal özelliklerinin yanı sıra sözel yapısının da grubun kimliğini tanımlamaya ve dayanışmaya teşvik etmeye yardımcı olan değerleri, deneyimleri, duyguları ifade etmesi ve içerik açısından da güçlü olması gerekmektedir (Križan, 2016: 16). Birçok spor çeşidi olmasına rağmen takım marşları daha çok futbol marşları başlığı altında ele alınmıştır. Bunun en çok ilgi gösterildiği düşünülen spor türü olmasından kaynaklandığı söylenebilir.

Alan ile ilgili literatür incelendiğinde çalgı alanında yapılmış olan lisansüstü tez ve makalelerin incelenmiş olduğu çalışmaların fazlalığı dikkat çekmektedir. Bu çalışmaların özellikle çalgı alanında yoğun olduğu görülmüştür. Piyano alanında (piyano düetleri, piyano pedal teknikleri, piyano eğitimi vs.) (Ömür ve Gültek, 2011, Toptaş, 2013; Babacan, 2017; Demir ve Keskin, 2020, Çetiner, 2020; Kalkanoğlu, 2020; Özer ve Eğilmez, 2021; Arslan ve Işıksungur, 2022; Pala, 2022; Erdoğan ve Boon, 2023), keman alanında (Arıca, 2017), viyola alanında (Sonsel, 2018; 2015; Özay, 2020), flüt alanında (Gençel Ataman, 2009; Soycan, 2021; Tankız ve Caf, 2023), viyolonsel alanında (Yıldırım Orhan, 2012; Kayaarslan ve Kumtepe, 2020; Cömert ve Erim, 2018; Danacı, 2023), ses eğitimi alanında (Kösreli,2020; Sav ve Gerekten, 2022; Göncü, Korkmaz ve Arsel, 2024) bağlama alanında (Gerekten, 2020; Güler ve Toptaş, 2022) çok çeşitli çalışmaların olduğu gözlenmiştir. Müzik alanında (müzik, müzik eğitimi vs.) yapılmış olan lisansüstü tez ve makalelerin incelenmiş olduğu genel çalışmalar da (Karkın, 2011; Aydınlı Gürler, 2021; Özer ve Demirbatır, 2021) mevcuttur. Çalgı alanının dışında müziğin diğer alanlarında lisansüstü tez ve makalelerin incelenmiş olduğu çalışmalar da azımsanmayacak düzeydedir. Koro alanında (Apaydınlı, 2014; Ertek Babaç ve Köse, 2018; Turhal ve Uçar, 2023), orkestra alanında (Efe ve Sonsel, 2019) ve müzik terapi alanında da (Can ve Yılmaz, 2019; Çelebioğlu ve Yazıcı, 2020; Orlowski, Can ve Bağcı, 2021) birçok çalışmanın mevcut olduğu görülmüştür. Bilhassa pandemi ile beraber yaygınlaşan uzaktan müzik eğitimi ile ilgili de yayımlanmış (Orhan ve Öztosun Çaydere, 2021; Aksoy ve Güçlü, 2023; Alkan, 2023) çalışmalar mevcuttur. Bahsedilen konular dışında alan ile ilgili çeşitli konuları kapsayan birçok lisansüstü tez ve makalelerin incelenmiş olduğu çalışma da mevcuttur. Yapılan çalışmaların incelenen alan ile ilgili yapılmış olan çalışmalara ışık tutması ve yapılacak olan çalışmalar için farklı perspektif geliştirilmesi için bir arada görülmesi açısından önem taşıdığı düşünülmektedir.

Araştırmanın Amacı

Marşların insanları ortak değer, düşünce ve duyguda buluşturmak gibi önemli misyonlarının olduğu düşünülmektedir. İlgili literatür incelendiğinde, konu ile ilgili yeterince çalışma yapılmamış olduğu görülmüştür.

Bu hususta yapılan çalışmanın yapılacak olan diğer çalışmalara örnek teşkil etmesi, konunun derinlemesine incelenmesi, konu çeşitlendirilmesinin yapılması ve en önemlisi de var olan çalışmaların yapılarının (çalışma türü, çalışmaların yöntemleri vs.) bir arada görülmesi açısından alana katkı sağlayacağı düşünülmektedir.

Bu araştırma ile marş konulu tez ve makalelerin çeşitli değişkenlere göre analizlerinin yapılarak çalışmaların bir arada görülmesi, literatürdeki boşlukların doldurulması ve alan ile ilgili çalışmalar yapacak olan araştırmacılara yeni bir bakış açısı kazandırılması amaçlanmıştır. Bu araştırma, konu ile ilgili farklı bakış açıları sunmayı hedefleyen araştırmacılara katkı sağlaması yönüyle önem taşımaktadır. Bu doğrultuda "Türkiye'de marş konusu ile ilgili yapılmış olan tez ve makaleler farklı değişkenlere göre nasıl şekillendirilmiştir?" cümlesi araştırmanın problem durumunu oluşturmaktadır. Araştırmanın alt problemleri ise aşağıdaki şekilde oluşturulmuştur:

1. Marş konusunda yapılmış olan çalışmaların çalışma türlerine göre dağılımları nasıldır?
2. Marş konusunda yapılmış olan tezlerin türleri ve tezlerin yapılmış olduğu enstitülere göre dağılımları nasıldır?
3. Marş konusunda yapılmış olan tezlerin üniversitelere ve anabilim dallarına göre dağılımları nasıldır?
4. Marş konusunda yapılmış olan çalışmaların yıllara göre dağılımları nasıldır?
5. Marş konusunda yapılmış olan makalelerin dergi adlarına göre dağılımları nasıldır?
6. Marş konusunda yapılmış olan çalışmaların konu ile ilintili olan başlıklara göre dağılımı nasıldır?
7. Marş konusunda yapılmış olan çalışmaların yöntemlerine göre dağılımları nasıldır?
8. Marş konusunda yapılmış olan çalışmaların amaçlarına göre dağılımları nasıldır?
9. Marş konusunda yapılmış olan çalışmaların sonuçlarına göre dağılımları nasıldır?

YÖNTEM

Bu araştırma, Türkiye'de 2006 ve 2024 yılları arasında müzik alanında yapılmış olan marş konulu tez ve makaleleri çalışma türleri, yılları, yöntemleri, amaçları, sonuçları gibi çeşitli değişkenler açısından incelemeye dayalı olarak yapılmıştır. Araştırma bir durum çalışması olup nitel araştırma yöntemlerine dayalı olarak bir doküman incelemesi şeklinde tasarlanmıştır. Doküman incelemesiyle elde edilen veriler betimsel analiz ile çözümlenmiştir. Nitel araştırma, sosyal veya beşeri bir probleme dayalı olup bireylerin ve grupların atfettiği anlamları anlama ve keşfetmeye yönelik olan bir yaklaşımdır (Creswell, 2017: 4). Durum çalışmasında bir duruma ilişkin etkenler (ortam, bireyler, olaylar, süreçler vb.) bütüncül bir yaklaşımla araştırılır, bu etkenlerin ilgili durumu nasıl etkiledikleri ve ilgili durumdan nasıl etkilendiklerine odaklanılır (Yıldırım ve Şimşek, 2016: 73). Doküman incelemesi, araştırılması hedeflenen olgu ve olgular hakkında bilgi içeren yazılı materyallerin analizini kapsar.

Elde edilen veriler Ulusal Tez Merkezi (2024) DergiPark (2024), Google Akademik (2024) ve Sobiad (2024) veritabanları taranarak incelenmiştir. Müzik alanının dışında çalışılmış olan marş konulu tez ve makaleler ise çalışma kapsamı dışında tutulmuştur. Yapılan inceleme sonucunda 2006-2024 (Haziran) yılları arasında toplamda 10 tez ve 24 makale tespit edilmiştir. Taranan tezlerin 3'üne ise erişim izni olmadığı için çalışma kapsamına dahil edilememiş ancak tablo 2'de bu çalışmaların konu, yazar ve danışman adlarına ilişkin bilgilere yer verilmiştir. Buna göre çalışma yayınlanmış 6 tez ve 24 makale olmak üzere toplamda 30 çalışmaya ilişkin yapılan tarama sonucu ile elde edilmiştir. Bu hususta incelenen çalışmalar Excell Programı yardımı ile analiz edilmiş olup frekans (*f*) ve yüzde (%) değerleri hesaplanmıştır. Elde edilen veriler tablo ve grafikler ile sunulmuş ve yorumlanmıştır.

Tablo 1 Türkiye'de çalışılmış olan marş konusu ile ilgili incelenen tezler yılları, yazar ve danışman adları, makaleler ise yılları, yazarları, dergi ve makale adları ile bir arada sunulmuştur.

Tablo 1. Türkiye'de Çalışılmış Olan Marş Konusu İle İlgili İncelenen Erişime Açık Tezler

Erişime Açık Tezler			
Yılı	**Yazarı**	**Danışman Adı**	**Tez Adı**
2006	Rıza Aydın	Yrd. Doç. Dr. Erdal Tuğcular	Türkiye'de Ortaöğretim Kurumlarında İstiklal Marşı Söyleme ve Yönetme Problemleri
2010	Hakan Duran	Doç Dr. Serhat Yener	Avrupa Birliği Üye ve Aday Ülkeleri Ulusal Marşlarının Sosyo-Kültürel ve Müzikal Yapı Bakımından İncelenmesi
2014	Merve Köşker	Dr. Ahu Köksal	Ulusal Marşların Söz ve Müzik Açısından İncelenmesi
2019	Soo Kyung Park	Doç. Dr. Emine Şirin Özgün Tanır	Güney Kore'deki Protest Şarkıların Toplumsal Simgeleri ve Müzikal Yapıları: Politik Hareketin Marşı "Sevdiklerimiz İçin Yürüyüş"
2023	Ömer Başak	Dr. Öğr. Üyesi Murat Karabulut	Marşlarımızın Müzik Eğitiminde Kullanılabilirliği Bakımından Zorluk Derecelerine Göre Sınıflandırılması Üerine Bir Deneme
2023	Ömer Burak Borulday	Doç. Dr. Ünsal Deniz	Muallim İsmail Hakkı Bey'in Bestelediği Marşların Tespiti, Tasnifi, Müziksel Analizi Ve Latin Alfabesine Çeviri Yazıları

Tablo 1'de Türkiye'de çalışılmış olan marş konusu ile ilgili 6 erişime açık tez olduğu incelenmiştir.

Tablo 2. Türkiye'de Çalışılmış Olan Marş Konusu İle İlgili İncelenen Erişim İzni Bulunmayan Tezler

Erişim İzni Bulunmayan Tezler			
Tez Kodu	**Yazarı**	**Danışman Adı**	**Tez Adı**
1993	Esin Sabah	Yrd. Doç. Dr. Serhad Durmaz	Batı Musikisinin Türkiye'deki Gelişimi Sürecinde Bando Ve Marş Türünün Yeri
2001	Cem Sevgi	Yrd. Doç. Dr. Erdal Tuğcular	Türkiye'deki İlköğretim Okullarının 2. Kademesinde Müzik Eğitiminde Kullanılan Marşların Eğitim Müziği Besteleme Teknikleri Bakımından İncelenmesi
2005	Şenay Topçu	Doç. Enver Tufan	İlköğretim Okulları İkinci Kademe Müzik Eğitiminde Kullanılan Marşlara İlişkin Piyano Eşliklerinin Müzik Öğretmenleri Tarafından Çalınabilirliği

Tablo 2'de Türkiye'de çalışılmış olan marş konusu ile ilgili 3 erişim izni olmayan tez olduğu incelenmiştir.

Tablo 3. Türkiye'de Çalışılmış Olan Marş Konusu İle İlgili İncelenen Makaleler

Makaleler			
Yıl	**Yazarı**	**Dergi Adı**	**Makale Adı**
2008	Uğur Türkmen	Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi	30 Ağustos-Kocatepe Konulu Marş ve Türkü Dağarcığı
2009	C. Hakan Çuhadar	Anadolu Üniversitesi Sosyal Bilimler Dergisi	Türkiye'de Ulusalcılığın Değişmeyen Simgesi: Onuncu Yıl Marşı
2010	Turan Sağer	Adıyaman Üniversitesi Sosyal Bilimler Enstitüsü Dergisi	İstiklal Marşı Besteleri
2010	Serhat Yener Hakan Duran	Güzel Sanatlar Enstitüsü Dergisi	Avrupa Birliği Ülkelerinin Ulusal Marşlarının Sosyo-Kültürel ve Müzikâl Açıdan İncelenmesi
2013	H. Yılmaz Küçüköncü	Çanakkale Araştırmaları Türk Yıllığı	Bir Çanakkale Marşı
2013	Erol Başara	İlahiyat Fakültesi Dergisi	Yüz Yıllık Bir Nota Defterinde Giriiftzen Asım Bey'in İstiklal Marşı
2017	Gülden Filiz Önal	Ulakbilge Sosyal Bilimler Dergisi	Ortadoğu Ülkeleri Milli Marşlarının Söz ve Müzik Biçimi Açısından İncelenmesi
2018	İlker Kapancıgil	Online Journal of Music Sciences	Balkan Ülkeleri Milli Marşlarının Kültürel Ve Müzikal Özelliklerinin İncelenmesi
2018	Caner Çakı-Derya Karaburun Doğan-Nurcan Yılmaz	İletişim Kuram ve Araştırma Dergisi	"Horst-Wessel" Propaganda Marşı Üzerinden Nazizm İdeolojisinin İnşası
2019	Ömer Bilgehan Sonsel-Selçuk Bilgin	Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi	Ön Elemeyi Geçen İstiklal Marşı Bestelerinin Eğitim Müziği Açısından İncelenmesi
2020	Erhan Tekin	Rast Müzikoloji Dergisi	Marş-ı Hâssa Osmanlı Padişahlarına İthaf Edilen Marşlar

Makaleler			
Yıl	**Yazarı**	**Dergi Adı**	**Makale Adı**
2020	Derya Karaburun Doğan-Mehmet Ali Gazi-Caner Çakı	Ermeni Araştırmaları Dergisi	Sovyetler Birliğinde Milli Marşlar Üzerinden Komünizm Propagandası: Ermenistan Üzerine İnceleme
2021	Sıtkı Akarsu	Turkish Studies	İstiklal Marşı ve İcrasına Yönelik Bir Analiz Çalışması
2022	Belgin Bağrıaçık-M. Ilgın Yıldız-K. Rüzgar Yelin-Adem Yüzgeç	Turkuaz Uluslararası Türk Dünyası Bilimsel Araştırmalar Dergisi	Azerbaycan-Türkiye Millî Marşlarının Edebî ve Müzikal Açıdan İncelenmesi
2022	Burak Sağırakaya	Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi	30 Ağustos Zaferi İçin Bestelenmiş Şarkı ve Marşlara Yönelik Tematik Bir İnceleme
2023	Yiğit C. Eyüboğlu	International Anatolia Academic Online Journal / Sosyal Bilimler Dergisi	İstiklal Marşı'nın Yapısal Analizi
2023	Ömer Bilgehan Sonsel-Güray Özbek	Lokum Sanat ve Tasarım Dergisi	Genel Müzik Eğitiminde Kullanılan Marşların Eğitim Müziği Açısından İncelenmesi
2023	C. Hakan Çuhadar	Akademik Müzik Araştırmaları Dergisi	Necil Kazım Akses'in 50. Yıl Marşı'nın Prozodi Bağlamında İncelenmesi
2023	Mert Gürer	Online Journal of Music Sciences	Türkiye Cumhuriyeti'nin 100. Yılı İçin Bestelenmiş Eserlere Genel Bir Bakış
2023	Oğuz Kalkan	İdil Sanat ve Dil Dergisi	Türklerde Kut İnanışı ve Marş Geleneğinde Etkileri
2023	Tolga Ürün	Akademik Müzik Araştırmaları Dergisi	Necil Kâzım Akses'in Tertip Ettiği 11'inci Tümen Marşı Üzerine Bir İnceleme
2023	Özlem Yıldırımer	Sahne ve Müzik Eğitim-Araştırma Dergisi	Cumhuriyetin 100. Yılı'nda İstiklâl Marşı'nın Bestesiyle On Kıtasının Okunması
2024	Hikmet Toker	Z Dergisi	İstiklal Marşı Resmî Bestesinin Serüveni
2024	İlknur Özal Göncü	Premium e-Journal of Social Sciences	Milli Eğitim Bakanlığı Tarafından Yayınlanan Müzik Dersi Kitaplarındaki Marşların İncelenmesi

Tablo 3'te Türkiye'de çalışılmış olan marş konusu ile ilgili 24 makale olduğu incelenmiştir.

BULGULAR

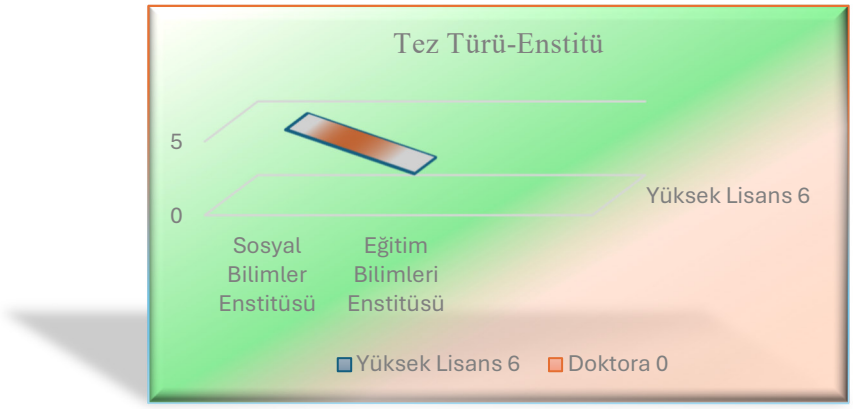
Araştırmanın bulgular kısmında 2006-2024 yılları arasında Türkiye'de müzik alanında çalışılan marş konulu tez ve makaleler incelenmiş olup marşlarla ilgili detaylı veriler grafik ve tablolar halinde sunulmuştur.

Tablo 4. Marş Konusunda Yayımlanmış Olan Çalışmaların Çalışma Türlerine Göre Dağılımları

Çalışma Türü	***f***	***%***
Tez	6	20
Makale	24	80
Toplam	30	100

Tablo 4 incelendiğinde marş konusunda yayımlanmış olan çalışmaların %20'sinin (f=6) tez türünde ise %80 'inin (f=24) makale türünde olduğu görülmektedir. Makale türünde daha çok yayım üretilmiş olduğu gözlenmiştir.

Grafik 1. Marş Konusunda Yayımlanmış Olan Tezlerin Türleri Ve Tezlerin Bağlı Olduğu Enstitülere Göre Dağılımları



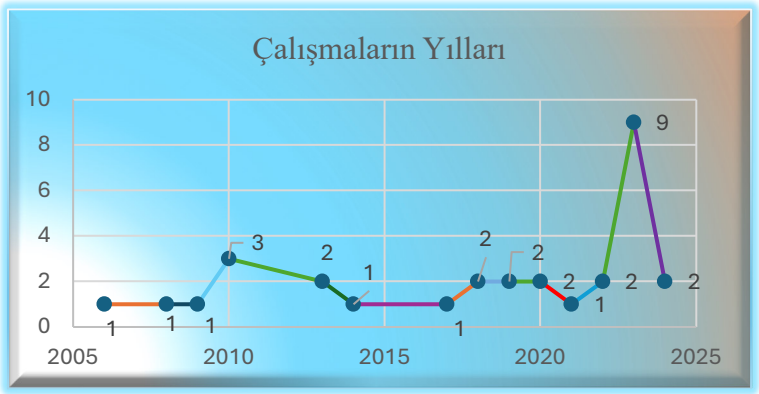
Grafik 1'de marş konusunda yapılmış olan tezlerin türlerine göre dağılımları incelendiğinde, tezlerin %100'ünün (f=6) yüksek lisans tezi olduğu ve erişilebilen tezler içerisinde bu alanda yayımlanmış olan doktora tezi olmadığı gözlenmiştir. Yüksek lisans tezlerinin %66,67'sinin (f=4) sosyal bilimler enstitüsü %33'ünün (f=2) ise eğitim bilimleri enstitüsünde çalışılmış olduğu görülmüştür. Buradan hareketle marş konusunda yayımlanmış olan doktora tezi olmadığı ve tezlerin büyük çoğunluğunun ise sosyal bilimler enstitüsüne bağlı olarak çalışıldığı incelenmiştir.

Tablo 5. Marş Konusunda Yayımlanmış Olan Tezlerin Üniversitelere ve Anabilim Dallarına Göre Dağılımları

Üniversiteler	***f***	***%***	**Anabilim Dalları**	***f***	***%***
Atatürk Üniversitesi	1	16,67	Müzik Bilimleri ABD.	2	33,33
Hacettepe Üniversitesi	1	16,67	Müzikoloji ABD.	1	16,67
Gazi Üniversitesi	2	33,33	Güzel Sanatlar Eğt. ABD.	2	33,33
İnönü Üniversitesi	1	16,67	Türk Müziği ABD.	1	16,67
İstanbul Teknik Üniversitesi	1	16,67	Müzik ABD.		
Toplam	6	100		6	100

Tablo 5'te marş konusunda yapılmış olan tezlerin üniversitelere ve anabilim dallarına göre dağılımları tek tabloda verilmiştir. Marş konusu hakkında çalışılan tezlerin %16,67'sinin (f=1) Atatürk, Hacettepe, İnönü ve İstanbul Teknik Üniversitelerinde, %33,33'ünün (f=2) ise Gazi Üniversitesinde çalışıldığı incelenmiştir. Bu bilgiler doğrultusunda çalışılan tezlerin daha çok Gazi Üniversitesinde çalışılmış olduğu görülmüştür. Çalışılan tezlerin anabilim dalları incelendiğinde ise konunun müzik bilimleri ve güzel sanatlar eğitimi anabilim dallarında %33,33 (f=2), müzikoloji ve Türk Müziği anabilim dallarında ise %16,67 (f=1) oranında çalışılmış olduğu görülmüştür. Bu bilgiler ışığında, bahsedilen konunun müzik bilimleri ve güzel sanatlar eğitimi anabilim dallarında diğer anabilim dallarına göre daha fazla çalışıldığı ortaya çıkmıştır.

Grafik 2. Marş Konusunda Yapılmış Olan Çalışmaların Yıllara Göre Dağılımları



Grafik 2'de marş konusunda yayımlanmış olan çalışmaların yıllara göre dağılımları incelendiğinde, %3,33'ünün (f=1), 2006, 2008, 2009, 2014, 2017 ve 2021 yıllarında, %6,67'sinin (f=2), 2013, 2019, 2020, 2022 ve 2024 yıllarında, %10'unun (f=3), 2010 ve 2018 yıllarında, %30'unun ise (f=9) 2023 yılında olduğu görülmüştür. Bu bilgiler doğrultusunda, marş konusu ile ilgili yayımlanmış olan çalışmaların 2023 yılında artış gösterdiği incelenmiştir.

Tablo 6. Marş Konusunda Yayımlanmış Olan Makalelerin Dergi Adlarına Göre Dağılımları

Dergiler	***f***	***%***	**Dergiler**	***f***	***%***
Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi	2	8,33	Online Journal of Music Sciences	2	8,33
Anadolu Üniversitesi Sosyal Bilimler Dergisi	1	4,17	İletişim Kuram ve Araştırma Dergisi	1	4,17
Adıyaman Üniversitesi Sosyal Bilimler Enstitüsü Dergisi	1	4,17	Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi	1	4,17
Güzel Sanatlar Enstitüsü Dergisi	1	4,17	Rast Müzikoloji Dergisi	1	4,17
Çanakkale Araştırmaları Türk Yıllığı	1	4,17	Ermeni Araştırmaları Dergisi	1	4,17
İlahiyat Fakültesi Dergisi	1	4,17	Turkish Studies	1	4,17
Ulakbilge Sosyal Bilimler Dergisi	1	4,17	Premium e-Journal of Social Sciences	1	4,17
Turkuaz Uluslararası Türk Dünyası Bilimsel Araştırmalar Dergisi	1	4,17	İdil Sanat ve Dil Dergisi	1	4,17
International Anatolia Academic Online Journal / Sosyal Bilimler Dergisi	1	4,17	Akademik Müzik Araştırmaları Dergisi	2	8,33
Lokum Sanat ve Tasarım Dergisi	1	4,17	Sahne ve Müzik Eğitim-Araştırma Dergisi	1	4,17
Z Dergisi	1	4,17			
Toplam				**24**	**100**

Tablo 6 Marş konusunda yayımlanmış olan makalelerin dergi adlarına göre dağılımları incelendiğinde Afyon Kocatepe Üniversitesi Sosyal Bilimler, Akademik Müzik Araştırmaları, Online Journal of Music Sciences dergilerinde %8,33 (f=2), diğer dergilerde ise %4,17 (f=1) oranında çalışılmış olduğu incelenmiştir. Marş konusu ile ilgili yayım yapan dergilerin büyük çoğunluğunun doğrudan müzik alanı ya da sosyal bilimler alanı ile ilgili olduğu görülmüştür. Eğitim dergilerinde ise konu ile ilgili az sayıda makale yayımlandığı gözlemlenmiştir. Bu durum konuyu çalışan araştırmacıların daha çok sosyal bilimler ya da müzik/müzikoloji gibi alanlarla araştırmalarını şekillendirdikleri göstermektedir.

Tablo 7. Marş Konusunda Yapılmış Olan Çalışmaların Konu İle İlintili Olan Başlıklara Göre Dağılımı

Marş ile İlintili Olan Konu Başlıkları	***f***	***%***
Marş ve Marş Yönetimi ile ilintili olan Başlıklar	1	3,33
Marşlar ve marşların Sözel ve/veya Müzikal Yapısı ile ilintili olan Başlıklar	13	43,33
Marş ile Müzik Eğitimi ilintili olan Başlıklar	3	10
Marş Dağarcığı ile ilintili olan Başlıklar	5	16,67
Marş ve Tarih- Marş ve Marş Tarihi İlintili olan Başlıklar	2	6,67
Marş ve Siyaset veya İdeoloji ile İlintili olan Başlıklar	4	13,33
Marş ve İcra ile ilintili olan Başlıklar	2	6,67
Toplam	**30**	**100**

Tablo 7 marş konusunda yayımlanmış olan çalışmaların konu ile ilintili olan başlıklara göre dağılımı açısından incelendiğinde Marşlar ve marşların sözel ve/veya müzikal yapısı ile ilintili olan başlıklar ile ilgili %43,33 (f=13), marş dağarcığı ile ilintili olan başlıklar ile ilgili %16,67 (f=5), marş ve siyaset veya ideoloji ile ilintili olan başlıklar ile ilgili %13,33 (f=4), marş ile müzik eğitimi ilintili olan Başlıklar ile ilgili %10 (f=3), Marş ve tarih- marş ve marş tarihi ilintili olan başlıklar ve marş ve icra ile ilintili olan başlıklar ile ilgili %6,67 (f=2), Marş ve marş yönetimi ile ilintili olan başlıklar ile ilgili %3,33 (f=1) oranında çalışma yapıldığı görülmüştür. Konuların büyük çoğunluğunu marşlar ve marşların sözel ve/veya müzikal yapısı ile ilintili olan başlıklardan oluştuğu söylenebilir. Bu da marş konularının daha çok müzikolojik alanla bağlantılı olduğunu göstermektedir. Marş dağarcığı ve marş ve siyaset veya ideoloji ile ilintili olan başlıkların da oranının az olmadığı görülmektedir. Marş ve marş yönetimi ile ilintili olan başlıkların ise en az çalışılan konu olduğu incelenmiştir.

Grafik 3. Marş Konusunda Yapılmış Olan Çalışmaların Yöntemlerine Göre Dağılımları



Grafik 3 Marş konusunda yayımlanmış olan çalışmaların yöntemlerine göre dağılımları incelendiğinde çalışmaların %73,33'ünün (f=22) nitel yöntemde olduğu, %23,33'ünün (f=7) yönteminin belirtilmemiş olduğu %3,33'ünün (f=1) ise karma yöntemde olduğu görülmüştür.

Bu durumda marş konusunda yapılmış olan çalışmaların çoğunluğunun nitel yöntemde olduğu söylenebilir.

Marş Konusunda Yapılmış Olan Çalışmaların Amaçlarına İlişkin Bulgular

Duran (2010) "Avrupa Birliği üye ve aday ülkeleri ulusal marşlarının sosyo-kültürel ve müzikal yapı bakımından incelenmesi" adlı yüksek lisans tezinde, Avrupa Birliği üye ve aday ülkelerinin ulusal marşlarının sosyo-kültürel yönlerden işlevinin araştırılması ve müzikal yapı bakımından analizini yaparak marş formunun belirgin özelliklerinin tespit edilmesini amaçlamıştır. Tezin yapısı incelendiğinde kültürel müzikoloji yanının ağırlıkta olduğu görülmüştür. Bu bilgilere ek olarak tezde sözel ve müzikal analizlerin yapılmış olduğu dikkat çekmektedir.

Köşker (2014) ve Park (2019), çalışmış olduğu yüksek lisans tezinde çalışmanın amacına değinmemiştir. Başak (2023), Gazi Üniversitesi Güzel Sanatlar Eğitimi Anabilim Dalı'na bağlı olarak çalışmış olduğu yüksek lisans tezinde, marşlarımızın zorluk derecelerini bularak, kolaydan zora doğru sıralamasını yapmayı amaçlamıştır. Borulday (2023) yüksek lisans tezinde, Muallim İsmail hakkı Bey'in Devlet Arşivleri koleksiyonundaki eserlerin türlerine göre makamsal, tonal ve usul yönünden dağılımının nasıl olduğunun incelenmesi ve Osmanlı Türkçesi ile kaleme alınan marşlarından nihavent ve rast makamında olanlarının Latin alfabesine çevrilmesini amaçlamıştır. Çalışmış olduğu konuyu müzik eğitimi perspektifinden inceleyen Rıza (2006), yüksek lisans teziyle, Türkiye'de ortaöğretim kurumlarında görev yapan öğretmenlerin İstiklal Marşı söyleme ve yönetmede karşılaştıkları problemlerin olup olmadığını ortaya koymayı amaçlamıştır.

İncelenmiş olan birçok makalede marşların sözel ve müzikal açıdan incelenmesi amaçlanmıştır (Önal, 2017; Bağrıaçık vd., 2022; Sağırkaya, 2022; Çuhadar, 2023; Çuhadar, 2009; Kapancıgil, 2018; Özal Göncü, 2024, Gürer, 2023; Sonsel ve Bilgin, 2019; Yıldırımer, 2023; Yener ve Duran, 2010; Akarsu 2021; Ürün, 2022; Türkmen, 2008; Küçüköncü, 2013; Eyüboğlu, 2023; Sonsel ve Özbek, 2023; Karaburun Doğan vd. 2020; Başara, 2013).

Çakı vd., (2018) çalışmasında Nazi Almanyası'nın iki milli marşından biri olan "Horst-Wessel-Lied"in Nazizm ideolojisinin kitlelere aktarımında propaganda amaçlı kullanımının incelenmesini amaçlamıştır. Tekin (2020) çalışmasında kitap analizi yapmıştır. Toker (2020) Kalkan (2023) ve Sağer (2010), müzikolojik açıdan yaklaşmış olduğu çalışmasında çalışmasına dair herhangi bir amaç belirtmemiştir.

Marşlar ile ilgili çalışılmış olan tezler amaçları doğrultusunda incelendiğinde, güzel sanatlar eğitimi anabilim dalları dışındaki alanlarda (müzikoloji, müzik bilimleri, Türk Müziği ABD. vs.) yayımlanmış olan tezlerin amaçlarının genel itibari ile marşların sözel ve müziksel analizlerinin incelenmesine dayandığı görülmüştür. Güzel sanatlar eğitimi anabilim dallarında yapılan çalışmaların ise amaçlarının müzik eğitimi ile entegre edildiği dikkat çekmektedir.

Marşlar ile ilgili yapılan makaleler incelendiğinde ise çalışılan konuların çoğuna müzikolojik açıdan bakılmış olup çalışmaların amaçlarının genel itibari ile marşların sözel ve müziksel analizlerinin incelenmesine dayandığı görülmüştür.

Marş Konusunda Yapılmış Olan Çalışmaların Sonuçlarına İlişkin Bulgular

Duran (2010), Köşker (2014), Park (2019) ve Borulday (2023) yüksek lisans tezlerinde marşları sözel ve müzikal açıdan incelemeleri sonucunda konu ile ilgili çok çeşitli çıkarımlarda bulunmuşlardır. Başak (2023) yüksek lisans tezi sonucunda müzik eğitiminde kullanılabilen marşları zorluk derecelerine göre çeşitli formlar yardımı ile sıralamıştır.

Tezinde Türkiye'de ortaöğretim kurumlarında İstiklal Marşı söyleme ve yönetme problemlerini konu alan Aydın (2006), araştırmasının sonucunda branşı müzik olmayan öğretmenlerin, topluluğu yönetmesi, okudukları bölümlerde koro yönetimi dersi almamış olması veya alınan bu dersin yeterli olmaması, törenlerde eşlik kullanmaması, öğrencilere ses verirken doğru ses vermemesi gibi faktörlerden dolayı İstiklal Marşı söyleme ve yönetmede bazı problemler olduğunu ortaya koymuştur.

Marş konusunda yayımlanmış olan tezlerin sonuçları incelendiğinde birçok tezin sözel ve müzikal sonuçlar verdiği dolayısı ile araştırmacıların çalışmalarını bu çerçevede şekillendirdiği görülmüştür.

Marş konusunda yayımlanmış olan makalelerin sonuçları incelendiğinde, (Önal, 2017; Bağrıaçık vd., 2022; Sağırkaya, 2022; Çuhadar, 2023; Çuhadar, 2009; Kapancıgil, 2018; Özal Göncü, 2024, Gürer, 2023; Sonsel ve Bilgin, 2019; Yıldırımer, 2023; Yener ve Duran, 2010; Akarsu 2021; Ürün, 2022; Türkmen, 2008; Küçüköncü, 2013; Eyüboğlu, 2023; Sonsel ve Özbek, 2023; Karaburun Doğan vd. 2020; Başara, 2013; Çakı vd., (2018) genel itibariyle sözel ve müziksel analiz çerçevesinde şekillendirildiği dikkat çekmektedir.

Makalesi mevsimlik tematik bir dergide yer alan Toker (2020) çalışmasında herhangi bir sonuç bildirmemiştir. Kalkan (2023) araştırmasının sonucunda nevbet davuluna yüklenen işlevlerden bahsetmiş olup inançların şaman davulu etrafında şekillendirildiğini vurgulamıştır. Sağer (2010), müzikolojik açıdan yaklaşmış olduğu çalışmasında İstiklal Marşının bugüne gelene kadar geçirdiği değişim ve tarihçesine ilişkin sonuçlara ulaşmıştır.

Marş konusu ile ilgili makale sonuçları incelendiğinde, birçok makalenin marşların sözel ve müzikal yapısı altında şekillendirildiği dolayısı ile sonuçların da bu yönde olduğu görülmüştür.

TARTIŞMA VE SONUÇ

Bu araştırma, Türkiye'de 2006 ve 2024 yılları arasında müzik alanında yayımlanan marş konulu tez ve makalelerin incelenmesi üzerinedir. Yayımlanmış olan tez ve makaleler çalışma türleri, yılları, yöntemleri, amaçları, sonuçları gibi çeşitli değişkenlerin belirlenmesine dayalı olarak incelenmiştir. Çalışmanın bu kısmında ulaşılan bulgulara ilişkin çeşitli sonuçlar ortaya çıkarılmış olup konu üzerine çeşitli önerilerde bulunulmuştur.

Marş alanında yayımlanmış olan çalışmaların büyük çoğunluğunu makalelerin oluşturduğu tespit edilmiştir. İncelenen tezlerin ise hepsinin yüksek lisans düzeyinde olduğu, büyük çoğunluğunun ise sosyal bilimler enstitüsüne bağlı olarak yapıldığı sonuçlarına ulaşılmıştır. Bu durum, araştırmacıların marş konusunu daha çok müzikolojik bir yaklaşım ile ele aldığını ve içeriğini de bu yönde geliştirdiğini akla getirmektedir. Bu bulgu Zengin (2021)'in bulguları ile benzerlik göstermektedir. Konunun daha çok müzik bilimleri ve müzikoloji alanlarında Atatürk, Hacettepe ve İstanbul Teknik Üniversitelerinde çalışılmış olduğu görülmüştür. Güzel sanatlar eğitimi anabilim dallarında ise sadece Gazi Üniversitesinde çalışılmış olduğu saptanmıştır.

Bu konuda yayımlanan çalışmaların yıllara göre düzensiz bir dağılım gösterdiği, bununla birlikte yapılan çalışmaların büyük çoğunluğunun 2023 yılında olduğu sonucuna ulaşılmıştır. Bu durumun 2023 yılının Türkiye'nin kuruluşunun 100. yılı olmasından kaynaklandığından ileri geldiği söylenebilir. Bu durumla bağlantılı olarak konu ile ilgili çeşitli marşlar yazılmış olup pek çok akademik çalışma da yapılmıştır. Kılıç vd. (2023), ve Özkan vd. (2023)'ın çalışmaları 2023 yılında yapılan konu ile ilgili yapılan çalışmalardan bazılarıdır. 2023 yılından itibaren çalışma sayılarının artması ile marş konusuna ilişkin önemin daha da arttığı ve özellikle müzikoloji ile ilgilenen araştırmacıların bu alana yöneldiği görülmüştür.

Konu ile ilgili yayımlanan makalelerin çoğu Afyon Kocatepe Üniversitesi Sosyal Bilimler, Akademik Müzik Araştırmaları ve Online Journal of Music Sciences dergilerinde yayımlanmıştır. Konu ile ilgili çalışmaların çoğunluğunun müzik ve sosyal bilimler alanındaki dergilerde yayımlanmış olduğu sonucuna varılmıştır.

Marş konusunda yayımlanan çalışmalar konu ile ilintili olan başlıklar açısından incelendiğinde, yapılan çalışmaların çoğunluğunun marşlar ve marşların sözel ve/veya müzikal yapısı ile ilintili olan başlıklardan oluştuğu saptanmıştır. Marş tarihi, marş ve siyaset veya ideoloji ile ilintili olan başlıkların ise azımsanmayacak düzeyde olduğu görülmüştür. Marşlar hakkındaki çalışmaların büyük çoğunluğunun ise yöntemlerinin nitel olduğu tespit edilmiştir.

Konu ile ilgili yayımlanmış olan tezler ve makaleler amaçları doğrultusunda incelendiğinde genel itibari ile marşların sözel ve müziksel analizlerinin incelenmesini amaçladıkları yönüyle alana katkı sağladıkları görülmüştür. Konu ile ilgili yayımlanan çalışmaların sonuçları incelendiğinde ise konuların marşların sözel ve müzikal yapısı altında şekillendirildiği dolayısı ile sonuçların da bu yönde eğilim gösterdiği sonucuna ulaşılmıştır.

Çalışmaların başlıkları farklı olsa da içeriklerinin (yöntemlerinin, amaç ve sonuçlarının) genel itibari ile birbirine benzerlik gösterdiği gözlemlenmiştir. Bu konudaki konu başlıklarının ve yöntemlerinin yelpazesi genişletilerek içerik de çeşitlendirilebilir. Bu durumun okuyucular ve araştırmacılara yeni bakış açıları kazandırabileceği düşünülmektedir.

KAYNAKLAR

Abril, C. R. (2007). Functions of a national anthem in society and education: A sociocultural perspective. *Bulletin of the Council for research in Music Education*, 69-87. https://www.jstor.org/stable/pdf/40319367.pdf?casa_token=Fx5AJdckmG0AAAAA:JRdowt7zKl1T8sfF23Zggf_1HEASLSIiSofq4OgWiJYjLB46uZNOndTGwYJXt8a2SHkOytcq8BLN8bpZ_J2T6UifCQ_yCULfCGwPUSZM9SXrewAulIY

Akarsu, S. (2021). İstiklal Marşı ve icrasına yönelik bir analiz çalışması. *Turkish Studies - Language*, *16*(5), 1-35. doi: https://dx.doi.org/10.7827/TurkishStudies.52875

Aksoy, Y., & Güçlü, O. (2023). Pandemi sürecinde Türkiye'de gerçekleştirilen uzaktan müzik eğitimi alanındaki çalışmalara ilişkin bir içerik analizi. *Sciences (IJOESS),* 14(51), 448-467. doi: http://dx.doi.org/10.35826/ijoess.3242

Alkan, U. (2023). Müzik alanındaki uzaktan eğitim çalışmalarına yönelik genel bir literatür değerlendirmesi. *Mevzu–Sosyal Bilimler Dergisi*, (9), 181-212. doi: 10.56720/mevzu.1230044

Arıca, E. (2017). Türkiye'de Keman Pedagojisi Alanında Hazırlanan Lisansüstü Tezler Üzerine Bir İnceleme. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi,* 32(2): 327-342. *doi*:10.16986/HUJE.2016018529

Apaydınlı, K. (2014). Türkiye'de koro alanında yazılmış lisansüstü tezlere bir bakış. *Ordu Üniversitesi Sosyal Bilimler Enstitüsü Sosyal Bilimler Araştırmaları Dergisi*, *4*(8), 61-66. https://dergipark.org.tr/tr/download/article-file/273649

Arslan, Y., & Işıksungur, B. K. (2022). Türkiye'de Piyano Eğitiminde Pedal Tekniğine Yönelik 2000-2022 Yılları Arasında Yapılan Akademik Çalışmaların İncelenmesi. *Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi Dergisi,* (54), 1246-1267. https://doi.org/10.53444/deubefd.1148416

Aydınlı Gürler, D. (2021). Müzik öğretmenliği alanında yapılan araştırmalar üzerine bir inceleme. *Elektronik Sosyal Bilimler Dergisi*, *20*(80), 1858-1880. doi:10.17755/esosder.870215

Aydın, R. (2006). *Türkiye'de orta öğretim kurumlarında İstiklâl Marşı söyleme ve yönetme problemleri.* (Tez No. 191116) [Yüksek lisans tezi Gazi Üniversitesi]. YÖK Tez Merkezi.

Aydın, S. (2019). *İslami marş ve ezgilerde araçsallaşma sorunu.* (Tez No. 592378) [Doktora tezi Ondokuz Mayıs Üniversitesi]. YÖK Tez Merkezi.

Aydoğdu, V. (2023). Taraftar marşlarının semiyotik analiz yöntemiyle incelenmesi: trabzonspor futbol kulübü örneği. *Uluslararası Anadolu Sosyal Bilimler Dergisi*, *7*(2), 340-348. doi: https://doi.org/10.47525/ulasbid.1275920

Ayoola, M. O. (2022). Generic Structure Analysis of Anthems of Selected Universities in Nigeria: A Genre Based Approach. *European Journal of Language and Culture Studies*, 1(5), 33–41. https://doi.org/10.24018/ejlang.2022.1.5.26

Babacan, E. (2021). Türkiye'de piyano ile ilgili yapılan lisansüstü araştırmaların içerik analizi:(1995-2017). *Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi*, *23*(3), 1159-1191. doi: https://doi.org/10.32709/akusosbil.869110

Babaç, E. E., Köse, H. S. (2018). Türkiye'de 2011-2018 yılları arasında koro alanında yapılmış olan lisansüstü tezlerin bazı parametreler bakımından incelenmesi *ONLINE JOURNAL OF MUSIC SCIENCES,* Cilt 3(sayı 1), 32-55. doi: https://doi.org/10.31811/ojomus.430359

Bağrıaçık, B., Yıldız, M. I., Yelin, K. R., & Yüzgeç, A. (2022). Azerbaycan-Türkiye Millî Marşlarının Edebî ve Müzikal Açıdan İncelenmesi. *Turkuaz Uluslararası Türk Dünyası Bilimsel Araştırmalar Dergisi*, 3(1), 32-45. doi: https://doi.org/10.54970/turkuaz.1106310

Basto, Maria -Benedita (2013), "The Writings of the National Anthem in Independent Mozambique: Fictions of the Subject -People", *Kronos,* 39(1), 185 -203. https://www.scielo.org.za/pdf/kronos/v39n1/09.pdf

Başak, Ö. (2023). *Marşlarımızın müzik eğitiminde kullanılabilirliği bakımından zorluk derecelerine göre sınıflandırılması üzerine bir deneme.* (Tez No. 821314) [Yüksek lisans tezi Gazi Üniversitesi]. YÖK Tez Merkezi.

Başara, E. (2014). Yüz Yıllık Bir Nota Defterinde Giriftzen Asim Bey'in İstiklal Marşı. *Cumhuriyet Üniversitesi İlahiyat Fakültesi Dergisi*, *17*(2), 35-42. https://dergipark.org.tr/en/download/article-file/220970

Sonsel, Ö. B ve Bilgin, S. (2019). Ön elemeyi geçen İstiklal Marşı Bestelerinin eğitim müziği açısından incelenmesi. *Gazi Üniversitesi Eğitim Fakültesi Dergisi,* 39(3), 1827- 1850. https://dergipark.org.tr/en/download/article-file/898679

Borulday, Ö. B. (2023). *Muâllim İsmail Hakkı Bey'in bestelediği marşların tespiti, tasnifi, müziksel analizi ve Latin Alfabesine çeviri yazıları.* (Tez No. 805364) Yüksek lisans tezi İnönü Üniversitesi]. YÖK Tez Merkezi.

Can, Ü. K., & Yılmaz, B. (2019). Türkiye'de müzik terapi konusunda oluşturulmuş bilimsel yayınların incelenmesi. *Motif Akademi Halkbilimi Dergisi,* 12(27), 794-812. doi: 10.12981/mahder.574009

Cangal, N. (2004). *Müzik formları.* Arkadaş Yayınevi.

Cerulo, K. A. (1989). Sociopolitical control and the structure of national symbols: An empirical analysis of national anthems. *Social Forces*, *68*(1), 76-99. https://www.jstor.org/stable/pdf/2579221.pdf?casa_token=jceBjGkEghkAAAAA:XVhsfPn33hzTxfZJCXlvDu-M6h_auvCa9LD6P9GOW-PZQ9N5bybI3avuilXHUpiKOn7RM4BFEfyArK36fliVw_9vNFLErhAy9Xrour7cngMGXD6NKMmT

Cömert, M., & Erim, A. (2018). Viyolonsel eğitimiyle ilgili araştırma sonuçlarının alana katkısı ve uygulanabilirliği. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, 18(1), 107-129. https://dergipark.org.tr/en/download/article-file/379169

Cusack, I. (2005). African National Anthems:'Beat the drums, the red Lion has roared'. *Journal of African Cultural Studies*, *17*(2), 235-251. doi: 10.1080/13696850500448337

Creswell, J. W. (2017). *Araştırma deseni: Nitel, nicel ve karma yöntem yaklaşımları [Research design: Qualitative, quantitative and mixed methods approaches]*. (3. Baskı). Çev. Ed. Selçuk Beşir Demir). Ankara: Eğiten Kitap.

Çakı, C., Doğan, D. K., & Yılmaz, N. (2018). " Horst-Wessel" Propaganda Marşı Üzerinden Nazizm İdeolojisinin İnşası. *Journal of Communication Theory & Research/Iletisim Kuram ve Araştırma Dergisi*, (46). https://www.researchgate.net/profile/Caner-Caki-2/publication/331478012_HorstWessel_Propaganda_Marsi_Uzerinden_Nazizm_Ideolojisinin_Insasi_The_Construction_of_Nazism_Ideology_through_the_Propaganda_Anthem_of_Horst-Wessel/links/5c7bbadca6fdcc4715aa35bb/Horst-Wessel-Propaganda-Marsi-Uezerinden-Nazizm-Ideolojisinin-Insasi-The-Construction-of-Nazism-Ideology-through-the-Propaganda-Anthem-of-Horst-Wessel.pdf

Çelebioğlu, M. O., & Yazıcı, T. (2020). Türkiye'de Müzik Terapi Alanı İle İlgili Yapılan Lisansüstü Tezlerin İncelenmesi. Eurasian Academy of Sciences Social Sciences Journal, 36-41. doi: https://doi.org/10.17740/eas.soc.2020.V33-05

Çeşit, C. (2019). Türkiye'de viyola üzerine yapılan lisansüstü tezlerin incelenmesi. *The Journal of Academic Social Science Studies*, 8(38), 445-462. Doi: https://doi.org/10.21764/maeuefd.403244

Çetiner, S. (2022). Piyano üzerine içerik yoğunluğu bulunan lisansüstü tezlere bir bakış: Türkiye, 2013-2018. *Avrasya Çalışmaları Dergisi*, 12, 1-23, doi: http://dx.doi.org/10.17740/eas.eus.2020-V12-01

Çuhadar, C. H. (2009). Türkiye'de ulusalcılığın değişmeyen simgesi: Onuncu yıl marşı. *Anadolu Üniversitesi Sosyal Bilimler Dergisi*, *9*(2), 199-208. https://www.ajindex.com/dosyalar/makale/acarindex-1423869543.pdf

Çuhadar, C. H. (2023). Necil Kazım Akses'in 50. yıl marşı'nın prozodi bağlamında incelenmesi. *Afyon Kocatepe Üniversitesi Akademik Müzik Araştırmaları Dergisi*, *9*(17), 275-292. doi: 10.36442/AMADER.2023.91

Danacı, E. F. (2023). Türkiye'de viyolonsel alanında yapılmış lisansüstü tezler üzerine bir inceleme (1992-2021). *İnsanat Sanat Tasarım ve Mimarlık Araştırmaları Dergisi*, *3*(1), 123-139. https://dergipark.org.tr/en/download/article-file/3181579

Daniel, R. T. (1959). English models for the first American anthems. *Journal of the American Musicological Society,* 12(1), 49-58. https://www.jstor.org/stable/829517

Demir, Ö., & Keskin, H. (2020). Piyanoda Deşifre Üzerine Yapılmış Akademik Çalışmaların Çok Boyutlu Olarak İncelenmesi. *Atatürk Üniversitesi Kazım Karabekir Eğitim Fakültesi Dergisi*, (41), 204-219. doi: 10.33418/ataunikkefd.801154

Doğan, D. K., Gazi, M. A., & Çakı, C. (2020). *Sovyetler Birliği'nde Milli Marşlar Üzerinden Komünizm Propagandası: Ermenistan Üzerine İnceleme.* Ermeni Araştırmaları, (67), 137-155. https://dergipark.org.tr/en/download/article-file/1274719

Duran, H. (2010). *Avrupa Birliği üye ve aday ülkeleri ulusal marşlarının sosyo-kültürel ve müzikal yapı bakımından incelenmesi*. (Tez No. 304045) [Yüksek lisans tezi Atatürk Üniversitesi]. YÖK Tez Merkezi.

Efe, M. & Sonsel, Ö. B. (2019). Orkestra alanında yazılmış yüksek lisans, sanatta yeterlik ve doktora tezlerinin incelenmesi. *SOBİDER Sosyal Bilimler Dergisi*, *6*(41). doi: http://dx.doi.org/10.29228/SOBIDER.32641

Erdoğan, Ö. A. ve Tuncer Boon, E. "Piyano düetleri ve piyano ensemble konusunda yurt içinde ve yurtdışında yapılan çalışmaların incelenmesi". *İdil*, 102 (2023 Şubat): s. 217–233. doi: 10.7816/idil-12-102-07.

Eyüboğlu, Y. C. (2023). İstiklal Marşı'nın Yapısal Analizi. *International Anatolia Academic Online Journal Social Sciences Journal,* 9(1), 77-88. https://dergipark.org.tr/en/download/article-file/2436323

Gençel Ataman, Ö. G. (2009). Ülkemizde flüt ve flüt eğitimi alanlarında yapılan lisansüstü tezler. *Kastamonu Education Journal*, *17*(1), 341-352. https://dergipark.org.tr/tr/download/article-file/817952

Gerekten, S, E. (2020) Bağlama/Saz Çalgısı İle İlgili Yapılan Çalışmalar Üzerine Bir Bibliyografya Denemesi. 391-411. https://dergipark.org.tr/en/download/article-file/1461503

Güler, E., & Toptaş, B. (2022). Türkiye'de bağlama ile ilgili yapılan lisansüstü çalışmaların incelenmesi. Erciyes Akademi, 36(4), 1693-1710. https://doi.org/10.48070/erciyesakademi.1145425

Gürer, M. (2023). Türkiye Cumhuriyeti'nin 100. Yılı için bestelenmiş eserlere genel bir bakış. Online Journal Of Music Sciences, 8 (2), 172-201. https://doi.org/10.31811/ojomus.1398510

Göncü, İ. Ö. (2024). Milli Eğitim Bakanlığı Tarafından Yayınlanan Müzik Dersi Kitaplarındaki Marşların İncelenmesi. *Premium e-Journal of Social Sciences (PEJOSS),* 8(42), 674-680. Doi: https://doi.org/10.5281/zenodo.11434535

İnal, İ., & Zahal, O. (2020). Piyano alanında yayımlanan ulusal tez ve makaleler üzerine bir içerik analizi çalışması (1987-2020). İçinde K. Gülbeyaz & T. Yazıcı (Ed.) *7. Uluslararası Müzik ve Dans Kongresi Bildiriler Kitabı.* (s. 206-217).

Kalkanoğlu, B. (2020). Türkiye'de 2013-2020 yılları arasında piyano alanında yazılmış lisansüstü tezlerin incelenmesi. *The Journal of Social Sciences,* (48), 289-302. doi:http://dx.doi.org/10.29228/SOBIDER.46476

Kalkan, O. (2023). Türklerde kut inanışı ve marş geleneğine etkileri. *İdil Sanat ve Dil Dergisi*, *12*(101), 87-97. doi: 10.7816/idil-12-101-08

Kapancıgil, İ. (2018). *Balkan ülkeleri milli marşlarının kültürel ve müzikal özelliklerinin incelenmesi.* Online Journal of Music Sciences, 3(3), 158-180. doi: http://dx.doi.org/10.31811/ojomus.505038

Karakuş, S. (2021). Hiçbir şey Mehmet Âkif ve İstiklâl Marşı sevgisini bu milletin gönlünden silememiştir, *Aylık Edebiyat & Fikir Dergisi,* (15 Mart 2021) https://ismailkara.izu.edu.tr/xmlui/bitstream/handle/ismailkara/1396/%C4%B0KA6046.pdf?sequence=1

Karkın, A. M. (2011). Müzik bilimleri alanında yapılan lisansüstü tezlerin incelenmesi. *İnönü Üniversitesi Sanat ve Tasarım Dergisi, 1(2).* 143-149. https://dergipark.org.tr/en/download/article-file/92418

Kayaarslan, B., & Kumtepe, M. A. (2020). Türkiye'de halk ezgilerinin viyolonsele aktarılmasına ilişkin yapılmış lisansüstü tezler. *Online Journal of Music Sciences,* 5(2), 185-211. doi: https://doi.org/10.31811/ojomus.834487 -

Kılıç, G., Budak, İ., & Haşıloğlu, S. B. Ülke Milli Marşları ve İstiklal Marşı'nın Özgünlüğünün Veri Analizi. *Pamukkale Üniversitesi İşletme Araştırmaları Dergisi,* 10(1-Prof. Dr. Feyzullah EROĞLU Armağan Sayısı), 96-109. doi: 10.47097/piar.1180263

Kösreli, S . (2020). Türkiye'de Ses Eğitimi Alanında Yazılmış Lisansüstü Tezlere Yönelik Bir İnceleme . *İnsan ve Toplum Bilimleri Araştırmaları Dergisi,* 9 (5), 3651-3668. Retrieved from http://www.itobiad.com/tr/pub/issue/57287/708104

Köşker, M. (2014). *Ulusal Marşların Söz ve Müzik Açısından İncelenmesi.* (Tez No. 380099) [Yüksek lisans tezi Hacettepe Üniversitesi]. YÖK Tez Merkezi.

Križan, A. (2016). The language in British and Slovene football anthems. *ELOPE: English Language Overseas Perspectives and Enquiries*, *13*(1), 15-29. doi: 10.4312/elope.13.1.15-29

Küçüköncü, H. Y. (2013). Bir Çanakkale Marşı. *Çanakkale Araştırmaları Türk Yıllığı*, *11*(15), 35-51. https://dergipark.org.tr/en/download/article-file/45130

Lopes, M. A. d. S. ve Avelino De França, M. d. P. S. G. d. S. (2022). The poems and school anthems ın the elementary schools of pará: spreadıng republıcan sentıment (1904-1905) os poemas e os hınos escolares no ensıno prımárıo paraense: dıfundındo o sentımento republıcano (1904-1905) los poemas y los hımnos escolares en la enseñanza prımarıa. *Revista Ibero-Americana de Estudos em Educação*, *17*(2), 1402-1425. https://doi.org/10.21723/riaee.v17i2.15824

Orhan, U. G., & Çaydere, Ö. Ö. (2021). Türkiye'de uzaktan eğitimde müzik alanında yapılmış lisansüstü tezlerin incelenmesi. *Online Journal of Music Sciences,* 6(1), 101-117. doi: https://doi.org/10.31811/ojomus.933928

Orlowski, D. D., Can, Ü. K., & Bağcı, H. (2021). Almanya'da müzik terapi alanında gerçekleştirilen bilimsel yayınların incelenmesi (2010-2019). *Motif Akademi Halkbilimi Dergisi*, *14*(33), 266-286. doi: 10.12981/mahder.844575

Ömür, Ö., & Gültek, B. (2011). Türkiye'de 2000-2010 yılları arasında piyano üzerine yazılmış lisansüstü tezlerin analizi. *E-Journal Of New World Sciences Academy*, *6*(4), 463-471. https://dergipark.org.tr/en/download/article-file/186553

Önal, G. F. (2017). Ortadoğu ülkeleri milli marşlarının söz ve müzik biçimi açısından incelenmesi. *Ulakbilge Sosyal Bilimler Dergisi,* 5(9), 153-177. doi: 10.7816/ulakbilge-05-09-08

Özal Göncü, İ., Korkmaz, A., & Arsel, S. (2024). Ses eğitimi alanında yapılmış yüksek lisans, doktora ve sanatta yeterlik tezlerinin incelenmesi. Journal of World of Turks/Zeitschrift für die Welt der Türken, 16(1). https://eds.p.ebscohost.com/eds/pdfviewer/pdfviewer?vid=0&sid=66957d94-36fd-44b2-9c10-040d3ab34edb%40redis

Özay, S. (2020). Türkiye'de viyola alanında yazılmış lisansüstü tezler. *OPUS International Journal of Society Researches, (Eğitim ve Toplum Özel sayısı),* 6344-6361. doi: https://doi.org/10.26466/opus.784467

Özer, Z. & Demirbatır, R. E. (2021). Müzik eğitimi ile ilgili TR Dizin veri tabanında yayınlanan araştırmaların eğilimlerinin belirlenmesi. *Bolu Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi,* 21(1), 282-304. doi: https://dx.doi.org/10.17240/aibuefd.2021.21.60703-796990

Özer, Z., & Eğilmez, H. O. (2021). Türkiye'de piyano eğitimi alanında yapılan lisansüstü tezlerin eğilimlerinin belirlenmesi. *Ondokuz Mayıs University Journal of Education Faculty*, *40*(1), 291-316. doi: 10.7822/omuefd.867774

Özkan, H., Çorbacı, O. K., Ünal, S., & Erdem, C. Bağımsız Türk Devletleri Millî Marşlarının Değerler Eğitimi Yönünden İncelenmesi. *Dil ve Edebiyat Araştırmaları*, (27), 205-237. https://dergipark.org.tr/en/download/article-file/2771805

Pala, A. Web Of Science veri tabanına dayalı piyano üzerine yapılan makalelerin bibliyometrik değerlendirmesi. *İnönü Üniversitesi Kültür ve Sanat Dergisi,* 9(2), 145-161. doi: https://doi.org/10.22252/ijca.1390974

Park, S. K. (2019). *Approach to social semiotic and music structure of the protest songs ın south korea: through the anthem of the political movement," marching for our beloved"* (Tez No. 618013) [Yüksek lisans tezi İstanbul Teknik Üniversitesi]. YÖK Tez Merkezi.

Sabah, E. (1993). *Batı musikisinin Türkiyedeki gelişimi sürecinde bando ve marş türünün yeri* Tez No. 27190) [Yüksek lisans tezi Dokuz Eylül Üniversitesi] YÖK Tez Merkezi.

Sağırkaya, B. (2022). 30 Ağustos Zaferi için bestelenmiş şarkı ve marşlara yönelik tematik bir inceleme. *Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi,* 24 (100. Yılında Kocatepe-Büyük Taarruz Özel Sayısı), 203-221. https://dergipark.org.tr/en/download/article-file/2640506

Sağer, T. (2010). İstiklal Marşı Besteleri. *Adıyaman Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, (5), 214-226. https://dergipark.org.tr/tr/download/article-file/15296

Sav, N. & Gerekten, S. E. (2022). Türkiye'de ses eğitimi alanında yapılmış lisansüstü çalışmaların eğilimleri. *Akademik Sosyal Araştırmalar Dergisi, 130,* 345-357. doi: http://dx.doi.org/10.29228/ASOS.62912

Sevgi, C. (2001). *Türkiyedeki ilköğretim okullarının 2. kademesinde müzik eğitiminde kullanılan marşların eğitim müziği besteleme teknikleri bakımından incelenmesi* (Tez No. 114799) [Yüksek lisans tezi Gazi Üniversitesi]. YÖK Tez Merkezi.

Sonsel, Ö. B. (2018). Türkiye'de Viyola Alanında Yazılmış Lisansüstü Tezlerin İncelenmesi. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi,* (47), 340-359. doi: 10.21764/maeuefd.403244

Sonsel, Ö. B., & Özbek, G. (2023). Genel müzik eğitiminde kullanılan marşların eğitim müziği açısından incelenmesi. *Lokum Sanat ve Tasarım Dergisi, 1*(1), 1-12. https://dergipark.org.tr/en/download/article-file/2818187

Soycan, M. (2021). Türkiye'de 2010-2020 yılları arasında yapılan flüt konulu lisansüstü tezlerin incelenmesi: İçerik analizi. *Gazi Üniversitesi Gazi Eğitim Fakültesi Dergisi,* 41(3), 2153-2187. https://dergipark.org.tr/tr/download/article-file/1642017

Şerifova, S. (2021). Azerbaycan edebiyatında marş türünün gelişiminin özellikleri. *Birey Ve Toplum Sosyal Bilimler Dergisi*, *11*(1), 51-71. doi: https://doi.org/10.20493/birtop.944351

Tankız, K. D., & Caf, G. (2023). Analyzing the articles published in the field of flute in Turkey: Türkiye'de flüt alanında yayımlanan makalelerin incelenmesi. Journal of Human Sciences, 20(4), 502-518. doi:10.14687/jhs.v20i4.6408.

Tekin, E., & Toker, H. (2016). Marş-ı hâssa Osmanlı padişahlarına ithaf edilen marşlar. https://dergipark.org.tr/en/download/article-file/1401490

Toker, H. (2020). İstiklal Marşı Resmi Bestesinin Serüveni. Z Dergisi, 4, 296-299. https://www.academia.edu/43510348/%C4%B0stiklal_Mar%C5%9F%C4%B1_Resm%C3%AE_Bestesinin_Ser%C3%BCveni

Topcu, N. (2023). The emphasis of patriotism and independence through a political and religious lens: A new historical reading of the selected national anthems. *RumeliDE Dil ve Edebiyat Araştırmaları Dergisi,* (Ö13), 1357-1363. doi: 10.29000/rumelide.1379362.

Topçu, Ş. (2005). *İlköğretim okulları ikinci kademe müzik eğitiminde kullanılan marşlara ilişkin piyano eşliklerinin müzik öğretmenleri tarafından çalınabilirliği* (Tez No. 159272) [Yüksek lisans tezi Gazi Üniversitesi]. YÖK Tez Merkezi.

Toptaş, B. (2019). Türkiye'de Piyano Üzerine Yapılmış Lisansüstü Çalışmalar. *The Journal of Academic Social Science Studies,* 6(6 Issue 3), 715-728. doi: 10.9761/JASSS710

Turhal, E. & Uçar, E. (2023). TR dizin veri tabanında 2002-2022 yılları arasında yayımlanan koro konulu makalelerin bibliyografik analizi. *Eurasian Journal of Music and Dance*, (23), 73-90. doi: 10.31722/ejmd.1277975

Türkmen, U., (2008). 30 August-Kocatepe Themed Anthem and Folk Song Repertoire. *Afyon Kocatepe Üniversitesi Sosyal Bilimler Dergisi,* vol.10, no.2, 1-20. https://acikerisim.aku.edu.tr/xmlui/bitstream/handle/11630/3731/149159.pdf?sequence=1&isAllowed=y

Ürün, T. (2023). Necil kâzım akses'in tertip ettiği 11'inci tümen marşı üzerine bir inceleme. *Afyon Kocatepe Üniversitesi Akademik Müzik Araştırmaları Dergisi,* 9(17), 214-233. doi: 10.36442/AMADER.2023.88

Yener, S., & Duran, H. (2010). Avrupa Birliği Ülkelerinin ulusal marşlarının sosyo-kültürel ve müzikâl açıdan incelenmesi. *Güzel Sanatlar Enstitüsü Dergisi*, (24), 185-206. https://dergipark.org.tr/en/download/article-file/28689

Yıldırım, A., & Şimsek, H. (2018). *Sosyal Bilimlerde Nitel Araştırma Yöntemleri*. 11. Baskı., Ankara: Seçkin Yayıncılık.

Yıldırımer, Ö. (2023). Cumhuriyetin 100. Yılı'nda İstiklâl Marşı'nın bestesiyle on kıtasının okunması. *Sahne ve Müzik*, *9*(17), 67-87. https://dergipark.org.tr/en/download/article-file/3273101

Yıldırım Orhan, Ş. (2012). Türkiye'de viyolonsel alanında yapılmış yüksek lisans, doktora ve sanatta yeterlilik tezleri. *Kastamonu Education Journal*, *20*(2), 701-716. https://dergipark.org.tr/en/download/article-file/806973

Zengin, R. (2021) "2021 Mehmed Âkif ve İstiklâl Marşı Dolayısıyla Yapılan Çalışmalar", *Hikmet-Akademik Edebiyat Dergisi [Journal of Academic Literature],* Yûnus Emre'den Mehmed Âkif'e Şiir Özel Sayısı, Aralık 2021, s. 411-418.

Online Kaynaklar

Afyon Kocatepe Üniversitesi. (t.y.) *Afyon Kocatepe Üniversitesi Marşı.* https://aku.edu.tr/hakkimizda/universitemizgenel-bilgiler/aku-marsi/

Ankara Üniversitesi Web TV. (t.y.). *Ankara Üniversitesi Marşı* [Video]. Ankara Üniversitesi Web TV. https://webtv.ankara.edu.tr/video/ankara-universitesi-marsi

Aytekin, H. (2016, Mayıs 22). *Maltepe askeri lisesi marşı* [Video]. Youtube. https://youtu.be/slSknEl4uTo?si=0Ds5-mOiiN61x7SN

Bayburt Üniversitesi (2024, Mart 26). Bayburt Üniversitesi Marşı Resmî Olarak Tescillendi. https://bayburt.edu.tr/tr/bayburt-universitesi-marsi-resm-olarak-tescillendi

DergiPark (2024, Haziran, 28). (Erişim Tarihi). https://dergipark.org.tr/tr/

Google Akademik (2024, Haziran, 28). (Erişim Tarihi). https://scholar.google.com/schhp?hl=tr

IMSLP. (t.ya). George Frideric Handel *"Funeral anthem (For Queen Caroline)"* X https://imslp.org/wiki/Funeral_Anthem_for_Queen_Caroline,_HWV_264_(Handel,_George_Frideric)

IMSLP. (t.yb). Frédéric Chopin *"Marche Funèbre* https://s9.imslp.org/files/imglnks/usimg/6/68/IMSLP113324-PMLP02641Chopin_Klavierwerke_Band_3_Peters_6207_Op_72_No_2_scan.pdf

IMSLP. (t.yc) *Slavonic March, Op. 31. https://imslp.org/wiki/Slavonic_March,_Op.31_(Tchaikovsky,_Pyotr)*

IMSLP. (t.yd) *Drei Militärmärsche. https://imslp.org/wiki/File:TN-Schubert_Werke_Breitkopf_Serie_9_No_63_Op_51.jpg*

IMSLP. (t.ye) *Radetzky Marsch Op. 228. https://imslp.org/wiki/File:PMLP68787-Strauss_-_Radetzky_March_-_Full_Score.pdf*

IMSLP. (t.yf) *Marche de Savoye.* https://imslp.org/wiki/File:PMLP303789-Marche_de_Savoye_-_partition.pdf

İSSUU (2017, Ekim, 5). *Handel Anthem On The Peace. https://issuu.com/scoresondemand/docs/anthem_peace_9616/1*

Kapıkıran, A. (2019, Ocak, 19). *BULGARİSTAN MİLLİ MARŞI "МИЛА РОДИНО"* [Video]. Youtube. https://www.youtube.com/watch?v=2ZEfNgVFafM

Kürücü, N. (2023, Kasım, 15). *Atatürk Üniversitesi Marşı | Muammer Sun* [Video]. Youtube. https://www.youtube.com/watch?v=SC_ZNYXnJjw

Sobiad (2024, Haziran, 28). (Erişim Tarihi). https://atif.sobiad.com/

Sosyal Müzik (2020, Şubat, 18). *DemirDöküm Şirket Marşı Bizden.* https://www.sosyalmuzik.com.tr/post/demirdokum-sirket-marsi-bizden

T.C. Milli Eğitim Bakanlığı (2023, Ağustos, 03). *Anadolu lisesi marşı.* https://kadikoyanadolulisesi.meb.k12.tr/meb_iys_dosyalar/34/12/160991/icerikler/kadikoy-anadolu-lisesi-marsi_933577.html?CHK=0d6757e2e609131cc680767d195c7cc5

T.C. Kültür ve Turizm Bakanlığı (t.y.). *Türk Bayrağı ve İstiklal Marşı. https://www.ktb.gov.tr/TR-96289/turk-bayragi-ve-istiklal-marsi.html*

Ulusal Tez Merkezi (2024, Haziran, 28). (Erişim Tarihi). https://tez.yok.gov.tr/UlusalTezMerkezi/giris.jsp

Ülke Marşları. (2018, Ocak, 6). *Azerbaycan milli marşı türkçe alt yazılı* [Video]. Youtube. https://www.youtube.com/watch?v=IDq3UkFyTiQ

tcoskun. (2012, Mayıs 10). *Galatasaray lisesi marşı* [Video]. Youtube. https://youtu.be/n4Vz4DN04FY?si=LiGdss8kt7k5JMpC

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

URARTU DÖNEMİ BRONZ KEMERLERİNDE BETİMLENMİŞ BAKRAÇLAR ÜZERİNE BİR DEĞERLENDİRME

Sefa KURT
Iğdır Üniversitesi, Lisansüstü Eğitim Enstitüsü, Arkeoloji Anabilim Dalı
ORCID: 0009-0000-2966-4394

ÖZET
Urartu Krallığı Doğu Anadolu Bölgesi'nde Van Gölü Havzası merkez olmak üzere kurulmuştur. Ancak Urartu krallarının izlemiş olduğu genişleme politikası çerçevesinde devletin sınırları batıda Karasu-Fırat, doğuda İran Azerbaycan'ı ve kuzeyde Ermenistan'a kadar uzamıştır. Söz konusu coğrafyada gerçekleştirilen bilimsel ya da illegal kazılarda Urartu Krallığı'na ait çok sayıda metal buluntu ele geçmiştir. Bu buluntular arasında bakraçlarda önemli bir yer tutmaktadır. Nitekim Urartu dönemi bakraçları Doğu Anadolu Bölgesi'nin ilk örneklerini oluşturmaktadır. Kazılarda ele geçmiş bakraçların form olarak benzerleri Urartu sanatında da görülmektedir. Keza Urartu'da toplam sekiz adet kemer/kemer parçasında bakraç motiflerine rastlanır. Bakraç betimlerine genellikle ziyafet ve eğlence sahnelerinde rastlanır. Tasvirlerde bakraçlar çoğunlukla kadın figürleri ve nadiren mitolojik yaratıkların ellerinde betimlenmiştir. Kemerlerde işlenmiş bakraçlar silindirik veya kutu biçimli olup yarım ay biçimli bir kulpa sahiptirler. Nitekim kemerler üzerinde görülen bakraçların tamamı herhangi bir süslemeye sahip değildir. Urartu'da bakraçlar kimler tarafından ve ne amaçla kullanılıyordu? Bu sorunun cevabını nispeten de olsa kemerler üzerinde betimlenmiş sahnelerden bulabilmekteyiz. Bu bağlamda ziyafet ve eğlence sahnelerinde görülen bakraçlar olasılıkla gündelik yaşamla ilgili olup sıvı madde taşımada kullanılmış olmalıdır. Yine Elazığ Müzesi'nde sergilenen kemer parçasında bakraç grifonun elinde betimlenmiş olup, mitolojik yaratığın diğer elinde de kozalak bulunmaktadır. Bakracın hem mitolojik yaratığın elinde olması hem de sahnede görülen kozalak söz konusu bakracın dinsel ritüeller de kullanıldığını gösterir. Urartu'da bakraçlar dinsel kullanım kadar günlük yaşamda da çeşitli sıvı ya da katı maddeleri taşıma da tercih edilmiş olmalıdır.
Anahtar kelimeler: Urartu, Bakraç, Bronz, Kadın, Mitolojik Yaratık.

AN EVALUATION ON THE BUCKETS DESCRIBED ON THE BRONZE BELT OF THE URARTIAN PERIOD

ABSTRACT
The Urartian Kingdom was established in the Eastern Anatolia Region, with the Lake Van Basin as its centre. However, within the framework of the expansion policy followed by the Urartian kings, the borders of the state extended to Karasu-Euphrates in the west, Iranian Azerbaijan in the east and Armenia in the north. Many metal finds belonging to the Urartian Kingdom were unearthed during scientific or illegal excavations carried out in the geography in question. Among these finds, buckets have an important place. As a matter of fact, Urartian period coppers constitute the first examples of the Eastern Anatolia Region. Similar forms to the copper pots unearthed during excavations are also seen in Urartian art. Likewise, copper motifs are found on a total of eight belts/belt pieces in Urartu. Buckets depictions are generally seen in banquet and entertainment scenes. In the depictions, buckets are mostly depicted in the hands of female figures and rarely in the hands of mythological creatures. The buckets carved on the belts are cylindrical or box-shaped and have a half-moon-shaped handle.

As a matter of fact, all of the buckets seen on the arches do not have any decoration. By whom and for what purpose were buckets used in Urartu? We can find the answer to this question, albeit relatively, from the scenes depicted on the arches. In this context, the buckets seen in banquet and entertainment scenes are probably related to daily life and must have been used to carry liquid substances. Again, in the belt piece exhibited in the Elazığ Museum, the buckets is depicted in the hand of the griffon, and the mythological creature has a pine cone in its other hand. Both the fact that the bucket is in the hand of the mythological creature and the pine cone seen on the stage indicate that the bucket in question was also used in religious rituals. In Urartu, buckets must have been preferred for carrying various liquid or solid substances in daily life as well as for religious use.
Keywords: Urartian, Bucket, Bronze, Women, Mythological Creature.

1. GİRİŞ

Eski Çağ'da en erken bakraç örneklerine Mezopotamya coğrafyasında rastlanır. Nitekim Mezopotamya'da Ur (MÖ 2112-2000), Orta Assur (MÖ 1920-1750), Eski Babil Sülalesi (MÖ 1894-1595) ile Akkad (MÖ 2350-2150) dönemlerinin tasvir sanatında nadiren yumurta ve çoğunlukla kutu ya da silindir formlu bakraçlar betimlenmiştir (Ceylan 1998: 59). Bunların yanı sıra Urartu Devleti'nin çağdaşları olan uygarlıklardan Geç Hitit Kent Devletleri'nden Karkamış ve Sakçagözü'nden birkaç kabartma (Gökce 2023: fig 2/A, fig 6/D-E) ile Yeni Assur dönemi kabartmaları ve mühürlerinde bakraçlar tasvir edilmiştir (Barnett 1958; 1975; Collon 2001). Ayrıca Yeni Assur kentlerinden Nimrud'da yapılan kazılarda oda HH'de bronz üretimi silindirik gövdeli bakraç da ele geçmiştir (Curtis 2013: pl. XL). Söz konusu uygarlıkların tamamında bakraçlar insan veya mitolojik yaratıklar tarafından taşınmaktadır.

Çevre kültürlerde olduğu gibi Urartu Devleti'nde de bakraç kullanımı söz konusudur. Bilindiği üzere Urartu Devleti "*Doğu Anadolu Bölgesi'nde Van Gölü Havzası merkez olmak üzere kurulmuştur. Ancak Urartu krallarının izlemiş olduğu genişleme politikası çerçevesinde devletin sınırları batıda Karasu-Fırat, doğuda İran Azerbaycan'ı ve kuzeyde Ermenistan'a kadar uzamıştır."* (Salvini 2006). Söz konusu coğrafyada gerçekleştirilmiş olan bilimsel kazılarda şimdilik az sayıda bakraç tespit edilmiştir. Bilinen iki örnek ise Patnos/Liç kazılarında ele geçmiştir (Yaşlı 2017: 43-44). Ancak aynı coğrafyada gerçekleştirilmiş olan kaçak kazılarda ele geçmiş ve yurt içinde Van Bölge Müzesi (Başaran 1979: 79-83, res.1, lev. III /1-2, lev. IV/1-2; Ceylan 1998: 61-62 çiz. 1-2; Belli & Avcı 2004: 127, çiz. 1), yurt dışında ise Les Arcs, Ebnöther Koleksiyonu'nda (Merhav 1991: fig. 20a-22) sergilenen bakraçların sayısı daha fazladır.

Buluntu olarak ele geçmiş bakraçların tamamı dövme tekniği ile yapılmıştır. Büyük çoğunluğu tunç yapımı olan bakraçların az sayıda gümüş üretimi örnekleri de vardır. Silindirik veya kutu biçimli olan ve genellikle hafif bombeli bir dip kısmına sahip bakraçlarda yarım ay formlu kulplar kullanılmıştır. Bu kulplar bakraçların ağız kenarının her iki tarafına karşılıklı yerleştirilmiş "T" formlu ataşmanlar ya da halkalara iliştirilmiştir. Kulpların bitim kısmı zaman zaman yılan veya grifon başı formlu da olabilmektedir. Bazı bakraçların ağız kenarının hemen altına yazıt da kazınmıştır. Sade bakraçların yanı sıra ördek, balık, at başı ve dini ritüellerle bezenmiş örnekler de bulunmaktadır. Bu bezemelerin yapımında kazıma ve kabartma teknikleri kullanılmıştır. (Belli 2003: 276-277). Buluntu olarak ele geçmiş bakraçlar aynı zamanda Urartu sanatında da sevilerek kullanılmıştır. Nitekim bakraçlar Urartu sanatında önemli bir yere sahip olan adak levhaları, mığferler, sadaklar, taşıt aksamları, at koşum takımları, mühürler ve fildişinden eserlerin yanı sıra duvar resimlerinde de sıklıkla betimlenmiştir. Tasvirli eserlerde bakraçlar insan veya karışık yaratıklar tarafından taşınırken betimlenmiştir.

Bu çalışmada Urartu sanatında oldukça önemli bir yere sahip olan kemer/kemer parçaları üzerinde betimlenmiş bakraçlar incelenmiştir. Çalışmada öncelikle "Urartu Sanatında Kemerler" başlığı altında kemerlerin buluntu durumları, malzeme ile üretim teknikleri, kullanım alanlarına kısaca değinilecektir. Akabinde "Bakraçların Betimlendiği Kemerler" başlığı altında, söz konusu kemer/kemer parçaları ikonografik olarak ele alınıp, bakraçların formları, kullanım alanları ve işlevleri ile bakraçları taşıyan figürlere açıklık getirilecektir.

2. URARTU BRONZ KEMERLERİ

Urartu Devleti'nin egemenlik sürdüğü coğrafyada birçok yerleşim yeri ve nekropolllerde kazı yapılmıştır. Söz konusu bilimsel kazı çalışmalarında çeşitli sayıda buluntu ile birlikte bronz kemer/kemer parçaları da tespit edilmiştir. Nitekim bronz kemerler Ayanis, Çavuştepe, Toprakkale, Erzincan/Altıntepe, Kayalıdere, Dilkaya, Giyimli gibi yerleşim yerleri ile Dedeli, Burmageçit, Suçatı, Karahasan, Adilcevaz ve Liç'den gömülerde ele geçmiştir (Burney 1966: 77-78; Özgüç 1969: 258-259; Öğün 1973: 66-67; Taşyürek 1973: 197-205; Erzen 1974: 16; Karaosmanoğlu 1991: 595-603; Yıldırım 1991: 131-148; Çevik 2000: 16, 80; Batmaz 2011: 142). Bunların yanı sıra define kazıları ile ele geçmiş ve günümüzde yurt içinde ve yurt dışında çeşitli müze ve özel koleksiyonlarda bulunan kemerler de vardır (Kellner 1991).

Urartu saray sanatı içinde değerlendirilen kemerlerin yönetimin denetiminde saray atölyelerinde üretildiği kabul edilmektedir (Çilingiroğlu 1997: 123). Büyük çoğunluğu bronz yapımı olan kemerler arasında sınırlı sayıda gümüşten olanlar da bulunur. Ayrıca az sayıdaki kemer örneğinde altın görünümü kazandırmak için bakırın içine belirli oranda çinko katılmıştır. Şimdilik Urartu Devleti'nden günümüze deri ya da dokumadan kemerler ulaşmamıştır (Çavuşoğlu 2014: 22). Bu durum deri ve dokumanın çürüyüp yok olmasına bağlanabilir. Urartulu zanaatkârlar kemerlerin üretiminde dövme ve döküm tekniklerini kullanmışlardır. Bir külçeden kesilerek ve çekiç tarzı bir aletle dövülerek inceltilen metal, haddelenerek 1-2 mm'lik şerit haline sokulur ve bu ince levhadan kemerler elde edilir (Sevin 2003: 223). Kemerler üzerinde betimlenmiş süslemelerde ise kabartma ve kazıma teknikleri uygulanmıştır (Kellner 1991; Çavuşoğlu 2002). Bu teknikler zaman zaman tek zaman zaman ise bir arada kullanılmıştır.

Bronz kemerlerin genişlikleri çoğunlukla 16-17 cm ve uzunluları 110-150 cm arasındadır. Nitekim kemerler üzerine bilimsel yayın yapan bilim insanları bu ölçüleri baz alarak, bunları kendi içinde dar, orta ve geniş kemerler olmak üzere sınıflandırmışlardır. Bu konuda ilk çalışma H. J. Kellner tarafından yapılmıştır. Nitekim Kellner, ölçülerine göre kemerleri dar, normal ve orta olarak gruplandırmıştır (Kellner 1991) . Aynı sınıflandırma U. Seidl tarafından 2004 yılında yapmış olduğu çalışmada kullanılmış olup, Seidl genişliği 5.5-8 cm ve uzunlukları 74 ile 86 cm arasında olanları dar; 1.10-1.20 m arasında uzunluğa ve 13-20 cm genişliğe sahip olanları geniş; 10 cm genişliğe sahip olanları ise orta kemer olarak sınıflandırmıştır (Seidl 2004). Urartu bronz kemerleri üzerine doktora tezi yapmış olan R. Çavuşoğlu ise Seidl'in sınıflandırmasını kullanmıştır (Çavuşoğlu 2002). Ayrıca bu ölçülerden yola çıkılarak, dar kemerlerin kadınlar, orta ve geniş kemerlerin erkekler tarafından kullanılmış olabileceği de belirtilmiştir (Seidl 2004: 133, 149).

Kıyafetlerde aksesuar olarak kullanılan kemerler çoğunlukla cinsiyet fark etmeksizin kadın ve erkekler tarafından bel kısmında kullanım görmüştür. Ancak kemerler üzerine yapılan bilimsel yayınlarda, bunların omuzdan sarkıtılarak da kullanıldığı önerilmiştir (Sevin 2003: 223). Bunların yanı sıra Urartu Dönemine ait nekropollerde yapılan kazı çalışmalarında çeşitli buluntular ile birlikte kemerler de ele geçmiştir. Söz konusu verilerden yola çıkılarak Urartu toplumunda kemerlerin ölü armağanı olarak da tercih edildiği ifade edilmiştir (Batmaz 2011: 143-144).

Urartu Dönemi kemerleri arasında sade örneklerin yanı sıra çeşitli süslemelere sahip olanlarda bulunmaktadır. Kemerler üzerine yapılan çalışmalarda süslemeler de kemer sınıflandırılmasına göre belirlenmiştir. Buna göre dar kemerlerde insan, hayvan ve mitolojik yaratık figürleri, kale betimleri ile bitkisel ile geometrik motifler bulunur (Seidl 2004: 137-140; Çavuşoğlu 2014: 28). Orta genişlikte kemerler ise dar kemerlerde olduğu gibi hayvan figürleri, mitolojik yaratıklar ile bitkisel ve geometrik motifler ile bezenmiştir (Seidl 2004: 163-166; Çavuşoğlu 2014: 26). Son grup olan geniş kemerler dar ve orta genişlikteki kemerlere nazaran daha geniş bir süsleme üslubuna sahiptir. Bu tip kemer örneklerinde kutsal hayat ağacı, hayvan ve mitolojik yaratıklar, zikzak, kabarık nokta, tomurcuk ve spiral bezemeler kullanılmıştır (Çavuşoğlu 2014: 25). Orta, dar ve geniş kemerler bezemeler açısından kendi içinde farklılık gösterse de, bunlarda işlenmiş konulu sahneler ortaktır. Nitekim üç kemer tipinde de Urartu Devleti'nin sosyo-kültürel yapısına açıklık getirecek askeri, dini, eğlence, ziyafet ve av gibi konular betimlenmiştir.

3. BAKRAÇLARIN BETİMLENDİĞİ BRONZ KEMERLER

Urartu Dönemine ait toplam sekiz adet kemer üzerinde bakraç motiflerine rastlanır. Bakraçların betimlendiği kemerlerin tamamı satın alma yoluyla müze ve özel müzelere kazandırılmış olup bronz üretimidir. Kemerler üzerinde bakraç betimlerine av, ziyafet ve eğlence sahnelerinde rastlanır. Ayrıca çeşitli hediye taşıyan insan figürleri ve karışık yaratıklar da bakraçlar ile birlikte tasvir edilmiştir. Hediye taşıyan insan figürlerine bakacak olursak, bunlar kadın figürlerinden oluşmakta olup, kale dışında resmedilmişlerdir. Profilden ve yürür pozisyonda verilmiş olan kadın figürlerinin başları açık olup, yüz uzuvları vurgulanmıştır. Bunların üzerinde kıyafet olarak uzun bir tunik bulunur. Tek parça tunik kısa kollu ve beli kemerlidir. Kıyafetin etek kısmında rozet, yatay ya da dikey şeritler ve nokta dizilerinden oluşan süslemeler bulunur. Zaman zaman sağ omuz üzerine de bir adet rozet işlenmiştir. Kadın figürlerinin havaya kaldırdıkları her iki ellerinde hediye olarak taşıdıkları kutu biçimli bakraçlar bulunmaktadır (Kellner 1991: taf. 70/279, 71/279, 69/274), (Şekil 1-3). Bakraçlarla birlikte betimlenmiş diğer figür grubu ise karışık yaratıklardır. Nitekim Elazığ Müzesi'nde 76.12.45 envanter numarasıyla sergilenen kemer parçası üzerinde betimlenmiş olan grifon bakraç ile birlikte tasvir edilmiştir. Grifonun üzerinde elbise olarak kısa tunik ile bu tunik üzerinde ayak bileklerine kadar inen kenarları püsküllü manto bulunur. Grifon yukarıya kaldırdığı ve ileriye doğru uzattığı elinde kozalak, sol elinde ise kutu biçimli bakraç tutmaktadır. Figürün yukarıya kaldırdığı sağ elinde kozalak ve aşağı da tuttuğu sol elinde ise kutu biçimli bakraç görülür (Çavuşoğlu 2002: 219, çiz. 67, kat. no. 95) (Şekil 4). Rezan Has Müzesi'nde 623 envanter numarasıyla sergilenen kemer parçasında betimlenmiş karışık yaratık figürlerinin ellerinde de bakraç bulunmaktadır (Çavuşoğlu 2014: 92, kat. no. 31). Sahnede toplam dört adet karışık yaratık figürü görülür. Bunlar biçim olarak aslan gövdeli, kuş kanatlı ve insan başlıdır. Kutu biçimli bakraçlar karışık yaratıkların aşağıda tuttukları sol ellerinde yer alır (Şekil 5).

Kemerlerde betimlenmiş ziyafet konulu sahnelerde de bakraçlar işlenmiştir (Kellner 1991: taf. 70/279;Çavuşoğlu 2014: 137). Söz konusu kemerlerde tahtta oturan bir kadın figürü görülür. Ayakları karına çekik pozisyonda oturmuş kadın figürünün yüz uzuvları vurgulanmıştır. Üzerinde uzun bir tunik bulunan figürün başında ise olasılıkla bel ya da ayak bileklerine kadar inen bir başörtüsü vardır. Bu figürün hemen önünde aslan ayaklarına sahip bir sehpa bulunur. Sehpanın üzerinde yiyecek ve içecekler betimlenmiştir. Bu sehpanın hemen arkasında ise tahtta oturan kadın figürüne hizmet eden figürler görülür. Bunlardan başları açık ve yüz uzuvları vurgulanmış hizmetli kadınların üzerinde kısa kollu ve beli kemerli uzun bir tunik vardır. Elbisenin etek ve omuz kısımları rozet motifleri ile bezenmiştir.

Erkek hizmetlinin de yüz uzuvları belirtilmiş olup başında miğfer tarzı başlık yer alır. Bu figürün üzerinde iki parçalı bir kıyafet bulunur. Nitekim içte tek parça uzun bir tunik ve bunun üzerinde kenarları püsküllü bir manto görülür. Figürün belinde bulunan kemerden ise bir kılıç sarkıtılmıştır. Söz konusu hizmetliler arasında ellerinde bakraç ile tasvir edilmiş olanlar da mevcuttur. Bunlar genellikle tahtın arkasında bulunmakta olup bir ellerinde yelpaze diğer ellerinde ise kutu biçimli bakraç tutmaktadırlar (Şekil 6-7). İstisnai olarak bir kemer örneğinde her iki elinde silindir biçimli bakraç tutan hizmetli figürü sehpanın gerisinde betimlenmiştir (Şekil 7).

Kale dışında bir takım aktivitelerin betimlendiği bir başka kemer üzerinde de bakraçlara rastlanır (Kellner 1991: taf. 71/282). Kemer ortadan içi dairelerle bezenmiş bantlarla ikiye ayrılmıştır. Üst bantta sol tarafta dokuma işi ile uğraşan kadın figürleri görülür. Yine aynı sahnenin merkezinde müzisyen ve dansçı da yer alır. Bu iki figürün önünde ve sağında yürür pozisyonda ve profilden kadın figürleri bulunur. Başı açık ve yüz uzuvları belirtilmiş olan kadın figürlerinin üzerinde ayak bileklerine kadar uzanan, beli kemerli tek parça tunik vardır. Tuniğin etek kısmı yatay ve dikey şeritlerle bezenmiştir. Söz konusu kadın figürleri yukarı doğru kaldırdıkları sağ ellerinde kâse/çanak, ileri doğru uzattıkları ellerinde ise bakraç ve nadiren testi tutmaktadırlar. Bakraçlar kutu ve silindirik biçimlidir. Kemerin alt bandının sol tarafında tandır başında iş yapan kadın figürleri betimlenmiştir. Tandırın hemen önünde ellerinde bakraçlarla kadın figürleri tasvir edilmiştir. Bu kadın figürleri ve bakraçlar ikonografik olarak üst bantta betimlenmiş olanlarla ortak özellikler gösterir (Şekil 8).

SONUÇ

Urartu yerleşim yerlerinin metal atölyelerinde üretilen bakraçlar Doğu Anadolu Bölgesi'nin ilk örneklerini oluşturmaktadır. Bilimsel ya da kaçak kazılarla ele geçmiş bakraçların form olarak benzerleri Urartu sanatında da görülmektedir. Nitekim Urartu'da toplam sekiz adet kemer/kemer parçasında bakraç motiflerine rastlanır. Söz konusu kemerlerin tamamı satın alma yoluyla müze ve özel koleksiyonlara kazandırılmıştır. Bakraç betimlerine genellikle ziyafet ve eğlence sahnelerinde rastlanır. Tasvirlerde bakraçlar çoğunlukla kadın figürleri ve nadiren mitolojik yaratıkların ellerinde betimlenmiştir. Kemerlerde işlenmiş bakraçlar silindirik veya kutu biçimli olup yarım ay biçimli bir kulpa sahiptirler. Nitekim kemerler üzerinde görülen bakraçların tamamı herhangi bir süslemeye sahip değildir. Urartu'da bakraçlar kimler tarafından ve ne amaçla kullanılıyordu? Bu sorunun cevabını nispeten de olsa kemerler üzerinde betimlenmiş sahnelerden bulabilmekteyiz. Bu bağlamda ziyafet ve eğlence sahnelerinde görülen bakraçlar olasılıkla gündelik yaşamla ilgili olup sıvı madde taşımada kullanılmış olmalıdır. Yine Elazığ Müzesi'nde sergilenen kemer parçasında bakraç grifonun elinde betimlenmiş olup, mitolojik yaratığın diğer elinde de kozalak bulunmaktadır. Bakracın hem mitolojik yaratığın elinde olması hem de sahnede görülen kozalak söz konusu bakracın dinsel ritüeller de kullanıldığını gösterir. Urartu'da bakraçlar dinsel kullanım kadar günlük yaşamda da çeşitli sıvı ya da katı maddeleri taşıma da tercih edilmiş olmalıdır.

KAYNAKLAR

Barnett, R. D. (1958). Assyrische Palastreliefs. Artia.

Barnett, R. D. (1975). Assyrische Sculpturen in the British Musuem. Bongers.

Başaran, S. (1979). Van Bölge Müzesi'nden İki Urartu Bakracı. Anadolu Araştırmaları, VI, 79-88.

Batmaz, A. (2011). Urartu Kültürünü Oluşturan Temel Öğeler. Yüksek Lisans Tezi, Ege Üniversitesi, Sosyal Bilimler Enstitüsü, İzmir.

Belli, O. & Avcı, C. (2004). Törensel Urartu Bakraçları.60. Yaşında Fahri Işık'a Armağan, İstanbul, 127-130.

Belli, O. (2003). Urartu: Savaş ve Estetik. İstanbul.

Burney, C. A. (1966). A First Season of Excavation at the Urartian Citadel of Kayalıdere. Anatolian Studies, XVI, 55-111.

Ceylan, A. (1998). Van Bölge Müzesi'nde Bulunan İki Yeni Urartu Bakracı. Atatürk Üniversitesi Güzel Sanatlar Enstitüsü Dergisi, 4, 59-62.

Collon, D. (2001). Catalogue of Western Asiatic Seals in the British Museum: Cylinder Seals V. London.

Curtis, J. (2013). A Examination of Late Assyrian Metalwork with Special Reference to Nimrud. Oxford.

Çavuşoğlu, R. (2002). Urartu Kemerleri. Doktora Tezi, Atatürk Üniversitesi, Sosyal Bilimler Enstitüsü, Erzurum.

Çavuşoğlu, R. (2014). Rezan Has Müzesi Urartu Kemer Koleksiyonu. Rezan Has Müzesi Yayınları, İstanbul.

Çevik, N. (2000). Urartu Kaya Mezarları ve Ölü Gömme Gelenekleri. Ankara.

Çilingiroğlu, A. (1997). Urartu Krallığı Tarihi ve Sanatı. İzmir.

Erzen, A. (1974). Giyimli (Hırkanis) Kazısı, 1972. Türk Arkeoloji Dergisi, XI/1, 14-20.

Gökce, B. (2023). Geç Hitit Sanatında Mitolojik Yaratıklar. Belgü, Özel Sayı, 95-112.

Karaosmanoğlu, M. (1991). Suçatı Urartu Kemeri. Belleten, LV/214, 595-603.

Merhav, R. (1991). Ceremonial Buckets. Urartu A Metalworking Center in the First Millenium B.C.E. (ed. R. Merhav), Jerusalem, 214-220.

Öğün, B. (1973). Die Urartäische Gräber in der Gegend von Adilcevaz und Patnos. The Proceeding of the XIth International Congress of Classical Archaeology. 61-67.

Özgüç, T. (1969). Altıntepe II, Mezarlar, Depo Binası ve Fildişi Eserler. Ankara.

Salvini, M. (2006). Urartu Tarihi ve Kültürü. İstanbul.

Seidl, U. (2004). Bronzekunst Urartus. Mainz.

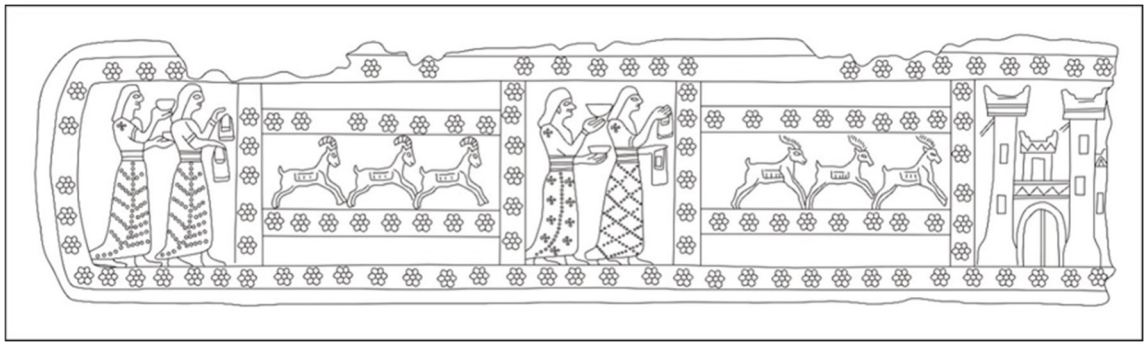
Sevin, V. (2003). Anadolu ve Trakya Başlangıcından Pers Egemenliğine Kadar. İstanbul.

Taşyürek, O. A. (1973). The Karahasan Bronze Urartian Belt in the Adana Regional Museum. Anadolu, 17, 197-205.

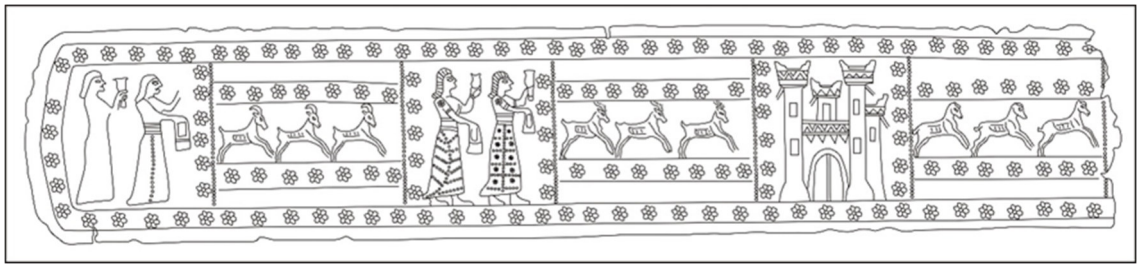
Yaşlı, K. Z. A. (2017). Kars Müzesinde Yer Alan Urartu Dönemi Madeni Kaplar. Yüksek Lisans Tezi, Kafkas Üniversitesi, Sosyal Bilimler Enstitüsü, Kars.

Yıldırım, R. (1991). Urartian Belt fragments from Burmageçit. Anatolian Iron Ages, The roceedings of the Second Anatolan Iron Ages Colloquium, held at İzmir, 4-8 May 1987. (ed. A. Çilingiroğlu-D. French), İzmir, 131-148.

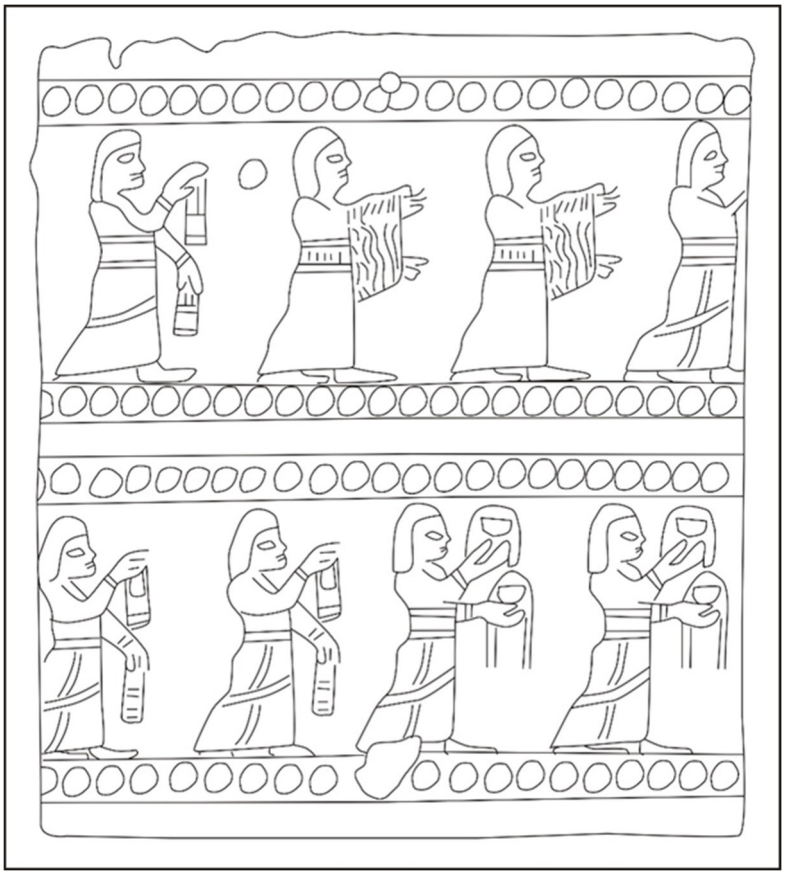
ŞEKİLLER



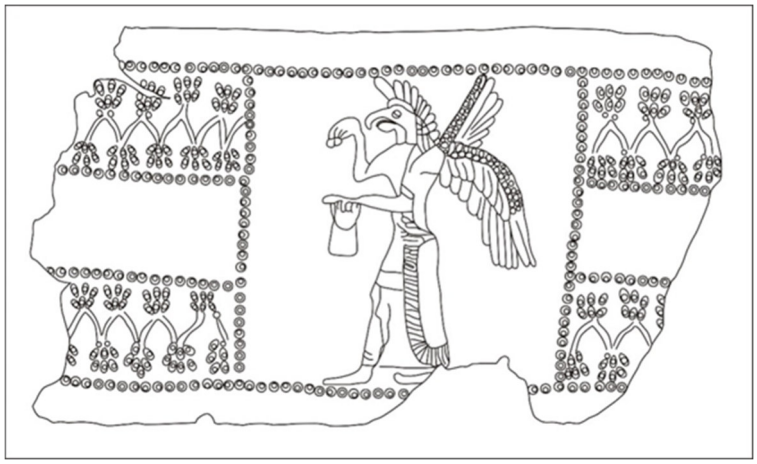
Şekil 1- (Kellner 1991: taf. 70/279)



Şekil 2- (Kellner 1991: taf. 71/279)



Şekil 3- (Kellner 1991: taf. 69/274)



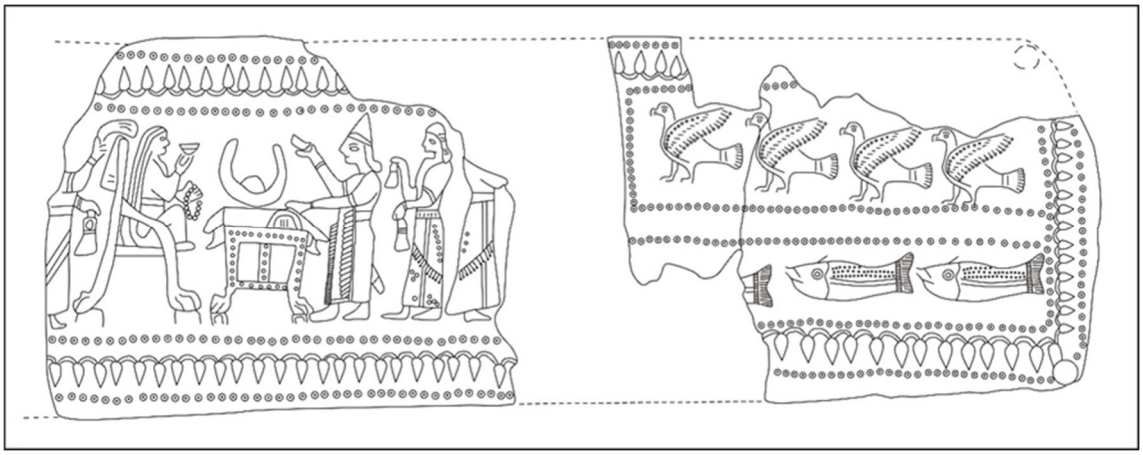
Şekil 4- (Çavuşoğlu 2002: çiz. 67)



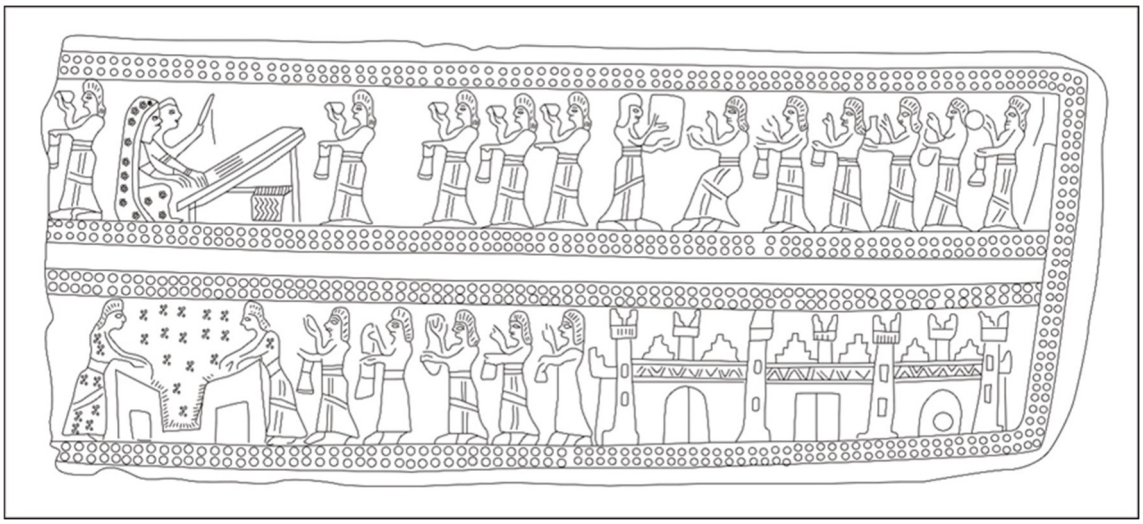
Şekil 5- (Çavuşoğlu 2014: 92)



Şekil 6- (Kellner 1991: taf. 70/279)



Şekil 7- (Çavuşoğlu 2014: 137)



Şekil 8- (Kellner 1991: taf. 71/282)

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

KUKLA TASARIMINDA PAPIER MACHE TEKNİĞİNİN KULLANIMI VE SANATÇI ÜRETİMLERİNE BİR BAKIŞ

Dr. Öğr. Üyesi Çağla TULUKÇU ARKMAN
Mimar Sinan Güzel Sanatlar Üniversitesi, Güzel Sanatlar Fakültesi, Sahne Dekoru ve Kostümü Bölümü
ORCID: 0000-0002-0238-9019

ÖZET
İsmini Fransızca'dan alan papier mache tekniği aslında, kağıdın insanlık tarihine girmesiyle başlayan bir sürecin parçasıdır. Kesin tarihi bilinmemekle birlikte, M.S. 105 yılında Çinlilerin "kağıt hamurunu" icat etmeleri ve geliştirmeleri günümüze kadar çeşitli alanlarda kağıdın kullanımını olanaklı hale getirecektir. Yüzyıllar içinde miğferden, mobilya yapımına, dekoratif objelerden, oyuncak bebek yapımına, iç dekorasyondaki tavan süslemelerine kadar kullanım olanakları keşfedilmeye çalışılmıştır. Özellikle maliyetinin düşük oluşu, hafifliği, istenilen formu alabilmesi ve üzerine boya vb. pek çok uygulamaya izin vermesi nedeniyle, dönemin zanaatkarları tarafından tercih edilen bir yapım tekniği olmuştur. Elbette bugün olduğu gibi, geçmişte de atölyedeki üretimin hızlı sonuç verebilmesi, zamana karşı dayanabilmesi ve istenilen estetiğe ulaşılabilmesi için eski formüllere hem Asya'da, hem de Avrupa'da tekniğin ilerleyişine bağlı olarak yeni katkılar sağlanmıştır. Sahne tasarımında, aksesuar yapımında kullanılan bir teknik olan papier mache; maske ve kukla tasarımında pek çok sanatçının ilgisini çekmiştir. Böylelikle, tasarımcıların aradıkları plastik dokuya ve dramatik anlatım değerine ulaşmalarına imkan vermiştir. Bu çalışma, kukla disiplinindeki üretimleriyle tanınmış; Julia Taymor, Theodora Skipitares, Ronnie Burkett ve Erik Sanko'nun papier mache tekniğiyle yapılmış farklı projelerdeki kukla tasarımlarına odaklanmaktadır. Onların, atölyelerindeki (kağıt malzemeden) üretimlerinin projelerine nasıl etki ettiğini anlamak ve yarattıkları karakterlere nasıl ilham verdiğini görmek, alanda çalışmakta olan sanatçılar için önemli bir referans oluşturacaktır. Son olarak, plastik sanatlar alanında eğitimine devam eden Sahne Dekoru ve Kostümü Bölümü'nde üçüncü sanat dalı olarak kurulmuş Kukla ve Gölge Oyunu Sanat Dalı'nın zorunlu tasarım dersleri kapsamında, papier mache tekniği ile üretilmiş öğrenci çalışmalarından örnekler sunarak, aynı tekniğin akademik eğitimde sağladığı olanaklar gözden geçirilecektir.
Anahtar Kelimeler: Kukla, Papier Mache, Kağıt Hamuru

AN OUTLOOK ON USING OF THE PAPIER MACHE TECHNIQUE IN PUPPET DESIGN AND ARTISTS' PRODUCTIONS

ABSTRACT
The papier-mâché technique, named after its French origins, is actually part of a process that began with the introduction of paper into human history. Although the exact date is unknown, the invention and development of "paper pulp" by the Chinese in 105 AD made it possible to use paper in various fields up to the present day. Over the centuries, opportunities to use have been tried to be discovered, from helmet and furniture making to decorative objects, doll making, and ceiling decorations in interior design. It has been a preferred production technique among artisans of the period that especially due to its low cost, lightness, ability to take any desired shape, and due to its ability to allow many applications such as paint, etc. Naturally, just as today, in the past as well to ensure that workshop production yields rapid results, stands the test of time and achieves the desired aesthetics, new contributions have

been made to old formulas, depending on the advancement of technology, both in Asia and Europe. In stage design, papier mache is a technique where used in props making; it has attracted the attention many artist in mask and puppet design. Thus, it allowed designers to achieve the plastic texture and dramatic expression value they were looking for. This study is focused where is known for its productions in the puppet discipline; Julia Taymor, Theodora Skipitares, Ronnie Burkett and Erik Sanko in their different puppet projects made with the papier mache technique to puppet design. Understanding how their productions (with paper materials) in their workshops affect their projects and seeing how they inspire the characters they create will be an important reference for artists working in the field. Finally, within the scope of the compulsory design courses of the Puppet and Shadow Play Art Section, which was established as the third art branch in the Department of Stage and Costume Design, which continues its education in the field of plastic arts, examples of student works produced with the papier mache technique are presented and the opportunities provided by the same technique in academic education are presented will be reviewed.
Keywords: Puppet, Papier Mache, Paper Pulp

GİRİŞ

Kağıttan çok önce Antik Mısır'da papirüs yaprakları, Çin'de ise ipek ve kenevir yaprakları, bambu bitkisi yazı yazmak için kullanılmış doğal materyallerdir. Çin'de Han Hanedanlığı döneminde "kağıt hamurunun" icat edilmesi insanlık tarihini önemli ölçüde etkileyecektir.

Saraya çocuk yaşta hizmetli olarak alınmış Cai Lun (Say-Lun), imparatorluk üretim atölyelerinin müdürlüğü görevi verildikten sonra, Çin'de yazı yazmak için yaygın olarak kullanılan ipeğin ve bambunun elverişsizliğini alt edecek yeni bir teknik geliştirme konusuyla özel olarak ilgilenmiştir. Bu doğrultuda imparatoru kağıt yapım fabrikası kurmak üzere ikna ederek, M.S.105 yılında pek çok denemenin sonucunda ağaç kabuğu, kenevir lifleri, bez parçaları ve atılmış balık ağlarından oluşan ilk kağıt hamurunu üretmiştir (Theobald, 2016).

Bu önemli buluş, günümüze kadar süregelen bir formülün temeli olacaktır. Cai Lun hayatı boyunca bu alana önemli bir katkı sağlayacaktır: Kimyasal karışımını geliştirecek, çok daha hızlı kağıt üretimi için preslemeyi ve kurutmayı sağlayan makineler icat edecektir.

Başlangıçta kağıt hamurunun formülü sır gibi saklansa da, zaman içinde Güney Asya'ya, Orta Asya'ya, Orta Doğu'ya ve nihayet onbirinci yüzyılda Avrupa'ya ulaşacaktır. Avrupa'daki onyedinci yüzyıl ve sonrasındaki bilimsel ve teknik gelişmelere bağlı olarak kağıt yapımı endüstriyel üretime doğru evrilirken bile temel formülünü ve aşamalarını koruyacaktır:

- Ağaç ve bitki lifleri ve atık materyalden oluşan bir karışımın suda bekletilmesi.
- Bekleyen karışımın çerçeveli bir tel kasnağa alınması ve ıslak lif tabakanın uygun bir zeminde presleme işlemi ile neminin yavaşça giderilmesi.
- Elde eğilen kağıdı uygun ortamda tamamen kurutulması.

Sonraları zanaatkarların atölyelerinde, farklı üretim ihtiyaçları doğrultusunda formüle çeşitli bağlayıcılar katılması ve dayanıklılığını arttıracak yöntemler geliştirilmesi yoluyla malzemeye dekoratif sanatlarda geniş bir kullanım alanı kazanacaktır.

ARAŞTIRMA ve BULGULAR

PAPIER MACHE TEKNİĞİNİN GELİŞİM YOLCULUĞU ÜZERİNE

Fransızca'da çiğnenmiş kağıt anlamına gelen papier mâché[1], günümüzde halen kullanılmakta olan oldukça eski bir tekniktir. Alçı ile papirüs ya da keten lifleriyle yapılan *cartonnage* (kartonaj) adı verilen bir uygulamanın Antik Mısır'da ölü maskeleri ve tabut kapaklarının yapımında kullanıldığını görmekteyiz.

Yüzyıllar içinde mığferden, mobilya yapımına, dekoratif objelerden, oyuncak bebek yapımına ve iç dekorasyondaki tavan süslemelerine kadar kullanım olanakları keşfedilmeye çalışılmıştır. Özellikle maliyetinin düşük oluşu, hafifliği, istenilen formu alabilmesi ve üzerine boya vb. pek çok uygulamaya izin vermesi nedeniyle, dönemin zanaatkarları tarafından tercih edilen bir yapım tekniği olmuştur.

Geç Orta Çağ ve Rönesans Avrupasında maliyetinin düşüklüğü ve istenilen estetik beklentilere cevap vermesi nedeniyle dini yapıların iç mekan detaylarında *cartapesta* (papier mache) tekniğinin kullanıldığını görmekteyiz. İtalya'nın Puglia bölgesindeki Lecce kentinde, 17. ve 18. yüzyıllar arasında kentte kilise ve anıt inşaatlarının geliştiği bir dönemde yerel zanaatkarların bez, saman, alçı gibi daha yoksul malzemelerle çalışarak elde etmeyi başardıkları cartapesta, çağdaş malzemelerle birleştirilerek bugün hala canlılığını korumaktadır (Di Donfrancesco).

Avrupa'da yüzyıllardır *Japaniese lacquer* (lake) eşyalar önemli bir yer tutmaktadır. Fakat, bu eşyaların pahalılığı zanaatkarlar arasında daha az maliyetli bir malzeme ile orijinalindeki dekoratif etkilere ulaşabilme düşüncesini doğurmuştur. Böylelikle 1800'lerin ortalarından itibaren papier mache eşyalar üretilmeye başlanmıştır. Zamanla, kalıcılığını ve dayanıklılığını sağlamak için uygulanan çeşitli formüllerin patentlerini sağlamak adına bir rekabet ortamı oluştuğu görülmektedir. Peter L. Simmond'un 1858 yılında basılmış olan *The Dictionary of Trade Products, Manufacturing, and Techinical Terms* adlı eserinde papier mache tekniği için; biri kalıp üzerine farklı kalınlıklarda kağıt yapıştırmak suretiyle, diğeri ise kağıdın hamura dönüştürülüp kalıplara preslenmesi, tutkallanması, is vb. yollarla elde edilmiş siyah boyayla kaplandıktan sonra (bu aşama mobilya vb. eşyalar için gerçekleşir), verniklenerek sıcak bir fırında kurutulması şeklinde iki atölye üretim yönteminden bahsetmektedir. (Simmond, s. 313)

Aynı zamanda 19.yüzyılda, Fransız tıp öğrencisi Louis Thomas Jérôme Auzoux (1797-1880), daha önce balmumu ile yapılmış olan anatomik etüt parçalarının yetersiz olduğunu düşünerek kendi geliştirdiği papier mache formülü ile sürekli dökülüp çoğaltılabilen parçaların üretiminden büyük bir başarı elde etmiş ve bu buluşuyla ticari alanda da ünlenmiştir (Maerker, 2008).

Çağın endüstrisinin gelişimi ile paralellik gösteren kalıp yöntemleri, iç mekan duvar süslemelerinde papier machenin dekoratif kullanımını olanaklı hale getirmiştir. Kraliçe Marie-Antoinette'nin tiyatro tutkusuyla emrini verdiği ve 1780 yılında tamamlanan saray tiyatrosunun tavanındaki ustalıklı süslemeler sarayın yetkin sanat ekibi Menus Plaisirs'in önerisiyle papier mache yöntemiyle yapılmışlardır. Bu kararın verilmesinde sürecin hızlı ve maliyetinin düşük olmasının rolü çok önemlidir.

[1] Sözcüğün metinlerde papier mâché, papier mache, paper mache olarak farklı kullanımları bulunmaktadır. (Yazarın Notu)

Döneminin ötesinde bir mimar olarak değerlendirilen, geleneksel mimari üslup öğeleriyle oynamayı ve tasarımlarında farklı malzemeleri denemeyi seven Antoni Gaudi'nin (1852-1926) Vicens Ailesi için tasarladığı ve 1885 yılında tamamlanan Casa Vicens konutundaki yemek salonunun yanındaki *Smoking Room* bölümünün tavan süslemelerinde, papier mache tekniği yine karşımıza çıkmaktadır (Casa Vicens) (Barselona'daki Casa Vicens: Gaudí'nin İlk Başyapıtını Keşfetmek).

Geçmişten günümüze kadar dekoratif sanatlardaki kullanım olanaklarına baktığımızda; atölye ortamındaki üretiminin kolaylığı, ucuz ve kolay erişilebilirliği, deneysel uygulamalara yatkınlığı, istenilen formu alabilecek esnekliğe sahip oluşu, üstüne boya, yaldız, vernik vb. gibi işlemlerin rahatlıkla uygulanabilmesi, tasarım alanına göre hafifliğinin sağladığı avantaj papier machenin öne çıkan özellikleri olmuştur. Bununla beraber konu gösteri sanatları olduğunda teknik ile sanatçının ilişkisi farklı bir anlam kazanmaktadır.

Ataların ruhlarına saygıyı temel alan inanç geleneğinin kağıdı kutsallaştırması ve ondan aldığı ilhamla yaratıcılıklarını birleştirmiş olan Çin ve Güney Asya toplumlarında, papier mache maskeler, figürler, kuklalar kendilerine atfedilen kutsallık misyonlarını günümüzde dahi korumaktadırlar. Sadece bu coğrafyada değil, pek çok kültürde düzenlenen festivallerde bu etkileri bulmamız mümkündür. Çin'de Hayalet Festivali, Tayvan'da Taipei şehrinde düzenlenen Baosheng Kültür Festivali, Meksika'da Ölüler Günü Festivali geçmiş ritüellerin izlerini hala taşımaktadırlar.

Papier mache, uzun yıllardır sahne tasarımında, estetik beklentilerin karşılığını verebilmesi, hafifliği, sağlamlığı ve ucuz maliyetli olma özellikleriyle dekor, sahne aksesuarı, maske, kukla tasarımı uygulamalarında zaman zaman tercih edilen bir yol olmuştur.

Bu konuda kukla tasarımı alanındaki sanatsal üretimlere odaklandığımızda, çağdaş sanatçılardan Julie Taymor, Theodora Skipitares, Ronnie Burkett ve Erik Sanko'nun papier mache tekniğiyle yarattıkları karakterlere değinilecektir. Çünkü, sanatsal projelerinde farklı mediumlarla çalışırken, bu geleneksel tekniği tercih etmeleri dikkat çekicidir.

1952 yılında doğan Julie Taymor'ın tiyatro ile ilişkisi yedi yaşlarında başlamıştır.

Onu, doğduğu ortamın verdiği ilhamla Sri Lanka'dan New York'a, Endonezya'dan Fransa'ya gelecekteki sanatsal projelerine etki edecek pek çok ortamda Geleneksel Doğu Tiyatrosu ve çağdaş oyunculuk teknikleri üzerine çalışırken görmekteyiz.

1960'ların sonlarında Jacques LeCoq'un pandomim okulunda, karakteri ve duyguyu ileten bir araç olarak vücudun nasıl kullanılabileceğini etüt etmiştir. Buradaki atölyelerde maskeler kullanılmıştır. Cansız nesnelerin, içsel duygusunu araştırmak ve bunu fiziksel olarak ortaya çıkarmak suretiyle onların birer kuklaya dönüşmesi amaçlanmıştır.

Aynı zamanda, 1970'lerde Herbert Blau ile tanışması sayesinde *ideographs (ideograflar)* ile karşılaşmıştır. Bu bir çeşit teatral işaret dilidir. Oyuncudan karakterinin en alt katmanındaki duygu ve hareketi yakalamasını talep eden, bir tür iç enerjidir. Her iki metod Taymor'un sahne tasarımlarına ve karakterlerine ilham verecektir (Bluementhal, Taymor, & Monda, 2007, s. 10,11).

Projelerinde teknolojik imkanları kullanmayı seven Taymor'ın her projesinde ayrı ayrı geliştirdiği ideografların doğrultusunda; Doğu geleneğinin bir parçası olarak Japonya Bunraku Tiyatrosu, Java Gölge Oyunu Tiyatrosu gibi geleneksel gösteri formlarını rejilerinde görmemiz mümkündür. Maskelerini ve kuklalarını yaratmak için atölyesine girdiğinde en sade üretim tekniklerini kullanmaktan çekinmez.

Julie Taymor'ın ellerinde papier mache bir karakter olarak doğan, William Shakespeare'in *The Tempest (Fırtına)* oyunu için tasarladığı *Ariel* karakteri de onlardan biridir. *Playing With Fire* kitabında aktarılanlar şöyledir :

"...Ariel, insan duygularının, kırılganlığın ve merhametin ruhani temsili, aynı zamanda Prospero'nun sahne yönetmeni ve ilham perisidir. Bir aktör nasıl olur da erkek ya da kadın olmasının ötesinde, komut üzerine ortaya çıkıp kaybolan, yerçekimine meydan okuyan, şekil ve boyut değiştirebilen saf ruhu canlandırabilir ve yine de izleyiciyi güldürüp ağlatabilir? Ariel'i tasvir etmek için bir tür kukla kullanımını istediğimi biliyordum, ancak en basit ve en az engelleyici tekniği arıyordum. Sonra, bedensiz maskenin gücünü ve esnekliğini yeniden keşfettim. Bali'de, bir dansçı maskesinin kişiliğini belirlemek için önce maskeyi elinde tutar ve bileğinin en ufak bir hareketiyle onu canlandırır. Bu, Ariel için çözüm oldu. Prospero'nun yardımcısı olarak siyah giysilerine bürünmüş, yüzü görünmeyecek şekilde gizlenmiş bir aktris, sağ eliyle şekillendirilmiş bir başı manipüle edecekti. Ariel'in yüzü, Eskimo ve Afrikalı ruh maskeleri tarzında, cinsiyetsiz ve karakteristik olmayan bir yapıya sahipti… Ariel, gerçekten insan olmuş olsaydı şimdi olduğundan daha dokunaklı olamazdı..." (Bluementhal, Taymor, & Monda, 2007, s. 122,123)

Taymor'ın Ariel'i cinsiyetsiz ve karakteristik özelliklerini yüzünde taşımayan (non-characterological) bir yapıya sahiptir. İstediği sert dokuyu ve hafifliği papier mache ile karaktere kazandırmıştır. Sadece başının arkasına beyaz, şeffaf, uzun bir kuyruk eklenmesi sayesinde havada zarif bir şekilde süzülebilecek bir etki kazandırılmıştır (Bluementhal, Taymor, & Monda, 2007, s. 123).
Çok yönlü bir sanatçı olan Julie Taymor'ın papier macheyi tercih ederken - yarattığı rejinin dramatik etkisine karşılık gelip gelmediği - doğrultusunda karar verdiğini görmekteyiz.



Resim 1,2: Ariel maskesi ile Prospero (Aktör Robert Stattel)
Kaynak: (Bluementhal, Taymor, & Monda, 2007, s. 115,118)

1957 yılı doğumlu Kanadalı sanatçı Ronnie Burkett, çocukken evde sıkıldığı bir gün oyalanmak için karıştırdığı ansiklopedinin P harfi bölümünde " Puppet " sözcüğünün görsellerini gördüğü anda mesleğini bulduğunu belirtmektedir. Ancak, canlı bir kukla gösterisini izleme olanağını daha ileri yaşlarında yakalamıştır. Sonrasında dönemin ustaları ile kuklacılığın ilkelerini öğrenmeye başlamıştır. Bu konuda ciddi bir kitap koleksiyonu bulunan Burkett'ın kuklanın üretim tekniklerine yönelik oldukça zengin bir birikimi vardır. Yılların içinde tutkulandığı ve karar kıldığı bir malzeme olan papier mache kukla karakterlerine dramatik bir anlam katmaktadır. Kukla karakterlerini titizlikle yaratırken papier machenin olanaklarını keşfeder. Tekniğe yönelik geçmiş pek çok formülü denemiş ve kendi formüllerini geliştirmiş olan Ronnie Burkett, papier machenin kukla sanatında hafife alındığını düşünmektedir. Bunun nedenini ise, sanatçıların onun yeteneklerini keşfetmek için yeteri kadar çaba harcamamasına bağlamaktadır. Bir söyleşisinde konuya dair yaklaşımını şöyle ifade etmektedir:

> " *…Bir kalıpta döküm yapmak için güvenilir bir yöntem bulmak istiyordum, hiçbir lüks kağıt veya yapıştırıcı ya da kalıp yapma malzemesi kullanmadan; ve kağıt şerit kafayı bir alçı kalıbında tek seferde dökme yöntemini buldum, bu da kukla kafasının çok daha az bükülmesine neden oldu. Ve en güzeli...o yaz çok eğlenceliydi. Gerçekten tekrar çocuk gibi olmak gibiydi. İnsanlara anlatmaya çalıştığım bir şey bu. Papier mache çok eğlencelidir. Riskler o kadar yüksek değil... pahalı malzemeler yok, endişelenecek toksisite yok, üstelik ellerinizi kirletip bir şeyler yapıyorsunuz. Bundan daha iyi ne olabilir ki, değil mi*?..." (https://creaturistepapermache.blogspot.com, 2011)

Ronnie Burkett'in estetiğinin en önemli unsurlarından biri olan papier machenin olanaklarıyla yarattığı etkileyici ve canlı *marionetteler (ipli kuklalar*) izleyicilerle buluşmaya devam etmektedir.

1947 doğumlu Theodora Skipitares, heykel ve sahne tasarımı eğitimi almış ve 1970'lerden itibaren, New York'ta disiplinler arası çalışmalar yapmaya başlamış bir sanatçıdır. Kendisi, Julie Taymor gibi Geleneksel Asya Tiyatrosu formlarına ilgi duymuştur. Ayrıca, Yunan Tiyatrosu'nun klasiklerini çağdaş sahneye taşımıştır. Farklı medialarla çalışan Skipitares'in solo çalışmaları kapsamında performanlarının önemli bir parçası olan figürlerin, kuklaların ve maskelerin üretimlerinde papier mache tekniğini kullandığını görmekteyiz.

Theodora Skipitares'in, 2014 yılında sahnelenen *The Chairs* oyununun konusu şöyle belirtilmiştir:

> "*Yaşlı bir kadın, insanlığa önemli bir mesaj duyurmak üzere gelecek misafirleri için evini hazırlar...Bu performansta, kapının zilini çalan 29 sandalyenin her biri, bize acil bir şey anlatacak benzersiz bir performans nesnesidir. Sandalyeler, Stephen Hawking, Gertrude Stein, Malala ve Yoko Ono gibi ünlü kişilerin yanı sıra, zorlu bir dünyada hayatta kalmaya çalışan bilinmeyen erkek ve kadınların reenkarnasyonlarıdır.*" (http://theodoraskipitares.com)

Bu bağlamda reji için marionette tarzı sandalye kuklaları, papier mache büyük boy kafa kuklaları gibi çeşitli ölçeklerde ve tekniklerde kuklalar tasarlamıştır. Metnin sanatçıda yarattığı duygunun ve metne önereceklerinin ışığında; karakterlerin kuklanın hangi türü ile ifade bulması gerektiğine ya da estetik dilinin hangi malzemeyle anlam kazanacağına karar verilmesi önemlidir. The Chairs projesinde bu arayışın sonuçları görülmektedir.

1963 doğumlu Erik Sanko, New York'taki stüdyosunda profesyonel müzisyenliğinin yanı sıra, kukla projeleriyle de tanınmaktadır. Çocukken izlediği ilk kukla tiyatrosu ile büyülenmiş ve kukla yapmaya kendi amatör dünyasında devam etmiştir. O yıllarda karakterlerini hazır üretim kağıt hamurundan yapmıştır. En sevdiği hobisini ticari kaygılarla kaybetmek istememesi sebebiyle gizemli görünüşlü kuklalarının seyircisi ile buluşturması zaman alacaktır.

Bugün, profesyonel bir tasarımcı olarak kurucusu olduğu *Phantom Limb Company*'nin ilk uzun metrajlı kukla filmi 2006 yapımı *Fortune Tallers*'taki kukla karakterlerinin gri tonlardaki, tekinsiz, ürkütücü ve kusurlu görünümlerini basit, sade bir malzeme olan papier macheye borçludur. Ölmüş bir milyonerin mirasına talip olmak için bir malikanede toplanan yedi karakterin karanlık hikayesini konu eden filmin içinde kullanılan marionettelerin papier macheden yapılmış yüzlerindeki bakışları senaryodaki karanlığın izlerini taşımaktadırlar.

AKADEMİK EĞİTİMDE BİR YAKLAŞIM OLARAK PAPIER MACHE

Güzel sanatlar eğitiminde papier machenin akademik anlamda kullanımına yönelik, İDGSA bünyesinde 1962 yılında kurulmuş olan, bugünkü adıyla Sahne Dekoru ve Kostümü Bölümü'nün bünyesinde 1997 yılında heykeltraş Saim Bugay'ın öncülüğünde üçüncü sanat dalı olarak yapılandırılan Kukla ve Gölge Oyunu Sanat Dalı'nın çalışmalarına kısaca değinmek istiyorum. 1970'lerin sonunda mesleğe giriş derslerinden biri olan *Malzeme* dersi kapsamında, yarım dönem *Öğr.Gör. Saim Bugay*'ın üstlendiği kukla projesi: çamur modlajın, iki parçalı negatif alçı kalıbın ve negatif kalıpların içine plastik tutkal ve gazete kağıdının kat kat yapıştırılmasıyla pozitif papier mache kalıbın nasıl yapılacağının öğretilmesi süreçlerini kapsamaktadır. Bu atölye çalışması bir tane ipli kukla karakteri ve aynı kalıptan tip değiştirme ile maske uygulaması ile sonuçlanmaktadır. Kukla, 1997 yılından sonra, zorunlu tasarım dersi olarak sahne tasarımı eğitimi müfredatı içindeki yeni yerini almıştır.



Resim 3: Banu Güçlü, İpli kukla projesinden papier mache el detayı, Proje Konusu: Sempé'nin Babam ve Ben hikayesi, Karakter: Bale Öğretmeni, 2022 Güz Dönemi.
Kaynak: Yazarın kendi arşivinden



Resim 4: Ebru Özdemir, İpli kukla projesinden papier mache el ve bacak detayı, Proje Konusu: Yaşar Kemal'in Teneke romanı, Karakter: Zeyno, 2012 Güz Dönemi.
Kaynak: Yazarın kendi arşivinden



Resim 5: Papier mache için, atölyemizde kullanılan ana malzemeler: Gazete kağıdı,duvar kağıdı tutkalı ve negatif alçı kalıp
Kaynak: Yazarın kendi arşivinden

Böylelikle, 2.yıl itibariyle gölge oyunu, el kuklası, ipli kukla, büyük kafa kuklaları ve serbest proje içerikleriyle her dönem ayrı konular verilmiş ve temel prensipleri korunmak suretiyle içeriği geliştirilmiş olarak eğitimine devam etmektedir.



arşivinden**Resim 6:** Ebru Özdemir, İpli kukla projesinden papier mache el ve bacak detayı, Proje Konusu: Yaşar Kemal'in Teneke romanı, Karakter: Zeyno, 2012 Güz Dönemi.
Kaynak: Yazarın kendi arşivinden



Resim 7: Hüseyin Çamur, Serbest Proje, papier mache yüz, 4.yıl 7. Sömestr.
Kaynak: Yazarın kendi arşivinden



Resim 8: Zanna Abasova, İpli kukla rojesinden papier mache el ve baş detayı, Konu: Aziz Nesin'in Kimliksiz Adam öyküsü, Karakter: Kimliksiz Adam, 2016 Güz Dönemi.
Kavnak: Yazarın kendi arsivinden

Diğer kukla tasarımı dersleri içinde, özellikle el kuklası projesi, üç boyutlu kukla yapımı ile ilk kez karşılaşacak öğrencilerimiz açısından, çamur modlaj, alçı kalıp ve papier mache tekniklerini deneyimlemeleri açısından halen atölye eğitimi içinde önemli bir yere sahiptir. Genellikle her dönem değişen konuların ışığında, 14. hafta boyunca, çizim aşamasından realizasyonuna kadar yarattıkları kukla karakterlerin; öngörülen zamanda tamamlanması, alçı, gazete kağıdı ve duvar kağıdı tutkalı gibi ekonomik materyallere ulaşmanın kolaylığı ve en önemlisi estetik beklenti açısından istenileni vermesi bakımından kukla atölyesinin vazgeçilmez bir unsurudur.



Resim 6: Asude Kılıç, El kuklası projesinden papier mache el ve baş detayı, Proje Konusu: Halikarnas Balıkçısı, Anadolu Tanrıları, Karakter: Pan, 2013 Bahar Dönemi.
Kaynak: Yazarın kendi



Resim 7: Umut Yılmaz, El kuklası projesi mache el ve baş detayı, Proje Konusu: Firuzan'ın Kırlangıç Balıkları Hikayesi,
Karakter: Zarife, 2024 Bahar Dönemi.
Kaynak: Yazarın kendi arşivinden

Kukla ve Gölge Oyunu Sanat Dalı, kuklanın plastik dilini modern tekniklerin farkındalığı ile, papier mache uygulamalarla malzemenin olanaklarını etüt etmeye devam etmektedir.

SONUÇ

Kapsamını belirli bir çerçeve içinde tutmaya çalıştığımız bu yazının dışında kalan diğer temel sanat eğitimi alanlarında ve atölye çalışmalarında zaman zaman tercih edilen, geçmişten günümüze pek çok alanda kullanılmış olan papier machenin olanaklarının genç sanatçılar ve eğitimciler için araştırılması ve çağdaş malzemelerin bir alternatifi olabileceğinin fark edilmesi önemlidir.

Yukarıda odaklandığımız dört yetkin tasarımcının sanatsal üretimlerindeki gerekçelere bağlı olarak aynı plastik dili tercih etmeleri, geleneksel yapım tekniklerinin çağdaş yaklaşımlarla yeniden ele alınması bakımından alandaki pek çok sanatçıya ilham verebileceği düşüncesindeyim.

Aynı zamanda, akademik alanda güzel sanatlar fakültelerinin yapısı içinde gelişebilecek kukla tasarımı sanat dalları kapsamında; hafifliği, malzemeye erişebilme kolaylığı ve maliyetinin uygun olması, rahatlıkla form verilebilmesi, sağlamlığı, estetik dili vb. olumlu nitelikleri bakımından atölye uygulamalarında çağdaş malzeme ve tekniklerin yanı sıra özel bir yere sahiptir.

KAYNAKÇA

Barselona'daki Casa Vicens: Gaudí'nin İlk Başyapıtını Keşfetmek. (2024, 07 29). https://nanoo.travel: https://nanoo.travel/en/casa-vicens/

Bluementhal, E., Taymor, J., & Monda, A. (2007). E. Bluementhal, J. Taymor, & A. Monda içinde, *Julie Taymor, Playing With Fire, Third Edition* (s. 122,123). New York: Abrahms.

Brett,Vanessa; Somerville,Pauline; Salton,Jenny; Targett,Julie; Behr,Caroline; Kendall,Suzenne; White,Elizabeth(1998), *Sotheby's Guide: Antiques And Their Prices Worldwide, 1989 Edition, Volume 4,* Fransa: The Penguen Group.

Casa Vicens. (tarih yok). https://casavicens.org: https://casavicens.org/the-house/main-floor adresinden

Di Donfrancesco, M. (tarih yok). *Di Donfrancesco Papier Maché Holy Statuary*. http://www.didonfrancesco.it: http://www.didonfrancesco.it/index_eng.htm

http://theodoraskipitares.com. (Bilinmiyor). The Chairs 2014: http://theodoraskipitares.com/projects/chairs.htm adresinden alındı

https://creaturistepapermache.blogspot.com. (2011, December 13, Tuesday). *https://creaturistepapermache.blogspot.com*. Creaturiste's Paper Mache: https://creaturistepapermache.blogspot.com/2011/12/ronnie-burkett-interview.html

Mackey, James A., *Antiques of The Future, A Guide For Collectors and Inventors,*

Maerker, A. (2008). *Dr. Auzoux's Papier-Mâché Models*. https://www.whipplemuseum.cam.ac.uk/: https://www.whipplemuseum.cam.ac.uk/explore-whipple-collections/models/dr-auzouxs-papier-mache-models

Simmond, P. L. (tarih yok). https://books.googleusercontent.com. *The Dictionary of Trade Products, Manufacturing, and Technical Terms*. Google Books, The Dictionary of Trade Products, Manufacturing, and Technical Terms: https://books.googleusercontent.com/books/content?req=AKW5QafwelzQ8SxE_KYs9f4xzqtaDETvGfbvi3gbROG2bFKj0baMhLe9-RlRyKlMl62egjAgQFUczDq28ouCdrBTUpTxrDZDtinRlBbUHiAnvxXkmZRymZbKH2D2LdBKHZzB_V59B4FyIq03vwgy2jYIKdQC9r_3gwjfxbrALLGZVPgM7oTtnPDnu9O3z9col-eyuoX41

Theobald, U. (2016, 4 January). *An Encyclopaedia on Chinese History, Literature and Art, Cai-Lun*. http://www.chinaknowledge.de: http://www.chinaknowledge.de/History/Han/personscailun.html

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

ANTONIO CANO'NUN METOT KİTAPLARININ İÇERİĞİ VE KATEGORİZASYONU

Dr Öğr. Üyesi İbrahim Şevket GÜLEÇ
Necmettin Erbakan Üniversitesi, Güzel Sanatlar Fakültesi, Müzik Bölümü
ORCID: 0000-0002-7961-5715

ÖZET
İspanyol gitarist ve besteci Antonio Cano (1811-1897), tıp eğitiminden sonra gitar çalışmalarına yönelmiştir. 1847'de Dionisio Aguado ile tanıştıktan sonra konser gitaristi olarak kariyer yapmış ve ün kazanmıştır. 1852'de "Metoda para Guitarra" adlı gitar metodunu yayınlamış ve aynı yıl Madrid Ulusal Konservatuarı'nda gitar profesörü olarak atanmıştır. Cano, opera temalarından gitar fantezileri bestelemiştir ve yaşamı boyunca elli, ölümünün ardından ise yirmi dolayında eseri yayınlanmıştır. 19. yüzyılın ilk yarısında altı çift ve tek beş telli gitarın yerini romantik gitar alırken, gitar müziğinde metodolojik yaklaşımlar önem kazanır, gitar müzik repertuarı genişler. Antonio de Torres'in 1860'ta geliştirdiği yeni gitar modeli, romantik gitarın yerini alır. Çalışmada Cano'nun iki metot kitabı ele alınmıştır. Bestecinin "Metodo Abreviado de Guitarra" ve "Metodo Completo de Guitarra" kitapları incelenerek gitar teknikleri sınıflandırılmıştır. Bu sınıflama, eğitimcilerin ve öğrencilerin istedikleri tekniklere kolayca ulaşmalarını amaçlamaktadır.
Anahtar Kelimeler: Antonio Cano, Metot, Klasik Gitar

THE CONTENT AND CATEGORIZATION OF ANTONIO CANO'S METHOD BOOKS

SUMMARY
Spanish guitarist and composer Antonio Cano (1811-1897) dedicated himself to guitar studies after his medical education. After meeting Dionisio Aguado in 1847, he started his career as a concert guitarist and gained fame. In 1852, he published his guitar method "Metoda para Guitarra" and was appointed as a guitar professor at the Madrid National Conservatory the same year. Fifty of his works were published, and twenty more were published after his death. In the first half of the 19th century, the Romantic guitar took the place of the six double-string and single five-string guitars, methodological approaches in guitar music became important, and the guitar music repertoire expanded. The new guitar model developed by Antonio de Torres in 1860 replaced the Romantic guitar. In the study, Cano's two method books were examined. The guitarist's "Metodo Abreviado de Guitarra" and "Metodo Completo de Guitarra" books were examined and guitar techniques were classified. This classification aims to make it easier for educators and students to easily access the techniques they want to work on.
Keywords: Antonio Cano, Method, Classical Guitar

GİRİŞ
Klasik dönem müziğinde sadelik, armoni eşliği ve tek çizgili melodiler öne çıkarken Romantik dönem müziği; geniş melodi atlama aralıkları, renkli armoni ve çalgılama, ritmik özgürlük ve biçimsel esneklik ile karakterize edilir. Bu dönemde, müziksel anlatım ön plandadır. Klasik dönemdeki denge ve oran yerini, Romantik dönemde abartı ve coşkuya bırakır. Romantik besteciler, klasik kalıpların dışına çıkarak, içlerinden geldiği gibi duygularını ifade ederken tonaliteyi genişletirler (İlyasoğlu, 2009).

Klasik dönemde hem altı çift telli, hem tek beş telli gitar kullanılırken, 1800'lerin başında Romantik gitarın Avrupa'da popüler olmasıyla gerek solo, gerek oda müziği, gerekse de etüt ve metot yazıları katlanarak artar. Klasik dönem gitar müziğinde metodolojik yaklaşımlar önem kazanır, gitar icracılığı bir meslek haline gelir. Metot ve etüt gibi yazılı kaynakların oluşturulması önem kazanır (Kahraman, 2018: 1).

19. yüzyılın ilk yarısına gelindiğinde Romantik gitar Avrupa, ABD ve Güney Amerika'da popüler bir çalgı haline gelir. Gitarın altın çağı olarak bilinen bu dönemde (1800-1850), gitar için yazılan konçertolar, varyasyonlar, düzenlemeler, şarkılar ve oda müziği eserleriyle repertuar zenginleşir. Gitar konserleri ve nota satışları büyük ilgi görür. 1850'den sonra piyano ve kemanın yükselişiyle gitarın popülerliği azalır. Antonio de Torres'in 1860'da geliştirdiği yeni gitar modeli, Romantik gitarın yerini alır (Uluocak, 2014).

İspanyol gitarist ve besteci Antonio Cano (Curriela) (1811-1897), üniversitede tıp eğitiminin ardından kendini gitar çalışmalarına adar. 1847'de Dionisio Aguado ile tanışan besteci, konser gitaristi olarak kariyerine başlar. 1853 Fransa ve 1855'deki Portekiz konserlerinin ardından üne kavuşur. 1852'de "Metoda para Guitarra"[1] adlı gitar metodunu yayınlar. Besteci, aynı yıl Madrid Ulusal Konservatuarı'na gitar profesörü olarak atanır. 1859'da Borbón müzik arşivini yönetir. 1874'ten itibaren sağır ve dilsizler için bir enstitüde öğretmen olarak çalışır. Cano, opera temalarından gitar fantezileri besteler. Yaşamı boyunca elli, ölümünün ardından ise yirmi dolayında eseri yayınlanır (Annala, Matlik, 2010 & Uluocak, 2014 & Wade, 2001).

Literatür taramasında, bestecinin metot kitaplarını ele alan bir çalışma bulunamamıştır. Çalışma bestecinin tüm metot kitaplarını ele alan ilk araştırma olması açısından önem taşımaktadır.

Bestecinin "Metodo Abreviado de Guitarra" ve "Metodo Completo de Guitarra" adındaki iki etüt kitabı çalışmanın örneklemini oluşturur. Metot kitaplarına, International Music Score Library Project (imslp.org) isimli internet kütüphanesinden erişilmiştir.

Çalışmada düzenlenen analiz tablolarıyla sol el ve sağ el teknikleri sınıflandırılırken, eğitimcinin ve öğrencinin çalışmak istediği tekniğe kolayca ulaşması amaçlanmaktadır.

Çalışma betimsel bir çalışmadır ve doküman analiz yöntemi kullanılmıştır. Literatürde kabul edilen gitar tekniklerinin yanı sıra "melodi eşlik"[2] tekniği çalışmaya dahil edilerek değerlendirme yapılmıştır.

Etütlerin sol el tablosunda süslemeler, legato, glissando, bare, aralık, akor, susturma, gam ve pozisyon atlama teknikleri yer almıştır. Sağ el tablosunda arpej, baş parmak çalışması, susturma, gam, tremolo ve melodi-eşlik teknikleri yer almıştır.

Teknik sınıflama yapılırken, her bir tekniğin tekrar sıklığı ve toplam ölçü sayısı oranına dikkat edilmiştir. Etütlerin kitaplardaki numaraları, ilgili teknik ile örtüşecek şekilde tablolara yerleştirilmiştir.

BULGULAR

Tablo 1. Antonio Cano'nun İki Metot Kitabının Künye Bilgileri

Kitap	Yıl	Etüt Sayısı	Edisyon
Metodo Abreviado de Guitarra	1892	64	Zozaya
Metodo Complete de Guitarra	1852(1.Basım) 1868(2.Basım)	51	Romero

[1] Bu metoda 1868 yılında uygulamalı armoni bölümü eklenerek yeniden basılır.

[2] Üst, orta veya alt partide belirgin bir şekilde yer alan melodi ve eşlik çizgisinin varlığını ortaya koyar. Melodinin ön planda ve eşliğin geri planda tutulması sağ el disiplini gerektirir.

Antonio Cano'nun Metot Kitapları

1. Metodo Abreviado de Guitarra (1892, Edisyon: Zozaya)

İçerik: a: Sol/ sağ el parmak numaraları ve boş tellerin açıklaması /Diyatonik gam / Etüt çalışmaları 1-20

b: 25 etüt/ Gam, çift ses, ses uzatma, flajöle, kadans, arpej, akor, legato çalışmaları ve 7 etüt.

c: 12 etüt

2. Metodo Completo de Guitarra (1868, Madrid, Edisyon: Zozaya)

İçerik: a: Sol/ sağ el parmak numaraları ve boş tellerin açıklaması/ 15 etüt/ Arpej akor ve kadans çalışmaları/ 12 sağ el etüdü/ Legato, çift ses ve gam çalışmaları/ 12 sol el etüdü/ Flajöle ve arpej çalışmaları/ 12 etüt (iki el için eşit)

b: Uygulamalı armoni çalışmaları

Tablo 2. Sol El Teknikleri

SOL EL	*Süslemeler*	*Legato*	*Glissando*	*Bare*	*Aralık*	*Akor*	*Gam*	Pozisyon Atlama
Metodo Abreviado	**16, b:20/ 22/ 25, c: 4/ 8/**	**13-15, 17, b:4/ 15/ 18-23/ 25, 1.Andante, Hemen sonrasındaki 4 etüt, c:6/ 7/ 9**	**17, 18, b:23, 1.Andante, c:2/ 4/ 10**		**2, 3, 7, 8, 10, 14, 19, b:5/ 8/ 9/ 12/ 14/ 17/ 18/ 19/ 21, c:6/ 8/ 9**	20, b:8/ 11/ 13, c:6/ 10	**1, b:25**	
Metodo Completo	**7, sol el: 7- 8, iki el: 3/ 9/ 10**	**6, 7, 11, sol el: 1- 3/ 5- 10/ 12, iki el: 1/ 4-6/ 8-12**	**8, 9, 12, sol el: 9/ 12, iki el: 12(var.3)**	**Sol el: 12, iki el: 1-3/ 7/ 9-10/ 12(var. 2)**	**4, 10, 12, 15, sağ el: 8, sol el: 4-6/ 11, iki el: 7-10**	**İki el: 10-11**	**Sol el: 7-8, iki el: 6/ 8/ 12**	**İki el: 9**

Tablo 3. Sağ El Teknikleri

SAĞ EL	*Arpej*	*Baş parmak çalışması*	*Gam*	*Melodi-Eşlik*
Metodo Abreviado	**4, 6, 8, 10, 11, 12, b:3/ 5/ 15/ 20/ 25/ 2.Andante/ Campanelas/ Hemen sonrasındaki 4 etüt, c: 1-6/ 8/ 10/ 11**	**C:1/ 3**	**1, b:25**	**5, 9, 15-18, b:1/ 2/ 4/ 6-11/ 14-25, 1.Andante, c: 1-3/ 5-10**
Metodo Completo	**Sağ el: 2-12, sol el: 10, iki el: 1-12(var.2)**	**14, sağ el: 1-2/ 10/ 12, iki el: 1**	**Sol el: 7/ 8, iki el: 6/ 8/ 12**	**1-15, sağ el: 1-7/ 9-12, sol el: 9-10/ 12, iki el: 1-5/ 7-12(var.3)**

SONUÇ

Metot kitapları, bir müzik aletini öğrenmek isteyenler için hazırlanmış, detaylı eğitim materyalleridir. Bu kılavuzlar, bir öğretmen eşliğinde ya da bireysel olarak çalışacak amatörler ve öğrenciler için tasarlanmıştır. Temel müzik ve enstrüman bilgileriyle başlayan bu kitaplar, adım adım ilerleyerek yazılı açıklamalar ve pratik alıştırmalar sunar.

Besteci Antonio Cano'nun iki metot kitabında da gitar hakkında temel bilgiler verdikten sonra, kısa açıklamalarla teknik çalışmalar ve etütler sunulmuştur.

Tablo 2 ve 3'teki verilere bakıldığında Metodo Abbreviado'da en çok tercih edilen çalışmanın melodi-eşlik olduğu, sonrasında sırasıyla arpej, legato, aralık, glissando, süsleme, akor, gam ve baş parmak çalışması olduğu görülmektedir. Kitapta bare ve pozisyon atlama çalışması yoktur. Metodo Completo'da en çok tercih edilen çalışmanın yine melodi-eşlik olduğu, sonrasında sırasıyla arpej, legato, aralık, bare, glissando, süsleme, baş parmak çalışması, gam, akor ve pozisyon atlaması olduğu görülmektedir.

Tüm kitaplardaki teknik çalışmaların dağılımına baktığımızda bestecinin kitaplarında ağırlıklı olarak kullandığı tekniklerin sırasıyla melodi eşlik, arpej ve legato olduğu görülmektedir. En az başvurulan teknikler sırasıyla akor, gam, baş parmak ve pozisyon atlama çalışması olmuştur.

KAYNAKÇA

Annala, H., Matlik, H. (2010). Handbook of Guitar and Lute Composers. United States: Mel Bay Publications, Incorporated.

İlyasoğlu, E. (2009). Zaman İçinde Müzik. İstanbul: Remzi Kitabevi.

Kahraman, V. (2018). Gitar Lisans Hazırlık Sınıfı Müfredatında Kullanılan Etütlerin Amacına ve İçeriğine Göre Sınıflandırılması Üzerine Bir Araştırma. Ankara: Hacettepe Üniversitesi.

Uluocak, S. (2014). Klasik Gitar Tarihi -III / Klasik ve Romantik Dönemde Gitar (1750-1900). İstanbul: Doruk Yayınları.

Wade, G. (2001). A Concise History of the Classic Guitar. Mel Bay Publications.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

ALÇIYLA DÜŞÜNMEK

Doçent Yıldız GÜNER
Mimar Sinan Güzel Sanatlar Üniversitesi, Güzel Sanatlar Fakültesi, Heykel Bölümü
ORCID: 0000-0001-5546-1048

ÖZET
Alçı, heykel sanatının temel malzemelerinden biridir. Kolay ve çok yönlü kullanımı ile çeşitli biçimlendirme olanakları sunmaktadır. Alçıyı etkin kullanan heykeltıraşların başında Rodin sayılmalıdır. Rodin heykellerinde alçı, kimi zaman sergilenmeye hazır ana malzeme; kimi zaman da broz, taş gibi başka malzemeye aktarılmak üzere ara malzeme olarak karşımıza çıkmaktadır. Alçının ekleme, çıkarmaya uygun yapısı, yapıt üzerinde uzun sürelerle çalışabilmesini sağlamaktadır. Hayatı boyunca ürettiği heykellerin temel izleği sayılabilecek "Cehennem Kapısı"nın (*La Porte d'Enfer*) 20 yıllık üretim sürecinde değişen kompozisyonu, Rodin'in birçok heykeline kaynaklık etmiştir. Ayrı çalışılmış figürler devasa kapıya eklenerek cehennem tasvirini oluştururken; bazen aynı isimle, bazen de farklı isimlerle bağımsız heykeller olarak var olmuştur. Alçının kalıpla çoğaltılabilir oluşu Rodin'in çığır açıcı tasarımlarına olanak sağlamıştır. Aynı heykelin kalıpla çoğaltılması sayesinde oluşturduğu figür ve fragman tekrarları hareket izlenimi yaratırken; farklı heykelleri kesip birbirine yapıştırdığı kompozisyonlar ölçekle oynayarak yeni anlamlar yaratmayı mümkün kılmıştır. Alçı sadece kalıp, döküm gibi kopyalama, çoğaltma dışında, doğrudan biçimlendirmeye de uygun bir malzemedir. *Les Bourgeois de Calais kompozisyonundaki figürler çıplak çalışıldıktan sonra üzerlerine alçılı bez giydirilmiştir. Bu sayede figürlerin kütlesi üzerine giydirilen kumaşa doğal ve ağır bir görünüm kazandırılmıştır.* Rodin alçı heykellerini sergilerken üzerindeki kalıp izlerini korumuştur. Bu izlerle birlikte alçının ışığı yansıtmayan, ham görüntüsü bitmemişlik izlenimi yaratmaktadır. Michelangelo'dan miras aldığı bitmemişlik görünümü, izleyici açısından yapıtın üretim sürecini göstermesi ve hayal gücünü tetiklemesi bakımından heyecan vericidir.
Anahtar Kelimeler: Heykel, Alçı, Rodin.

THINKING IN PLASTER

ABSTRACT
Plaster is one of the fundamental materials in sculpture art. Its easy and versatile use offers various shaping possibilities. Among the sculptors who effectively used plaster, Rodin should be noted. In Rodin's sculptures, plaster sometimes appears as the main material ready for exhibition; other times, it is used as an intermediate material to be transferred to other materials such as bronze or stone. The additive and subtractive nature of plaster allows for extended work periods on the piece. The evolving composition of "The Gates of Hell" (*La Porte d'Enfer*), which can be considered the central theme of the sculptures he produced throughout his life, was a source of inspiration for many of Rodin's sculptures during its 20-year production process. The individually worked figures were added to the massive gate to create the depiction of hell; sometimes they existed as independent sculptures, either under the same or different titles. The reproducibility of plaster through molds enabled Rodin's groundbreaking designs. The repetition of figures created by molding the same sculpture or fragments gave the impression of movement, while compositions made by cutting and fixing different sculptures together allowed for playing with scale and creating new meanings.

Plaster is not only suitable for copying and reproduction through molding and casting but also for direct shaping. After working on the figures of the *Les Bourgeois de Calais* composition naked, plastered cloth was dressed onto them. This gave the fabric a natural and heavy appearance over the figures' masses. When exhibiting his plaster sculptures, Rodin preserved the mold marks on them. Along with these marks, the non-reflective, raw appearance of plaster creates an impression of incompletion. The unfinished look inherited from Michelangelo is exciting for viewers as it shows the production process of the work and stimulates the imagination.
Keywords: Sculpture, Plaster, Rodin.

1. GİRİŞ

Çalışmanın amacı, birçok heykeltıraş tarafından bir ara malzeme sayılan alçının sağladığı yaratıcı biçimlendirme olanaklarına dikkat çekmektir. Kille biçimlendirilen heykellerin, taş, bronz gibi kalıcı hale aktarılması, geçici malzeme olarak nitelendirilen alçı sayesinde olmuştur. Ancak Rodin'in kopyaların tekrarlarını kullanarak; çoğaltmaları ve fragmanları keserek ya da ekleyerek kompozisyonlar oluşturması, alçıyı bir tasarım malzemesine dönüştürmüştür. Bu çalışmada Rodin'in alçının sağladığı olanakları örnekleyen yapıtları seçilerek teknik ve estetik olarak irdelenmektedir.

2. BULGULAR VE YORUM

2.1. Duvar Sıvasından Heykellere, Alçının Kısa Tarihçesi

Alçı tarih öncesi zamanlardan beri insanların biçim verdiği bir malzemedir. Elde edilişi temelde basit bir işlemdir: Doğadan elde edilen alçı taşının (*gypsum)* toz haline getirilmesi ve bu tozun suyunu kaybettikten sonra tekrar suyla karıştırılarak sertleşmesi. Böylece doğal ve kolay ulaşılabilir oluşu, alçıyı yaratıcılıkta eşsiz kılmaktadır. Alçı öncelikle yapı malzemesidir, suyla karışan toz sıva olarak kullanılarak düzgün bir yüzey kaplaması oluşturur. Çatalhöyük buluntuları (Hodder, 2005), duvar kaplamasından başka, bazı kabartmalar ve üç boyutlu nesnelerde de alçı kullanıldığını göstermektedir.

Alçıyla kaplanan yüzey kolayca zımparalanarak boya için uygun bir zemin oluşturur. Sanat tarihi boyunca karşılaşılan *stucco, gesso* gibi tanımlar alçı karışımlarını tanımlamaktadır. Heykel sanatında en çok kullanılan karışım Paris alçısı (*plâtre de Paris*), Türkçede yaygın adıyla kartonpiyer alçısı olarak adlandırılmaktadır. 18. yüzyıldan itibaren Avrupa'da hızla artan heykel talebi; Paris alçısının gözde bir malzeme haline gelişine sebep (Simon,2011) olmuştur. Çabuk kuruyup sertleşen, dayanıklı yapısı, ekonomik, hızlı ve kolay işlenir oluşu, kalıp alma ve çoğaltmaya uygunluğu ile alçı, iç mekânlarda tercih edilen heykel malzemesine dönüşmüştür.

2.2. Rodin'in Üretme ve Düşünme Biçimleri

Auguste Rodin (1840-1917) üç kez başvurduğu Akademi'ye kabul edilmemiş, teknik eğitimini farklı zanaatçıların yanında tamamlamıştır. 40 yaşına dek süren çıraklığında (Champigneulle,1967.44) birçok malzemeyi ustalıkla kullanmakta yetkinleşmiştir. Rodin daha ilk atölyesini açar açmaz çok sayıda insan çalıştırmaya başlamıştır: taş yontmak için yetenekli heykeltıraşlar, yaptığı küçük maketleri büyütmek için asistanlar, bronz dökümcüler ve tabii alçı kalıpçılar. Yaşadığı dönem için heykel işbirliği içinde çalışılan bir sanat dalı sayılmaktadır. Elinden çıkan küçük bir maket asistanları tarafından ölçekli büyütülerek ustanın son dokunuşlarına hazırlanmıştır. Sonrasında kalıpçılar, kilin üzerinden hünerli bir işçilikle aldıkları alçı kalıplara yine alçı dökerek, heykelin alçı kopyasını oluşturmuşlardır.

Bu alçı heykeller, ancak sipariş gelirse, taş ustaları tarafından taşa, dökümcüler tarafından bronza aktarılmıştır. Çok bilinen heykellerinden "Öpüşme" üç adet taş kopya olarak çalışılmıştır. Aynı heykelin Rodin imzasını taşıyan bronz kopyalarının sayısının 300 civarında (V&A Müzesi) olması atölyede nasıl hummalı bir çalışma yürütüldüğünü anlatmaktadır.
19. yüzyılda heykel çok talep görmekteydi, Fransız hükümeti orijinal yapıtın çoğaltılmasına sınır getirene kadar Rodin sonsuz sayıda heykel kopyası satmıştır. Rodin'in mirasının sahibi olan Musee Rodin ölümünden sonra da heykelleri çoğaltma hakkına sahipti.[1] Başta yapıtın otantikliğini korumak için ilk 12 ile sınırlandırılan kopya sayısı 1968'de sekize indirilmiştir. Bunun dört tanesi de müze, eğitim kurumu gibi halka açık koleksiyonlara verilme zorunluluğu taşımaktadır. (BENEDEK, 2000,27).
Eskiz çizimleri yapsa da Rodin'in çamurla düşünmüştür. Kilde yarattığı canlılık, sergilenen ilk yapıtı olan, "Tunç Çağı"nda (1877), doğadan kalıp alındığı yönünde saldırılara maruz kalmıştır. (Pinet, 2006) Atölyesinde çalışan canlı modellerden anlık izlenimlerini, maket sayılabilecek ölçekte kil ile çalışarak, heykelinin hareket ve kütle çözümlemelerini yapmıştır.
"Gerçekte Rodin yoğurup biçimlendiren biridir. O kadar" (Delcraux, 2006. 221). Hızlıca yaptığı maketler asistanları tarafından ölçekli büyütüldükten sonra son dokunuşları yapmakla yetinmiştir(Champigneulle,1967.104). Ölçekli büyütme işinde o zamanlar heykele yeni uygulanmaya başlanmış pantograf benzeri bir alet (cantorfoundation.org) kullanılmıştır. Elinden çıkan kil alçı kalıpla genellikle birden çok sayıda dökülerek çoğaltılmıştır. Birden fazla kopya, sayesinde atölye, Rodin'in tekrarlar ve kesip yapıştırmalarla deneyler yaptığı bir laboratuvara dönüşmüştür.

2.3. Alçının Yaratıcı Olanakları

Rodin'in sanatında temel karakteristik özellikler "oranlarda abartı, tek parça üzerinde birden çok odak noktası, kaideden kopma, piramidal kompozisyon kullanmama, biçim tekrarı ve fragmanları kullanım" (BENEDEK, 2000, 26) olarak tanımlanmaktadır. Tüm bunları "Cehennemin Kapısı"ndan fırlayıp canlanan figür varyasyonlarında izlemek mümkündür.
"Cehennemin Kapısı" (*La Porte d'Enfer*) Rodin heykelini anlamak için bir izlek oluşturmaktadır. Kapıda yer alan figürleri çoğaltarak ya da eksilterek yeniden isimlendirmiş, yeni kompozisyonlara dönüştürmüştür. Beş yılda teslim etmeyi vaat edilmesine rağmen sürekli değişen bu ilk resmi siparişin atölyeden çıkması 20 yılı bulmuştur. Yüksekliği altı buçuk metreyi bulan kapının üzerinde, kısa bir zaman diliminde kuruyan kilin alçıya aktarılmasından sonra mümkün olabilmiştir. Kapının bronza dönüşmesi Rodin'in ölümünden sonra gerçekleşebilmiştir.

2.3.1. Çoğaltma

Çamura göre daha dayanıklı oluşu, eklemeye, çıkarmaya uygunluğu alçıyı, özellikle kapının uzun yaratım süreci için, ideal bir malzeme haline getirmektedir. Rodin için alçının en büyük avantajı çoğaltılabilmesidir. Parçalı kalıp yöntemi ile çoğaltılan figürler ve fragmanlar sanatçıya sonsuz varyasyon yaratma imkânı sunmuştur. Aynı parçalı kalıplar yapıtların bronz veya pişmiş toprağa aktarılması için de kullanılabilmektedir.

2.3.2. Tekrar

Rodin heykellerinin alçı kalıplarının alınarak çok sayıda çoğaltılması Rodin'e kopyalarla oynama şansı vermiştir. Kapının üzerinde duran "gölgeler" kompozisyonu, aynı figürün üç tekrarından ibarettir.

[1] Rodin heykellerinin çoğaltılması ile ilgili hukuki açıklama: https://cantorfoundation.org/resources/laws-that-govern-the-casting-of-rodins-work/

Aynı şekilde kapıdaki figürlerden birinin tekrarları ile "üç *faune*" (vahşi kadınlar) heykelini yaratmıştır. "sır" heykelinde tıpatıp aynı iki sağ el, "katedral"de ise parmakları hafifçe farklı hareket iki aynı el böylece oluşmuştur.



Üç *Faune*



'sakatat'çekmecesi

2.3.3. Fragman

Kapıyı çalışırken vaz geçip aldığı, kırılan parçaları ya da ayrı ayrı çalıştığı uzuvları atölyesindeki çekmecelerde saklayan Rodin, bu küçük el, ayak; kol, bacak gibi parçalara '*abattis'* (sakatat) adını vermiştir. Bunlarla lego parçaları gibi oynayan Rodin yeni kompozisyon, hareket araştırmaları yapmıştır.

Bu çekmecelerden birini hediye ettiğinde "detaylara ait küçük çalışmalarınız heykel öğrencilerine, izlenimciliğin büyük ustasının doğayı nasıl yakından ve yoğun etüt ettiğini öğretecektir" (Vincent, 1981) şeklinde bir teşekkür cevabı almıştır.

2.3.4. Eksiltme

Rodin antik Yunan ve Roma heykellerini incelemiş ve atölyesinde bir koleksiyon oluşturmuştur. Heykellerin kırık olmalarında güzellik bulan Rodin (Tate) kendi heykellerini de eksilterek deneyler yapmıştır. Zamanın etkisiyle ya da taşınmadan dolayı kırılmış figürler; ideal güzelliklerinden uzak, bütünden ve çevresinden kopmuş halleri ile geçen zamanı anımsatan, gizemli birer forma dönüşmüştür. Rodin de bir beden parçasını bütünden ayrı sergileyerek zamanın eskitmesinden başka figürün başka bir şey temsil etmeden sadece form olarak güzelliğine dikkat çekmiştir.

2.3.5. Asamblaj

Üç boyutlu kolaj gibi tanımlayabileceğimiz asamblaj tekniği, var olan heykel (ya da nesnenin) yeni bir heykele dönüşmesini tanımlar. Rodin'in kendinden sonrakilere belki en büyük mirası sayılabilecek asamblaj örnekleri alçının sağladığı kolaylıkla gelişebilmiş bir yaratıcılık ürünleridir. Heykellerin çoğaltılması veya eksiltilmesi ile sonsuz olasılıklar oluşmuştur. Her bir figür tek başına bir heykel, başka figürlerle yan yana bir kompozisyonun parçası ya da bölünerek fragmanlar halinde var olabilmiştir. Dizilimi, yönü değiştiği her seferde figür yeni bir anlam kazanmıştır.

Rodin'in asamblajları arasında, doğrudan ya da kopyalarıyla kullanılan bazı eski eserler de bulunmaktadır. Rilke tarafından 'çiçek ruhları' (Tate) olarak tarif edilen, eski çanakların içine yerleştirilmiş alçı figürler *readymade* öncüsü olarak görülebilir. Rodin'in aklındaki heykeli yapmak için antik bir çömleğe zarar vermeyi göze aldığını da belirtmek gerekir.



Karnının üstünde iskelet eliyle kadın torsu



'Çiçek Ruhları'ndan



El ve kadın figürü

2.3.6. Ölçek

Ölçü ve ölçek heykel sanatının temel problemlerindendir. Ölçü fiziksel olarak heykeli nitelerken, ölçek bir anlamda çevre ile ilişkiyi tanımlamaktadır. Genellikle küçük ölçüde yapılan ilk araştırmalar hemen alçıya dönüştürüldükten sonra çeşitli ölçeklerde büyütülmüş ve çoğaltılmıştır. Aynı figürü farklı ölçeklerde görmek, bitmiş kompozisyonun ölçüsüne karar vermekte yararlıdır.

Rodin, alçı ile yaptığı asamblajlarda farklı ölçeklerde figürleri özgürce bir araya getirebilmiştir. Kocaman ellerle yan yana getirdiği küçücük bedenler heykellerin ilk yapıldıklarından başka anlamlar edinmelerine neden olmuştur.

2.3.7. Doğadan kalıp

"Tunç çağı" heykeli doğadan kalıp alınmış olmakla eleştirildiğinde Rodin bunu yeteneğine karşı hakaret kabul etmiştir. Modelden çalıştığı bazı büstler modelden kalıp alınmışçasına gerçekçi duruyorsa bunun nedeni sanatçının canlıymış gibi göstermesindeki becerisidir. Rodin zamanında canlı model üzerinden kalıp alınabiliyordu. Ancak insandan alınan kalıp asla heykelin canlılığını taşımamaktadır. Rodin alçının bu var olan biçim üzerinden kalıp alabilme özelliğini sütun, kap kacak gibi formların çoğaltılması ve bunların genellikle kaide olarak kullanılmasında yararlanmıştır.

2.3.8. Kumaş

Alçının karakteristik bir özelliği de kumaş, kâğıt gibi lifli malzemelerle uyumudur. Yaş alçıya batırılan malzeme, alçı donduğunda sertleşip şeklini koruyabilmektedir. Rodin alçının bu özelliğinden, figürlerine kumaş giydirirken yararlanmıştır. "Calais burjuvaları" (*Les Bourgeois de Calais*) kompozisyonundaki figürler nü olarak çalışıldıktan sonra üzerleri alçıya batırılmış kumaşla kaplanmıştır. Bu şekilde figürlerin örtündükleri kumaşlar, doğal dökümleri ile kompozisyonun duygusuna ağırlık katmıştır.

Rodin atölyesinde çalışan çok sayıda çıplak model sayesinde doğa etütleri yapabilmiştir. Balzac heykelinin siparişi aldığında elindeki fotoğraflara ek olarak benzer kişilerle çalışarak Balzac etütlerine girişmiştir. Ancak Balzac'ın imgesini kafasında canlandırmak için dâhiyane bir yönteme başvurmuştur. Yazarın terzisine yaptırdığı giysiyi alçıyla kaplayarak (Hale, 1969,121), Balzac'ın görüntüsüne ulaşmaya çalışmıştır. Sergilendiğinde eleştiri ve hatta alaylara göğüs geren "Balzac anıtı" bildiğimiz biçimini alması çokça ön çalışma gerektirmiştir.

Rodin'in alçı ve kumaşı birlikte kullandığı bir çalışması müzeye dönüşen atölyesinin tozlu bir köşesinden çıkarılarak, 2017 gibi yakın bir tarihte, ilk kez ölümünün 100. yılında sergilenmek üzere *The European Fine Arts Foundation* (TEFAF, 2022) tarafından restore edilmiştir. Cehennem kapısından Ugolino'nun gövdesi ve başka iki figürün başlarının, alçıya batırılmış büyük bir çuval kumaşı ile kaplandığı dev kompozisyon "Bağışlanma" adını taşımaktadır. Dökümlü kumaşı ve yükselen kompozisyonuyla klasik heykelleri andıran ama tamamen modern yaklaşımla üretilmiş bu heykel, Rodin'in farklı biçim ve malzemelerle yaptığı deneylerin, yaratıcı fikirlerinin eşsiz örneği sayılmaktadır.


Bağışlanma

2.3.9. Bitmemişlik

Işığı yansıtmayan, hatta kalıp izleri korunmuş alçı heykeller bitmemişlik duygusu taşımaktadır. Bitmemişlik bize Michelangelo'nun "köleler" figürlerini anımsatır. Blok taşın içinde devinen figürler, yapıtın üretim sürecine tanıklık etmekten başka izleyicinin hayal dünyasına seslenmektedir. Bitmemişlik, Rodin'in telaşlı çalışmasından, mükemmellik arayışından kaynaklanmaktadır: "çok şey istediği ve hiçbir zaman hoşnut kalmadığı için yapıtını kesinlikle tamamlanamaz" (Delclaux, 2006. 233) saymaktadır. Kapı sergilendikten sonra bile üzerine eklenen "gölgeler" ile yaşam döngüsünü sürdürmüştür. Sipariş üzerine bronza dökülen ya da taşa aktarılan heykelleri ancak geçici olarak son bulmuştur.

2.3.10. Yüzey ve renk

Alçı heykelleri çok parçalı kalıplarla üretildiği için yüzeylerinde kalıplarının birleşim yerleri görünmektedir. Bunları tamamen temizlemek mümkün olduğu halde Rodin korumayı tercih etmiştir. Bu izler heykellerin oluşum sürecini de göstermektedir, bu halleri ile daha canlı ve gerçekçi durmaktadır. Alçı kimi örneklerde kirletilmiş, ya da kille yıkanarak renklendirilmiş gibi görünse de alçı beyazı çoğunlukla korunmuştur. İşçiliğin büyük kısmının başkaları tarafından yapılmış olmasına rağmen Rodin son dokunuşların elinden çıkması konusunda ısrarcıdır. Alçıları bronza aktarıldığında da nihai görünümün istediği gibi olması için bronzun (siyah üzerine yeşil olacak şekilde) patinesiyle bizzat ilgilenmiştir. Ölümünden sonra dökülmüş bronzlar sanatçı müdahalesine saygı göstermek üzere kahverengi bırakılmıştır.

3. SONUÇ

Teknoloji ile birlikte hayatımıza giren ve heykel malzemesine dönüşen sentetik malzemelerin insan sağlığına ve çevreye etkisi kuşkuludur. 19. Yüzyıldan beri heykel atölyelerine girmiş olan alçı, doğal, zararsız bir malzemedir.

Rodin'in alçının olanaklarını kullanarak yaptığı denemeler yenilikçidir ve kendinden sonraki heykel sanatı için de ufuk açıcıdır. Figürü alegorik anlatımdan sıyırıp soyut bir forma dönüştürmek, tekrarlarla hareketi kurgulamak gibi plastik önermelerden başka çoğaltmanın estetik değeri, sanat eserinin biricik oluşu gibi tartışmalara kaynaklık etmiştir.

Alçının heykelde kullanım olanakları elbet Rodin'in yöntemleri ile sınırlı değildir. Islakken biçim vermeye ya da blok döküp yontmaya müsait olan malzeme sınırsız biçimlendirme olanakları ile heykel eğitiminin vaz geçilmezidir.

4. KAYNAKLAR

BENEDEK, Nelly Silagy (2000). Auguste Rodin The Burghers of Calais A Resource_for Educators. The Metropolitan Museum of Art Press. ISBN 0-87099-948-6

Britannica, T. Editors of Encyclopaedia (2024, February 16). plaster. Encyclopedia Britannica. https://www.britannica.com/technology/plaster

Cantor Foundation. https://cantorfoundation.org/resources/reductions-and-enlargements/

CHAMPIGNEULLE, Bernard (1967). Rodin. Thames and Hudson. ISBN 0-500-20061-0

DELCLAUX, Marie-Pierre (2006) Rodin'in Atölyesi, Heykelin büyük ustası Rodin İstanbul'da. Sakıp Sabancı Müzesi sergi kataloğu. S.221-233. ISBN: 975-8362-61-5

HALE, William Harlan (1969). The World of Rodin. Time-Life Books.

HODDER, Ian (2005), Çatalhöyük'de yeni buluntular ve yeni yorumlamalar, https://www.catalhoyuk.com/archive_reports/2005/ar05_02.html

PINET, Helene (2006) Tunç Çağı, Heykelin büyük ustası Rodin İstanbul'da. Sakıp Sabancı Müzesi sergi kataloğu. S.29-37. ISBN: 975-8362-61-5

SIMON, Jakob (2011) Plaster figure makers: a short history, https://www.npg.org.uk/collections/research/programmes/plaster-figure-makers-history

TATE. The making of Rodin. https://www.tate.org.uk/whats-on/tate-modern/ey-exhibition-rodin/exhibition-guide

TEFAF editörleri (2022, Haziran, 24). https://www.tefaf.com/stories/this-monumental-plaster-and-fabric-sculpture-by-rodin-is-shown-to-the-public-for-the-first-time-following-restoration

Victoria and Albert Museum https://www.vam.ac.uk/articles/rodin-production-techniques

VINCENT, Clare (1981, Bahar). Rodin at The Metropolitan Museum of Art, The Metropolitan Museum of Art Bulletin. The Metropolitan Museum of Art Press v:38 no:4. ISSN 0026-1521

Fotoğraflar: https://www.musee-rodin.fr/ ve https://www.tefaf.com/

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

KROTONLU MILO 17. YÜZYIL FRANSIZ HEYKELİNDEN BİR KESİT

Doçent Yıldız GÜNER
Mimar Sinan Güzel Sanatlar Üniversitesi, Güzel Sanatlar Fakültesi, Heykel Bölümü, İstanbul, Türkiye.
ORCID: 0000-0001-5546-1048

ÖZET
Puget tarafından çalışılmış "Krotonlu Milo" heykeli MÖ 6.yüzyılda yaşamış büyük güreşçiyi konu edinmektedir. Hikâyeye göre yaşlanmış güreşçi, ormanda tek başınayken gücünü denemek istemiş ve doğaya meydan okuyarak gücünün sınırlarını zorlaması ölümüne neden olmuştur. 17. Yüzyılda yaşamış Puget Fransız barok heykelin önde gelen isimlerindendir. Zorlu kişiliğini yansıttığı sanatı, onu çağcılı meslektaşlarından farklı bir yere konumlandırır. Büyük bükülmeler ve abartılı hareketler kullansa da klasik estetiğe sadık, dingin bir üslup yaratmıştır. Akademik anlayışa uygun olarak seçtiği mitolojik konuları, alışılmadık şekilde, yergiye varan eleştirilerini dillendiren alegorilere dönüştürmüştür. Kralın siparişi üzerine *Chateau Versailles* bahçesine yerleştirilmek üzere yapılmış olan "Krotonlu Milo" heykeli aslında gücün ve iktidarın geçiciliğine dikkat çekmektedir. Puget'nin Milo heykelini tamamlaması 11 yılını almıştır. Sanatçının dikkate değer bir diğer yapıtı da İskender ve Sinoplu Diyojen'in karşılaşmasını anlatan dev boyulu mermer rölyeftir. Bu heykel de yine gösterişten uzak yaşamak ve erdemli olmak konularında saraya hatırlatma yapar niteliktedir. Versailles bahçesinde yükselen heykellerden bir diğeri de, taş ustalığının kusursuz örneği sayılabilecek "Andromeda'nın Perseus tarafından kaçırılması" heykelidir. Puget resim sanatıyla uğraşmış da olsa özellikle mermer yontularıyla tanınmaktadır. Heykellerinin malzemesi Barok dönem Fransa ve İtalya'da pürüzsüz beyazlığı ile çok sevilen, Carrara mermeridir. Bu çalışmada, Pierre Puget'nin (1620-1694) sanatı bağlamında barok heykel, biçimsel özellikleri, konuları, kaynakları ve etkileri ile ele alınmaktadır.
Anahtar Kelimeler: Heykel, Puget, Barok.

MILO OF CROTON A SNAPSHOT OF 17TH CENTURY FRENCH SCULPTURE

ABSTRACT
The statue "Milo of Croton" by Puget depicts the great wrestler who lived in the 6th century BC. According to the story, the aged wrestler wanted to test his strength while alone in the forest, and challenging nature to its limits led to his death. Puget, who lived in the 17th century, is one of the leading names in French Baroque sculpture. His art, which reflects his challenging personality, sets him apart from his contemporary colleagues. Although he used grand twists and exaggerated movements, he created a style faithful to classical aesthetics. The mythological subjects he chose in accordance with academic understanding were transformed into allegories that voiced his critical opinions, sometimes amounting to satire. The statue "Milo of Croton," made to be placed in the gardens of the Château de Versailles upon the king's order, actually draws attention to the transience of power and authority. It took Puget 11 years to complete the Milo statue. Another notable work by the artist is the large marble relief depicting the encounter between Alexander and Diogenes of Sinope. This statue also serves as a reminder to the court about living modestly and virtuously. Another statue rising in the gardens of Versailles is the "Abduction of Andromeda by Perseus," which can be considered a flawless example of stone craftsmanship. Although Puget was also involved in painting, he is especially known for his marble sculptures.

The material of his sculptures is Carrara marble, beloved for its smooth whiteness in Baroque-era France and Italy. This study examines Baroque sculpture in the context of Pierre Puget's (1620-1694) art, considering its formal characteristics, subjects, sources, and influences.
Keywords: Sculpture, Puget, Baroque.

GİRİŞ

Bu çalışma, Puget ve onun Kroton'lu Milo yapıtı aracılığıyla, figüratif heykelde ifade araçları, biçim-içerik ilişkisi ve kompozisyon öğelerini tartışmayı amaçlamaktadır. Çalışmada, 17. yüzyıl Fransa'sında heykel sanatının işlevi ve dönemin estetik beğenisini oluşturan etmenler araştırılmış; bu ortam içinde üretilen Krotonlu Milo'yu özel yapan nitelikleri saptanmaya çalışılmıştır. Heykelin estetik yapısını çözümlemek için Puget'nin çağdaşlarına değilmiş ve diğer yapıtlarından seçilen örneklerle bir izlek oluşturulmuştur.

BULGULAR VE YORUM

17. Yüzyıl Fransız Heykelinden Bir Kesit

17. yüzyıl heykel sanatı için önemli bir zaman dilimidir. Özellikle virtüözite gösterisi halinde işlenen malzeme, bugün bile izleyiciyi hayranlık içinde bırakan figürlere dönüşmüştür. Dönemin güçlenen ve merkezileşen devletleri, akademi seçkinleri aracılığı ile idealizmin üst seviyesine ulaşan saray sanatını yaratmıştır. Güçlenen orta sınıf sipariş olmaksızın yapılmış tür (janr) resmi sayesinde günlük hayata ait imgelerle evlerinin duvarlarını süslemeye başlamıştır. İtalyan heykeli maniyerizmin mirasıyla beslenerek insan duygularının en uç noktada ifadesine yoğunlaşırken; Fransız heykeli ise klasik Yunan ve Helenistik heykeli, Poussin'in yol göstericiliği ile resimsel bir etki ile birleştirmiştir. Tüm bu çeşitlilik içinde barok sanat; statik kompozisyondan kopuş, espas, ışık, durağanlığa karşı geçicilik ve hareketin öne çıktığı biçimsel özellikleri ile kapsayıcı bir çatı oluşturmuştur.

Versailles

16. Yüzyılda Avrupa'nın en güçlü ülkesi haline gelen Fransa'nın sanatta merkez haline gelmesi için 1661 yılında Versailles Sarayının inşasını beklemek gerekmiştir. 16. Yüzyılın Fransız sanatçıları yapıtlarını üretmek için Roma'yı adres tutmuşlardır. XIV. Louis (1638-1715) dönemin tüm yetenekli sanatçılarını saraya yönlendirerek (Bazin, 1974, 113) "saray sanatı" oluşturmuştur. Babasının küçük av köşkünü ömrü yettiği sürece genişleterek devasa bahçesini heykellerle donatmıştır. Devrimi takip eden yıllarda halka hediye edilen bahçe; göletleri, ağaçları ile doğa ve yapay kurgu arasında, göz alabildiğine genişliği içinde Fransız heykelinin önde gelen örneklerine ev sahipliği yapmaktadır.

Saray Heykeltıraşının gözünden 'Güneş Kral'

Ailesinin yıllarca beklediği çocuğu, ölümcül hastalıklardan tanrının lütfu olarak kurtulmuş 14. Louis 'güneş kral' unvanı taşımaktaydı. Sarayın sevilen heykeltıraşlarından François Girardon (1628-1715) güneş kralına bağlılığını, onu güneş tanrısı Apollon olarak tasvir edecek kadar ileri taşımıştır.

Versailles sarayının sonu gelmez düzenlemeleri içinde 18.yy'da, Apollo Korusundaki suni kayalıkların içine yerleştirilen heykel, figürlerin yerleri de değiştirilerek resimsel bir kurguya yaklaştırılmıştır. Barok anlayışa uygun olarak (Web Gallery of Art) başka heykel gruplarının anlatıyı sürdürdüğü bir mimari kurgunun içinde yer almaktaydı. Diğer nişlerde Guerin ve Marsy kardeşler tarafından yontulan Apollo atları kompozisyonları bulunmaktaydı.

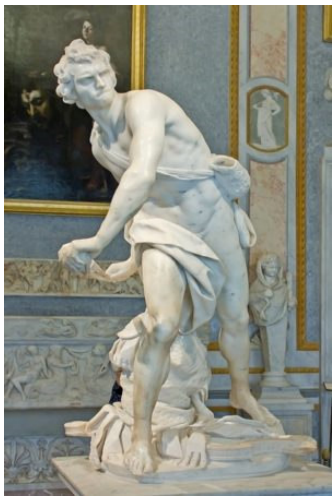
Girardon'un kompozisyonu 17.Yüzyıl Fransız heykelinin klasik eğiliminin en saf örneğidir.

Helenistik heykeldekine benzer, dolu formlarla idealize edilmiş nüler, giysi olarak seçilen kumaşlardaki drapeler, beden hareketleri ve yüz ifadeleri ile antik dönemden kalmış gibidir. Sanatçının u heykeli tasarlarken Antik heykelleri incelemek üzere Roma'ya gittiği bilinmektedir. Ancak bu kalabalık *nymphe* grubunun kompozisyonuna fikir veren antik heykeller değil Poussin'in (1594-1665) resimleridir. (Web Gallery of Art)

Barok heykelin iki görüntüsü: Klasik Fransa ve coşkulu İtalya

Sarayın baş heykeltıraşı Girardon'un Antik heykelleri incelemesi dönemin anlayışı gereğidir. Hatta Roma'daki Fransız Akademisi müdürü, Fransız mimarların eğitimi için Atina'da bir okul kurulmasını (Bazin, 1974, 128) önermiştir. Ancak Fransız sanatında rönesanstan süregelen klasizm geleneğine karşı, heykeltıraşlar Bernini'nin temsil ettiği coşkulu İtalyan baroğu etkilerine kendilerini kapamamışlardır. Birçok sanatçı İtalya'ya giderek oradaki sanatçıları takip etmektedir. Girardon'un rakibi, kralın gözdesi Antoine Coysevox (1640-1720) istisna olarak İtalya'ya hiç gitmemiş de olsa (Bazin, 1974, 128) özellikle büst çalışmalarında figürleri hep hareket halinde gösterirken; kısa süre de olsa 14.Louis hizmetinde çalışmış olan Bernini'nin etkilerini yansıtmaktadır.

Bernini (1598-1680)

Michelangelo ve Bernini, "Davut", https://borghese.gallery/

Dinginlik	Duygusal yoğunluk
Sonsuza kadar durabilir	Geçici bir an
Durağan (statik)	Dinamizm (kinetik)
Yatay ve dikey çizgiler	Diyagonaller ve yaylar
Asalet, idealize	Natüralist
Ayrılmış, uzak, yüksek (kaide)	Kapsama, yakın
Eşit dengeli ışık dağılımı	Açık koyu bölgeler[1]
Cephesellik	Kompozisyonda derinlik ve çoklu odak
Doluluk	Boşluk

[1] Buraya kadar karşılaştırma için https://tr.khanacademy.org/humanities/renaissance-refor ma tion/baroque-art 1/ beginners-guide-baroque1/v/how-to-recognize-baroque-art

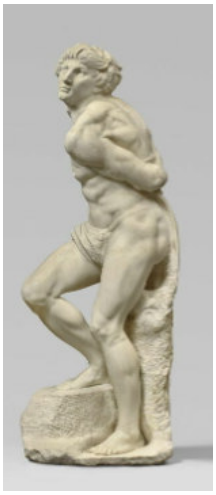
İtalyan barok heykeli, Bernini'nin yapıtlarında tanımını bulmaktadır. Michelangelo'nun (1475-1564) ve Bernini'nin Davut heykellerinin karşılaştırması barok heykelin belirleyici özelliklerini anlamaya yardımcı olacaktır.

17.yüzyılda İtalya'da hakim sanat (Bazin, 1974, 24) operadır. Tüm diğer sanatlar operadan teatralliği ödünç almıştır. Heykelde, özellikle bazı duygular, en uç noktada abartı ile temsil edilmiştir. 1506 yılında gün yüzüne çıkan "Lakoon ve oğulları" heykeli, hemen tamamı heykel restorasyonu işinde çalışmış, 17. yüzyıl heykeltıraşları için bir referans noktası oluşturmuştur. Artık Lakoon'un acısı İncil tasvirlerine uyarlanmaya başlamıştır.

Farklı sanat dalları barokta hep iç içe geçmiştir (Dell'Arco, 1996, 205): mimari, heykel dekoruna; mobilya, binaya; çeşme, sembol mimariye; resim, mimari illüzyon ve halıya dönüşerek çeşitlenmiştir. Bu durum 17. yüzyıl sanatçısını, Rönesans'tan süregelen çok yönlü üretim içinde yetiştirmiştir.

Barok ve Klasizm Sentezi: Puget (1620-1694)

14. Louis Versailles sarayını inşa ederken şehirde görkemli binalar ve mezarlar yaptırılmaktaydı. Çok sayıda yetenekli sanatçıya ihtiyaç duyulmaktaydı. Bu sanatçılardan biri de, bağımsız kişiliği yüzünden saray çevresinde muteber sayılmayan Puget olmuştur. Bernini'den etkilenmiş olan Puget, Fransız sanatındaki klasizm eğilimi ile İtalyan baroğun plastik öğelerini sentezlemeyi başarmıştır. İlk önemli yapıtlarından olan Toulon Belediye Sarayı girişindeki taşıyıcı (karyatit) Atlas figürleri (1657) ile barok sanat kadar Michelangelo'nun köleleri (1515) arasında yakınlık kurmak mümkündür.



Michelangelo, Başkaldıran Köle
www.collections.louvre.fr



Puget,
Atlas
www.wga.hu



Puget,
St.Sebastian

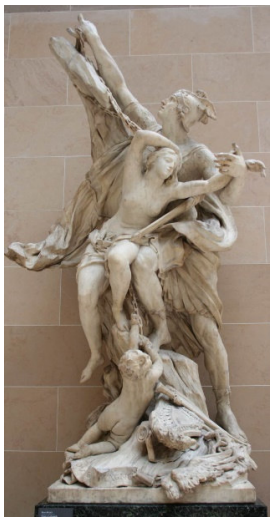


Bernini,
Daniel ve aslan

Puget'nin Bernini'ye en çok yaklaştığı heykeli Genova'dayken yaptığı St.Sebastian (1663-68) figürüdür. Acı içinde kıvranan beden yaylar ve diyagonallerin oluşturduğu kompozisyonuyla Bernini'ye ait "Daniel ve Arslan" (1655-61) andırmakla birlikte, Bernini de tam temsilini bulan izleyiciye doğru çıkıntılarla uzak yakın ilişkisi kuran barok etkisinden uzaktır. Bernini'nin figüründe gövde bükülürken; kol, bacak gibi uzuvlar, kesik çizgiler le kompozisyona katılır. Ancak Puget'in figürü bir kesintisiz kontürle algılanabilmektedir. Bernini-Michelangelo karşılaştırmasına baktığımızda Puget'nin belki ikisinin arasında bir yerde durduğunu söyleyebiliriz.

Puget St. Sebastian ile birlikte sergilenmek üzere Kutsal Alessandro Sauli figürünü yapmıştır. Bu heykel yine Bernini heykeline benzetilse de (Öndin, 2018, 367) kendine özgü sentezinin izlerini taşımaktadır. Öncelikle klasik bir piramidal yapı içine yerleştirilmiştir figür, uzuvlar Bernini'de olduğu gibi bedenden ayrılıp izleyiciye doğru taşmamaktadır. Kolların duruşu ve bedenin spiral dönüşü klasik erken Helenistik heykelleri anımsatmaktadır. İtalyan baroğa en çok yaklaştığı nokta, gökyüzüne çevirdiği yüzündeki mimikler, derin koyuluklar oluşturan çukur alanlar ve özellikle detayların işlenişindeki maharettir. Baston, bacak ve kumaş diyagonallerinin paralel tutularak beden yayının vurgulanması ve bu şekilde bedensel acının tasvir edilmesi, Puget'nin diğer yapıtlarında da karşımıza çıkan bir üslup özelliğine dönüşmüştür. Atılmış bir mermer bloktan yonttuğu Perseus ve Andromeda, diyagonal çizgiler ve yayların kurgusu ile Puget'ye özgü plastik dilin güçlü bir örneğidir.
Puget'nin, barok ve klasiği harmanlarken gösterişten uzak durduğunu söylemek mümkündür. Sarayın heykeltıraşı Girardon atölyesinin kapısından göz ucuyla bakıp gördüğü heykelin "doğal güzellik ve hoş drape" (Dell'Arco, 1996, 181) içermese de mermer ustalığıyla bir etki yarattığını belirtmiştir.


Kutsal Alessandro Sauli
www.wga.hu


Perseus ve Andromeda


Meryemin göğe yükselişi

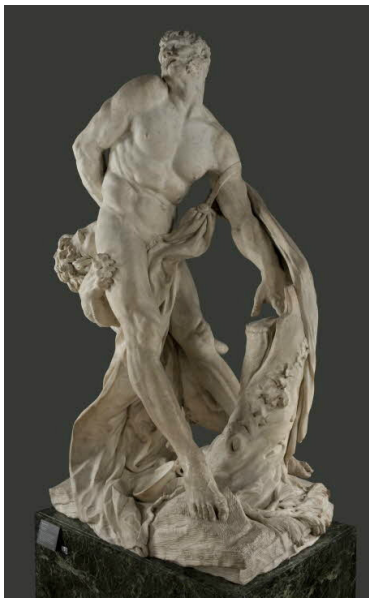
Poussin (1594-1665)
Nicolas Poussin 17. yüzyıl Fransız sanatında belirleyici bir figür olmuştur. Resimlerinde göze hoş görünmeye çalışmaktan uzak (Thompson, 1992), izleyiciyi düşünerek anlamaya teşvik eden bir tutum sergilemiştir. Işığın karanlığın içinde kümelenerek dramatik etkiler yarattığı resimlerinde konular çoğunlukla Yunan mitolojisinden seçilmiştir. Renkten çok ışık ve hacim öne çıkan resimleri ve desenleri, antik Yunan heykeline yakınlaşmaktadır. Figürlerin genelde doğal mekân içinde dağılımı ve derinlik duygusu, heykel sanatında da kompozisyonun nasıl olması gerektiği konusunda kanon oluşturmuştur. Puget'nin Meryem'in göğe yükselişi (1665) rölyefinde Poussin resmindeki ilkelerin, barok heykeldeki karşılığını sergilemektedir.
Heykellerindeki diyagonalleri ve paralel çizgileri taşıyan rölyef bütünde bir alçak rölyefken, kompozisyonun izleyiciye yaklaşan noktalarında üç boyutlu anlatıma sahiptir. Üçgen bir kompozisyonla tabutun üzerine yerleşen figürler, Meryem'in yüzünü göğe çevirmesi ve figürlerin ve drapenin çizdiği yaylar ile izleyici üzerinde yükselme etkisi yaratmaktadır. Kalabalık kompozisyon olmasına rağmen figür grubunun etrafındaki boşluk hissedilmektedir. Arkaya gittikçe silinen elemanlar ve derinlik duygusu ile Poussin resmine yaklaşmaktadır.

Puget'nin hayatındaki en önemli yapıtlarından biri olan Krotonlu Milo 1670 yılında sanatçıya Versailles bahçesine konmak üzere sipariş edilmiştir.

Krotonlu Milo

"Yeniden başlar güçsüzlük yolunda yürümeler, yaşlılık.
İşte budur sarsan, yıpratan, ilk gençlik yıllarının
Gücünü, budur Milon'u kocaltan, ağlatan, güçten düşüren,
Hercules gibiydi güçlü kolları, gergin kasları vardı.

Şimdi gevşemiş, pörsümüş sarkar iki yandan" (Ovidius'tan aktaran Öndin, 2018)
Pisagor'un çağdaşı olan Krotonlu Milo'nun öyküsü Ovid'in Dönüşümler kitabında yer almaktadır, kolları Herkül kadar güçlü, olimpiyatlar şampiyonu, ünlü bir güreşçidir. Milo'nun ölümü gücünü sınamak isterken olur, kibrine yenik düşmüştür. Yaşlılığında, ormanda bir başına dolaşırken, üstü kırılmış bir meşe ağacı gövdesini elleri ile ayırmak istemiş, ancak kütüğü kıramadığı gibi parmaklarını da çatlağa sıkıştırmış ve tam da o sırada vahşi hayvanların saldırısına uğramıştır. Vahşi hayvanlar bazı metinlerde kurt olarak tasvir edilse de Puget gibi birçok sanatçı kurdu daha asil bulduğu için aslanla değiştirmiştir.



Krotonlu Milo


İskender'in Diyojen'le karşılaşması
www.louvre.com

Puget, Perseus ve Andromeda'da olduğu gibi bulduğu bir Carrara mermerine çalıştığı 2.7 m yüksekliğindeki kompozisyonda; abartılı *contrapposto*, bükülme, acıyla kendinden geçme, Praksiteles'in mirası yumuşak et dokusu, derin alanlarla yaratılan ışık gölge gibi, barok heykelin tüm plastik özelliklerini kullanmıştır. Kompozisyon büyük boşluğun etrafına yerleştirilerek adeta merkezkaç kuvvetiyle dönen elemanların hareketi kurgulanmıştır. Diğer heykellerinde gördüğümüz, birbirini kesen iki diyagonal çizgi kasılmış bacak ve gövdenin aksları ile oluşturulmuş, drape, aslan, kütük gibi elemanlar hem bu hareketi desteklemek hem de malzemeyi sağlamlaştırmak üzere yerleştirilmiştir. Boşluğun etrafında dönen yayları oluşturan drape kesik çizgilerin tekrarı ile ritmik bir yapı oluşturarak hareketi desteklemektedir.

Portredeki acı ifadesi tüm abartısına rağmen büyük deformasyona sebep olmamış ve asalet duygusunu korumuştur. Milo'nun bedenini acı ile bükülürken gösteren heykel, barok zevkin tutku ve dramasını taşımaktadır.

Puget'nin heykeli tamamıyla *frontal* (cephesel) sayılamaz. Kompozisyonda kullanılan yaylar helezon çizerek boşlukta dağılmakta ve saklı detayları ile izleyiciyi etrafında görmeye teşvik etmektedir. Yine de, sanki Poussin'in resmi karşısında durup olup biteni anlamaya çalışır gibi bütün hikâyenin kesintisiz izlenebildiği bir bakış açısı vardır. Sanki tiyatroda olayı canlandıran oyuncun bir anı dondurulmuş ve ölümsüzleştirilmiştir.

Puget - Versailles

Krotonlu Milo Puget'nin Saray'dan aldığı ilk siparişitir. Sert mizacı ile akademik çevrelerden dışlansa da kralın onaylaması sayesinde Milo ve Perseus kompozisyonları bir yıl arayla Versailles bahçesine yerleştirilir. Saraydan aldığı üçüncü sipariş ise, kendisini dışlayan sanat çevresi tarafından engellenmiş (Britannica, 2024) ve yerine ulaşamamıştır. İskender ve Sinoplu Diyojen'in karşılaşmasını anlatan 3.3 x 3 m gibi dev ölçüde, Carrara mermerinden yontulmuş bu rölyef Louvre müzesi koleksiyonunda yer almaktadır. Rölyef dilimize de yerleşmiş "gölge etme, başka ihsan istemem" deyimini görselleştirmektedir. İskender'in zaferini kutlamaya gelen tüm ileri gelenler ve filozoflar arasında sadece Diyojen yoktur. Meraka kapılan İskender bu filozofun kim olduğunu görmek ister ve filozofun dünyevi hiçbir şeye değer vermeyen halinden etkilenir. Puget bu karşılaşmayı İskenderi ve zaferini, tüm dünyevi değerleri karmaşık bir kalabalıkla betimlemiştir. Dikey çizgilerin baskın olduğu kompozisyonda yere yakın yatay çizgilerle yerleşen Diyojen öne uzanan kolu, çerçevenin dışına çıkan ayağı ve örtüsü ile bulunduğu dünyanın dışına taşmaktadır. "Meryem'in göğe yükselişi" rölyefinde olduğu gibi alçak rölyef ve üç boyut arasında katmanlarla düzenlenen rölyefte, yine arkaya doğru yumuşayan ışık gölge ile resimsel bir espas yaratılmıştır.

SONUÇ: 11 YIL VE BİR SÖZ

17.yüzyıl İtalyan sanatı kitleleri dine teşvik etmek amacını taşırken; Fransa'da Yunan mitolojisi, sarayın gücünü, ışıltısını yansıtan bir alegorik anlatım olarak kullanılmıştır. İtalyan ve Fransız barok heykelin ortak özelliklerinin başında hikâye anlatımcılığı gelmektedir. Hikâye teatral biçimde aktarılmıştır: figür gruplarının kurgusu, sahneyi andıran çevre düzenlemesi, geçici hareketin dondurulmuş anlık görüntüsü ve abartılı ifadeler baroğun belirgin özellikleridir.

Puget, gerek İtalyan baroğa yaklaşan biçim dili, gerek eleştiriye varabilecek meselleri ile, 'güneş Kral'ı perilerin arasında bir tanrı olarak betimleyen çağdaşlarından ayrılmaktadır. Tüm kaynaklarda zorlu olduğu belirtilen bağımsız kişiliği; belki -elindeki yegâne tası da bir çocuğu eliyle su içerken gördükten sonra gereksiz bulup atan- Diyojen ile özdeştir. Yapımı 11 yıl süren Krotonlu Miro'nun anlam örüntüsü, kibir ve büyüklenmeye bir yergi olarak okunabilmektedir. Kralın onayından geçerek Versailles bahçesine kabul edilmesi, ya sanata karşı hoşgörü ya bir ironi olarak değerlendirmeye açıktır.

KAYNAKÇA

BAZIN, Germain (1974), *Baroque and Rococo*. Çev: Jonathan Griffin. Thames and Hudson. ISBN: 0 500 20018

Britannica, T. Editors of Encyclopaedia (2024, April 3). Pierre Puget. Encyclopedia Britannica. https://www.britannica.com/biography/Pierre-Puget

Chateau Versailles, https://en.chateauversailles.fr/discover/history/great-characters/pierre-puget

DELL'ARCO, Maurizio Fagiolo (1996). Piere Puget – Milo of Crotona (163-184). *Sculpture, the great sculpture from fifteenth century to the eighteenth century*. Taschen. ISBN: 3-8228-8556-8

ÖNDİN, Nilüfer (2018). *Barok Resim ve Heykel Sanatı*. Hayalperest Yayınevi. ISBN: 978-605-9452-18-2

THOMPSON, James (1992). *Nicholas Poussin*. Metropolitan Museum of Art Bulletin v:50, no: 3. https://www.metmuseum.org/met-publications/nicolas-poussin-the-metropolitan-museum-of-art-bulletin-v-50-no-3-winter-1992-93

Web Gallery of Art, https://www.wga.hu/html_m/g/girardon/apollon.html

DİJİTAL GİYSİ TASARIMI VE DRAPAJ

Dr. Öğretim Görevlisi Şenel GENÇ
Marmara Üniversitesi, Güzel Sanatlar Fakültesi, Tekstil Bölümü
ORCID: 0000-0001-7203-5470

ÖZET
Drapaj tekniği, moda tasarımının temel taşlarından biri olup, kumaşın vücut üzerindeki doğal düşüşünü ve hareketini analiz etmek için kullanılır. Son yıllarda dijital drapaj ve üç boyutlu modelleme teknolojileri, bu alanda önemli yenilikler olarak öne çıkmıştır. Bu yenilikler, tasarım süreçlerini daha verimli, yaratıcı ve sürdürülebilir hale getirerek, moda endüstrisinde önemli dönüşümler yaratmaktadır. Ayrıca bu teknolojiler, tasarımcıların sanal ortamda kumaşı modelleyip, drape ederek hızlı ve maliyeti düşük prototipler oluşturmasını sağlar.
Artırılmış gerçeklik (AR) ve sanal gerçeklik (VR) teknolojileri, drapaj tekniklerine yenilikçi bir bakış açısı kazandırmıştır. Bu teknolojiler, tasarımcıların ve öğrencilerin kumaş ve giysi tasarımlarını üç boyutlu ve etkileşimli bir ortamda deneyimlemelerini sağlar. Dijital drapaj yazılımları, kullanıcıların kumaşın özelliklerine göre en uygun drapaj tekniklerini belirlemelerine yardımcı olur.
Dijital drapaj, aynı zamanda tüketici deneyimini de iyileştirir. Online alışverişte, müşteriler dijital drapaj simülasyonları ile giysilerin nasıl görüneceğini ve vücuduna nasıl oturacağını önceden görebilirler. Bu, müşterilerin daha bilinçli alışveriş yapmalarını sağlar ve iade oranlarını azaltır. Ayrıca, dijital drapaj araçları, kişiselleştirilmiş giysi tasarımlarını mümkün kılar. Müşteriler, kendi ölçülerine ve tercihlerine göre özelleştirilmiş giysiler sipariş edebilirler, bu da müşteri memnuniyetini artırır.
Günümüzde drapaj ve dijital giysi tasarımının entegrasyonu, moda tasarımı eğitiminde ve hazır giyim endüstirisinde önemli fırsatlar sunmaktadır. Dijital drapaj yazılımları, tasarımcıların ve öğrencilerin yaratıcılıklarını ve teknik becerilerini geliştirmelerine olanak tanır. Gelecekte, drapaj ve dijital tasarımın entegrasyonu daha da gelişerek, moda dünyasında yenilikçi ve etkili çözümler sunmaya devam edecektir.
Dijital teknolojilerde meydana gelen yenilikler giysi tasarımı alanında sürdürülebilir, hızlı ve düşük maliyetli olmasına karşın, gerçek ürünlerin oluşturulmasında geleneksel drapaj yönteminin kullanımı günümüzde hâlâ büyük öneme sahiptir.
Anahtar Kelimeler: Giysi, ModaTasarımı, Drapaj, Dijitalleşme, Sürdürülebilirlik

DIGITAL FASHION DESIGN AND DRAPING

ABSTRACT
The draping technique is one of the cornerstones of fashion design and is used to analyze the natural fall and movement of fabric on the body. In recent years, digital draping and three-dimensional modeling technologies have emerged as important innovations in this field. These innovations are creating significant transformations in the fashion industry by making design processes more efficient, creative and sustainable. In addition, these technologies enable designers to create fast and low-cost prototypes by modeling and draping fabric in a virtual environment.
Augmented reality (AR) and virtual reality (VR) technologies have provided an innovative perspective to draping techniques. These technologies enable designers and students to experience fabric and clothing designs in a three-dimensional and interactive environment.

Digital draping software helps users determine the most suitable draping techniques according to the characteristics of the fabric.

Digital draping also improves the consumer experience. When shopping online, customers can preview how clothes will look and fit on their body with digital draping simulations. This allows customers to shop more consciously and reduces return rates. Additionally, digital draping tools enable personalized garment designs. Customers can order customized clothing based on their measurements and preferences, increasing customer satisfaction.

Today, the integration of draping and digital clothing design offers significant opportunities in fashion design education and ready-to-wear industry. Digital draping software allows designers and students to enhance their creativity and technical skills. In the future, the integration of draping and digital design will continiue to evolve, providing innovative and effective solutions in the fashion world.

Although innovations in digital technologies offer sustainable, fast and cost-effective solutions in the field of clothing design, the use of the traditional draping method for producing the real garments is still of great importance today.

Keywords: Clothing, Fashion Design, Draping, Digitalization, Sustainability

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

ÖNEMLİ BİR SOSYAL OLGU: SAVAŞ VE TERÖR OLAYLARI VE TOPLUM SAĞLIĞINA OLAN ETKİLERİ

Doç. Dr. Semra KOCATAŞ
Sivas Cumhuriyet Üniversitesi, Sağlık Bilimleri Fakültesi, Hemşirelik Bölümü
ORCID: 0000-0001-7566-0060

Arş. Gör. Edanur AKTAŞ
Sivas Cumhuriyet Üniversitesi, Sağlık Bilimleri Fakültesi, Hemşirelik Bölümü Sivas, Türkiye
ORCID: 0009-0008-7981-9671

ÖZET
Dünya Sağlık Örgütü'ne göre savaş ve terör; diğer afetler gibi insan kaynaklı oluşan, insanların normal yaşantısını olumsuz etkileyen, bu durumla baş etmeyi sağlayacak destek mekanizmalarını yok eden bir yıkım olayı olarak tanımlanmaktadır. Diğer afetler gibi insan kaynaklı oluşan, insanların normal yaşantısını olumsuz etkilediği gibi çok sayıda ölüme ve sakatlanmaya yol açan, diğer canlılara, çevreye ve ekonomiye ciddi zarar veren önlenebilir bir sorun olan "savaş" günümüzde en önemli halk sağlığı sorunlarından biri olarak yerini korumaktadır. Savaş esnasında yalnızca ölümler ve sakatlıklar değil, birçok bulaşıcı ve ruhsal hastalıklar ortaya çıkmaktadır. Savaşlar ve terörist saldırılar; oldukça fazla insanın hayatını tehlikeye attığı gibi sağlık kuruluşlarına hasar vermekte, ilk ve acil bakımı, hasta nakillerini, ileri tetkik ve tedaviyi etkilemekte, sağlık çalışanlarını çaresiz bırakabilmektedir. Halen dünyanın birçok yerinde devam etmekte olan savaş ve terör olayları karşısında hemşirelere çok önemli sorumluluklar düşmektedir. Hemşireler, savaş ve terör anında triyaj kurallarını, rol ve sorumluluklarını iyi bilmeli ve kriz anını iyi yönetebilmelidirler. Saldırı durumunda hemşireler, afetlere benzer şekilde ivedilikle riskli grupları (sığınmacılar, yaralı askerler, gebe ve çocuklar, yaşlılar vb.) belirleyerek, her türlü yaralanma sebebiyle oluşan travma, yanık, kanama gibi acil durumlara doğru, etkin, hızlı bir şekilde müdahale etmekle sorumludur. Hemşirelerin özellikle savaş esnasında çevre sanitasyonu ve aseptik tekniklere dikkat etmesi gerektiği vurgulanmaktadır. Hemşireler kriz döneminin geçmesinin ardından, temel yaşamsal ihtiyaçların karşılanması (beslenme, giyinme, hijyen ve barınma vb.) ile ilgili sıkıntıları gidermek için çeşitli bilgi, yetenek ve deneyim gerektiren alanlarda hemşirelik hizmetlerini sürdürmektedir.
Anahtar Kelimeler: Savaş, terör, sağlık, hastalık, hemşirelik.

AN IMPORTANT SOCIAL PHENOMENON: WAR AND TERRORIST EVENTS AND THEIR EFFECTS ON PUBLIC HEALTH

ABSTRACT
According to the World Health Organization, war and terrorism; Like other disasters, it is defined as a human-caused destruction event that negatively affects people's normal lives and destroys the support mechanisms that will enable them to cope with this situation. "War", which is a preventable problem that is human-caused like other disasters, negatively affects people's normal lives, causes many deaths and injuries, and causes serious damage to other living things, the environment and the economy, maintains its place as one of the most important public health problems today. During war, not only deaths and injuries but also many infectious and mental diseases occur. Wars and terrorist attacks; While it endangers the lives of many people, it damages healthcare institutions, affects primary and emergency care,

patient transfers, advanced examination and treatment, and can leave healthcare professionals helpless. Nurses have very important responsibilities in the face of war and terrorism that are still ongoing in many parts of the world. Nurses should know the rules of triage, their roles and responsibilities in times of war and terrorism, and be able to manage the crisis well. In the event of an attack, nurses are responsible for immediately identifying risk groups (refugees, injured soldiers, pregnant women and children, the elderly, etc.), similar to disasters, and responding correctly, effectively and quickly to emergency situations such as trauma, burns and bleeding caused by all kinds of injuries. It is emphasized that nurses should pay attention to environmental sanitation and aseptic techniques, especially during war. After the crisis period has passed, nurses continue their nursing services in areas that require various knowledge, skills and experience in order to eliminate the problems related to meeting basic vital needs (nutrition, clothing, hygiene and shelter, etc.).
Keywords: War, terrorism, health, disease, nursing.

GİRİŞ

Savaş ve terör Dünya Sağlık Örgütü'ne göre "insanların normal yaşantısını olumsuz etkileyen, diğer afetler gibi insan kaynaklı oluşan, olaylar esnasında baş etmeyi sağlayacak destek mekanizmalarını yok eden" bir "yıkım olayı" olarak isimlendirilmektedir (Gebbie ve Qureshi, 2002; Kelly, 2010). Türk dil kurumuna göre terör kavramı ise "yıldırı" olarak karşımıza çıkmaktadır. Terör; bir grup insan topluluğunun, toplumun sadece bir kesimini veya tamamını, şiddet yoluyla baskı altına alarak yönlendirmesi demektir (Türk Dil Kurumu, 2019). Savaşların insanın varoluş tarihi boyunca var olduğu bilinmektedir. İnsan toplulukları arasında; küçük çaplı çatışmaların yanı sıra dünya nüfusunu olumsuz etkileyen büyük ve düzenli ordular arasında yapılan büyük çaplı dünya savaşları gibi farklı savaşlar yaşanabilmektedir (Anameriç, 2010; Bebiş ve Özdemir 2013). Günümüzde, görsel/ basılı medya üzerinde sık sık "son dakika haberi" olarak iki ülke arasındaki "savaşlar" ya da suçsuz halka karşı yapılan "terörist" olarak adlandırılan saldırılardan bahsedildiğini görmekteyiz. Dünyanın herhangi bir bölgesinde gerçekleşen savaş ve terör saldırıları, artık uzun zaman boyunca bilinmez kalmamakta; medya araçları aracılığıyla anında iletişimle geniş gruplara iletilmekte, ve dünya çapında yardım gönderilmesi için çalışmalar sağlanmaktadır. Savaş ve terörün yıkıcı etkileri, uzak mesafelerdeki insanları da olumsuz yönde etkilemektedir (Bebiş ve Özdemir 2013). Birçok insanın yaşamını tehdit eden savaşlar çeşitli nedenlerden ortaya çıkmaktadır. Toprak ve kaynak çatışmaları, ideolojik ve politik farklılıklar, etnik ve dini çatışmalar, ekonomik nedenler, uluslararası güç mücadeleleri örnek olarak verilebilir. Tarihte ölüm nedenleri sıralaması incelediğinde, salgın hastalıklar ve savaşların bu sıralamada başı çektiği görülmektedir. Çok sayıda ölüme neden olan, binlerce sakatlanmaya yol açan, diğer canlılara, çevreye ve ekonomiye ciddi zarar veren önlenebilir bir sorun olan "savaş" günümüzde en önemli halk sağlığı sorunlarından biri olarak yerini korumaktadır (Kılıç ve ark., 2015). İnsan haklarının sıkça vurgulandığı günümüz dünyasında, savaş ve terör olayları insanın en vazgeçilmez hakkı olan sağlık ve yaşam hakkının elinden alınması tehdidini oluşturur (Saçaklıoğlu ve Hür, 2005).

Savaş/ Terör Olaylarının Birey ve Toplum Sağlığına Olan Etkileri

Dünyanın değişen şartlarında savaş ve terör eylemleri toplumsal hayatın içinde yeni bir toplumsal travmaya sebep olan kaynak olarak karşımızda görülmektedir (Dikici, 2023). Savaş ve terör olaylarının bıraktığı etkiler çevre ve insanlık için de uzun süre devam eden tehdit oluşturmaktadır (Kefeli, 2003).

Savaşlar ve terörist saldırılar; oldukça fazla insanın hayatını tehlikeye attığı gibi sağlık kuruluşlarına hasar vermekte, ilk ve acil bakımı, hasta nakillerini, ileri tetkik ve tedaviyi etkilemekte, sağlık çalışanlarını çaresiz bırakabilmektedir (Bebiş ve Özdemir, 2013). Silahlı çatışmalar sırasında çatışmanın taraflarıyla birlikte çatışma dışında kalan siviller de önemli ölçüde zarar görmektedir. Siviller içerisinde ise özellikle kadınlar ve çocuklar ciddi zararlar görmekte ve kötü muameleye maruz kalmaktadır (Işık Şen, 2023). Çatışmalar, gıdaya erişimde düşüşe, sosyal bozulmaya, gıda fiyatlarında yükselişe ve sonucunda açlığa yol açabilir (Bendavid vd., 2021). Yetersiz beslenen çocuklar daha fazla hastalanma riski altındadır (Irmak, Piyal, 2023). Çocuklar hastalandıklarında bağışıklık sistemleri zayıflar ve yetersiz beslenmenin etkilerine daha da hassas hale gelirler (UNICEF Syria, 2023). Ölümler çoğunlukla açlıktan veya çocuklarda kızamık, tifo ve kolera gibi eşlik eden hastalıklardan kaynaklanır (Bendavid ve ark., 2021). Savaşın yıprattığı ortamlarda yaşayan çocuklar ve ergenler sıklıkla stresli koşullarla karşılaşmakta ve ruhsal sağlıklarını, duygusal ve hatta fiziksel gelişimlerini ciddi şekilde etkileyebilecek birçok travmatik olayla karşılaşabilmektedirler (Dimitry, 2011). Bazı kişisel ve ailevi birçok faktör savaştan etkilenen çocuklar için dayanıklılığı azaltan faktörler olmuştur. Örneğin yaşa bakacak olursak; savaşla ilgili olaylara maruz kalma ile olumsuz psikolojik tepkiler arasındaki genel korelasyona rağmen yaşa bağlı farklılıklar belgelenmiştir (Slone, Peer, 2021). Küçük çocukların genel olarak psikolojik semptomlar (Benjet ve ark., 2021; Mbwayo ve ark., 2020) ve TSSB (Nuttman-Shwartz, 2019) geliştirme riski altında olduğu, daha büyük çocukların ve ergenlerin ise duygusal ve sosyal zorluklardan, akademik işlev bozukluklarından (El-Khodary ve ark., 2020) duygusal düzensizlikten muzdarip oldukları bulunmuştur (Khamis, 2018) ve daha fazla saldırganlık göstermektir (Nuttman-Shwartz, 2019). Ayrıca çocuğun meraklı, itaatkâr ve kimi zaman cesaretli yapısını kullanarak çocukları savaşın öznesi durumuna getirip ön saflarda yer almalarına ve 'çocuk asker' kavramının ortaya çıkmasına yol açar (Gözübüyük ve ark., 2015: 324-330; Bilgin, 2014: 135-151). Çocuklar, silahlı kuvvetler tarafından endişe verici ölçüde askere alınmakta veya aşçı, hamal, haberci ve casus gibi rollerde kullanılmakta hatta cinsel sömürüye maruz bırakılmaktadır (UNICEF, 2022c). 2005-2020 yılları arasında yapılan bir çalışmada 93.000'den fazla çocuğun çatışma taraflarınca silah altına alındığı ve kullanıldığı doğrulanmıştır; ancak gerçek vaka sayısının çok daha fazla olabileceğine inanılmaktadır (UNICEF, 2022c). Uluslararası Ceza Mahkemesi 15 yaş altındaki çocukların askere alınmasını savaş suçu olarak yasa dışı ilan etmiş olmasına rağmen çocuklar çatışmaların odak noktasında yer almaktadır (UNICEF, 2018; Deveci, 2014). Diğer bir hassas grup ise 'kadınlardır'. Kadınlar silahlı çatışmalar dolayısıyla sürgüne maruz kalmakta, ailelerinden ayrılmakta, cinsel şiddete ve tecavüze uğramakta, ayrıca birçok ciddi insan hakları ile karşı karşıya kalmaktadırlar (Işık Şen, 2023). Savaşın kadın doğurganlığı üzerindeki etkisine ilişkin literatür az olsa da etkilerinin olduğu bilinmektedir. Çok eski raporlar, uzun savaş dönemleri ile adet bozuklukları arasındaki ilişkiyi gösteriyordu. İkinci Dünya Savaşı sırasında esir düşen pek çok kadında ani başlayan ve uzun süren amenore görüldü (Whitacre ve Barrera, 1944; Bass, 1947). Savaşın ayrıca toplumsal anlamda yarattığı olumsuz sonuçlara bakacak olursak savaş sırasında ve sonrasında birçok hastalığa yol açtığı görülmektedir. Birinci Dünya Savaşı esas olmak üzere birçok savaşta bulaşıcı hastalıklara maruz kalan askerler çiçek, tifo, tifüs, kolera, dizanteri ile de mücadele etmiştir (Arabacı ve Doğru, 2017). Savaşlar, insanların yaralanması, sakatlanması, yakınlarını, evini kaybetmesi, ölmesi bunların yanında korku, terör, dehşet, acı ve gözyaşı demektir. Tüm bunlar nedeniyle savaş, ciddi ve geniş çaplı psikiyatrik sorunların oluşmasına yol açmakta, insanlar üzerinde çeşitli derin etkiler bırakmaktadır (Şahin, 2010). Savaşlar, toplumda yıkımlara, ölümlere, yaralanmalara ve bulaşıcı hastalıklara yol açarak bireylerin ruh sağlığını da olumsuz etkileyebilmektedir.

Araştırmalar, savaşla ilgili travmatik olaylara maruz kalmanın, ruhsal bozuklukların yaygınlık oranlarının yüksek olduğunu ortaya koymaktadır (Fazel ve ark., 2005; Steel ve ark., 2009). Ruh sağlığı sorunları çatışmalar sırasında sık görülür ve zihinsel sağlık hizmetlerinin ve toplumsal başa çıkma stratejilerinin bozulması, stres seviyeleri ve uyuşturucu ve alkol kullanımındaki artışlarla daha da artar (Murthy ve Lakshminarayana 2006). Savaş ve terör eylemlerinin neden olduğu ruhsal yıkım, toplumun çeşitli kesimlerini farklı ruhsal düzeylerde etkilemektedir. Hem acil hem de kalıcı travmatik etkiler savaş ve terör eylemlerinin ruh sağlığı üzerine etkilerini akut dönem ve uzun dönem etkiler olarak iki grupta incelenmektedir. Akut ruhsal etkiler arasında; bombalama olayını hatırladığında üzülme, olayla ilgili rahatsız edici rüyalar görme, konsantrasyon güçlüğü, uykuya dalmada güçlük, irritabilite ya da öfke patlamaları, olayın tekrarlanacağına ilişkin yoğun korku yaşama gibi travma sonrası stres belirtileri bulunmaktadır. Uzun dönemde ise en önemli etkilerinden biri yaşam kalitesinde ve destek arayışında azalma olarak ifade edilmektedir (Tay ve ark., 2019). En sık görülen durumlar depresyon, anksiyete ve psikosomatik bozukluklardır, ancak çatışmayla ilgili en yaygın olarak araştırılanı travma sonrası stres bozukluğudur (TSSB) (Somasundaram, 2002; Moscardino ve ark., 2012). Bu belirtilere zamanında müdahale edilmezse, ciddi ruhsal bozuklukların ortaya çıkması ise kaçınılmaz olabilir (Dikici, 2023). Savaşların neden olduğu hayat kaybı korkusuyla birlikte, aniden oluşan hasarlarla çok sayıda insan güvenli bölgelere doğru zorlu göçler yaşamaktadırlar (Altıntaş, 2003). Göç sürecinde, yeni zararların insana ve çevreye yönelik ortaya çıkmasının yanı sıra göçün gerçekleştiği bölgelerin de kaynaklarında bir zorlanmaya neden olmaktadır (Özmen, 2012). Bu durum geçim sıkıntısı, konut ve barınma sorunu ile birlikte göçmenlerin oldukça sağlıksız koşullarda yaşamalarına, dengesiz ve yetersiz beslenmelerine yol açarak ciddi sağlık problemlerine neden olmaktadır (Aksu & Sevil, 2010; Tekin Yılmaz, 2015). Savaş sonucu göç edenlerin, yaşam tatmini ve sağlıklı yaşam biçimi davranışları üzerinde önemli ölçüde olumsuz etkiler olduğu ifade edilmektedir (Çiçek, 2015). Sağlığa verilen zararların bireyin yaşamı boyunca uzun süreli olabileceği iyice anlaşılmıştır, ancak olumsuz etkilerin nesiller arası biyolojik mekanizmalar yoluyla devam edebileceği konusunda artan bir farkındalık vardır. Bir savaş sona erebilir ama etkileri bitmez (Devakumar ve ark., 2014).

Savaş ve Terör Olaylarında Halk Sağlığı Hemşiresinin Rol ve Sorumlulukları

Dünya genelinde, yaralı askerler ve diğer savaş/terör mağdurlarının bakımı ve tedavisinde görev alan hemşireler bu olaylarla birlikte profesyonel bir meslek haline dönüşmüştür. Savaş ve terör durumlarında, hemşirelerin üstlendiği büyük sorumluluklar düşmektedir. Hemşireler, hemşirelik mesleğinin tarihi süreci içerisinde afete hazırlık ve müdahalede konularında önemli rol almıştır. Geçmişten günümüze kadar, hemşirelerin kitlesel yaralanmalara yönelik bilgi ve uygulamalarının tanımlanması yasal olarak kabul edilmiştir (Kandemir ve Öztekin 2018). Hemşireler; çalıştıkları kurumlarda var olan savaş ve terör durumlarına müdahale çalışmalarına etkin olarak katılarak, eğitim ve uygulamalarda yer almalıdır. Potansiyel bir savaş/terör durumunda sağlık hizmetleri organizasyonunda rol alacakları görevleri öğrenmeli ve uygulayabilme becerisi kazanmalıdır (Bebiş ve Özdemir 2013). Hemşireler, savaş ve terör anında triyaj kurallarını, rollerini ve sorumluluklarını iyi bilmeli ve kriz yönetiminde etkili olabilmelidir (Kenny ve Hull, 2008; Kelly, 2010). Florence Nightingale'in Kırım Savaşı sırasında hasta ve yaralı askerlerin sağlıklarını olumlu yönde etkilemesi, bu konuda en çarpıcı örneklerden biridir (Dülcek ve ark., 2022). Savaş sırasında binlerce insanın dizanteri, kolera, beriberi, kötü yaşam koşulları ve yetersiz hasta bakımı sebebiyle hayatını kaybettiğini belirleyen Florence Nightingale; çevre sanitasyonu, kişisel hijyen ve el yıkama gibi sağlık bakım hizmetlerinde gerçekleştirdiği çalışmalar sonucunda mortaliteyi önemli oranda

düşürdüğü bilinmektedir (Bebiş ve Özdemir 2013). Saldırı durumunda hemşireler, afetlerde olduğu gibi acil bir şekilde riskli grupları (sığınmacılar, yaralı askerler, gebe ve çocuklar, yaşlılar vb.) belirleyerek, yaralanma sonucu oluşan travma, yanık, kanama gibi acil durumlara doğru, etkin, hızlı bir şekilde müdahale etmekle sorumludur. Hemşirelerin savaş sırasında özellikle çevre sanitasyonu ve aseptik tekniklere dikkat etmesi gerektiği vurgulanmaktadır (Bebiş ve Özdemir, 2013; Gebbie ve Qureshi, 2002; Nies ve Mceven, 2011). Mağdurlara ilk müdahale olay yerinde yapılır. Ve stabilizasyonları sağlanır. Kontaminasyon şüphesi varsa veya biliniyorsa, olay yerinde dezenfeksiyon uygulanır. Afetzedeler triyaj işlemi tamamlandıktan sonra hastanelere nakledilmelidirler. Afetlerde yanıt aşamasının bir diğer aşaması ise hasta/ yaralı bireye bakım sağlamaktır. Bu bakımın tipi, kullanılan ajan/ ajanlara göre değişmektedir (Kandemir ve Öztekin 2018). Savaş bölgesinde hemşireler yoğun stres altındadır ve klinik uygulamalarını mümkün olduğunca en hızlı ve en doğru şekilde yapmak zorundadırlar. Bu nedenle, böylesine karışık bir ortamda birden fazla müdahaleyi gerçekleştirebilmesi için geniş bilgi, beceri ve yetkinlik yelpazesine sahip olmaları gerekmektedir. Bu aşamada, hazırlık sürecinde yapılan planlar hızla hayata geçirilmelidir (Brewer ve RyanWenger, 2009). Sağlık ekibi üyelerinin hızlı değişen koşullara hemen uyum sağlamaları ve hastanelerin farklı birimlerinin koordineli bir şekilde çalışması kritik önem taşır. Hemşirelerin bu tür kritik zamanlarda sorunları çözme yeteneklerinin ve iletişim becerilerinin güçlü olması gerekmektedir (Aydemir Gedük ve Türkoğlu, 2019). Sonrasında iyileşme süreci olarak adlandırılan savaş sonrası dönem, savaş ve terör olaylarının açtığı derin yaraların iyileştirildiği bir zaman dilimidir. Yaralılara yapılan müdahaleler tıbbi, sosyal ve mesleki uygulamalar kapsamında hemşirelik bakımı olarak devam etmektedir (Bebiş ve Özdemir 2013). Hemşireler kriz döneminin sonra ermesinin ardından, beslenme, giyinme, hijyen ve barınma gibi temel yaşamsal ihtiyaçların karşılanması konusundaki zorlukları çözmek için çeşitli bilgi, beceri ve deneyim gerektiren alanlarda hemşirelik hizmetlerini sürdürmektedir (Reineck ve ark., 2001; Bridges, 2003; Sanders, 2004; Hinton ve ark., 2005). Hemşireler bölge halkına sağlık hizmeti sunarken savaş ve terör saldırılarına karşı toplumsal uyarı sistemleri, potansiyel riskler ve korunma konusunda eğitim vermelidir (Cox ve Briggs, 2004). Savaşın bu şekilde travmatik oluşumlara yol açıp bireylerin ruh sağlığını ciddi bir şekilde bozması göç sürecinin her birey için farklı sonuçlara neden olması ve halk sağlığını doğrudan ve dolaylı olarak ciddi bir biçimde etkilemesi, halk sağlığı alanında çalışanların, özellikle de halk sağlığı hemşirelerinin temel sorumlulukları arasında yer almaktadır (Çiçek ve Güngörmüş 2018).

SONUÇ

Savaş ve terör olayları, insanların normal yaşantısını olumsuz etkilediği gibi bulaşıcı ve ruhsal hastalıklar gibi birçok yıkıcı sağlık sorununa yol açan topluma her anlamda ciddi zarar veren önlenebilir bir sorun olarak görülmektedir. Hemşirelere savaş/terör olayları esnasında birçok rol ve sorumluluk düşmektedir. Savaş öncesinde birincil koruma kapsamında önlemler almalı ve savaş/terör olaylarına hazırlıklı olmalıdır. Bakım verdiği toplumun olası savaş/terör olaylarına karşı farkındalık kazanmalarını sağlamalıdır. Savaş/terör olayları esnasında ise olaya maruz kalan kurbanların değerlendirilmesi, tanılanması ve tedavisinde önemli rol oynamakla birlikte tüm afetlerde olduğu gibi, olay esnasında temel yaşam desteği sağlayıp gerekli olan bakımın belirlenmesi, tıbbi tedaviyi ve buna yönelik hemşirelik bakımını gereken standartlarda uygulamasını, mümkün olduğunca ivedi bir sürede askerlerin tekrar savaşın yapıldığı alanına, sivil halkın ise normal yaşantısını sürdürdüğü haline dönmesini kolaylaştırmalıdır. Ayrıca toplumu bilinçlendirerek farkındalık oluşturulmasına katkı sağlamalıdırlar.

Son olarak savaş/terör olayları sonrası iyileşme döneminde de olayların bireyler üzerinde bıraktığı etkileri değerlendirmeli buna göre hemşirelik sürecini yönetmelidir. Ek olarak gelecekteki olası savaş ve terör durumlarına karşı gerekli hazırlıkları yapmaları ve bulundukları ortamlarda donanımlı birer hemşire olmaları zorunludur. Bütün bunların yanında asıl çözüm savaşın olmadığı bir dünyada yatmaktadır.

KAYNAKÇA

Aydemir Gedük, E., Türkoğlu D., (2019). Savaş ve Terörün Hemşirelik Hizmetlerine Etkisi; Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi 22(3): 205-210.

Kılıç M., Arslanyılmaz M., Özvarış, Ş. B. (2015). Savaş ve Çatışma Ortamında Kadın Sağlığı; Sürekli Tıp Eğitim Dergisi; 24(6), 237-244.

Türk Dil Kurumu, (2024). Savaş tanımı. https://sozluk.gov.tr/

Türkay, M. (2014). Çocuklar ve Savaş. Günümüz Savaşının Özellikleri ve Halen Savaşan Bölgeler: Halk Sağlığı Uzmanları Derneği, 1-8.

Vatansever, K., (2016). Sığınmacılarda Sağlığın Belirleyicileri: Sığınmacıların Kamplardaki Sorunları [Determinants of Health on Refugees: Refugees' Problems in Camps]. Savaş, Göç, Sağlık. Ankara, Türkiye: Türk Tabibipler Birliği Yayınları, 20-31.

Bebiş, H., Özdemir, S. (2013). Savaş, Terör ve Hemşirelik; F.N. Hem. Derg Cilt 21 - Sayı 1: 57-68.

Cox E, Briggs S. Disaster nursing: new frontiers for critical care. Critical Care Nursing 2004;24(3):16-22.

Yavuz, C., Eskiocak, M. (2014). Health-care reform in Turkey: far from perfect. Lancet. 383(9911).

Işık Şen, C.S., (2023). Uluslararası Silahlı Çatışmalar Hukukunda Kadınların Korunması, Aksaray Üniversitesi Sosyal Bilimler Meslek Yüksekokulu Dergisi, 1(1), 79-91.

Dülcek, S., Eryiğit, T., Çoban, N., Beydağ, K.D., Ortabağ, T. (2022). Savaş ve Savaş Sonrası Hemşirelik. Fenerbahçe Üniversitesi Sağlık Bilimleri Dergisi, 2(2), 515-521.

Kandemir, D, Öztekin, SD. (2018); Terör Olaylarında Hemşirenin Rolü. Öztekin SD, editör. Afet Hemşireliği. Ankara: Türkiye Klinikleri. 60-67.

Çiçek E., Güngörmüş, Z.; (2018) Savaş Ve Göçlerin Sağlikli Yaşam Biçimi Davranişlarina Etkisi Ve Halk Sağliği Hemşireliğin Rolü 4(19), 2387-2393.

World Health Organization: World Report on Violence and Health; 2002. Available at: http://www.who.int/violence_injury_prevention/violence/ world_report/en/.

Abu-Musa, A.A., Kobeissi, L., Hannoun, A.B., Inhorn, M.C. (2008). Effect of war on fertility: a review of the literature. 17(1). 43-53.

Dikici, A. (2023). Savaş ve Terör Mağduru Bireylerin Yaşadıkları Ruhsal Sorunlar ve Bu Sorunlara Yönelik Uygulamalar. İzmir Kâtip Çelebi Üniversitesi Sağlık Bilimleri Fakültesi Dergisi 8(2). 861-866.

Çiçek, E., Güngörmüş, Z. (2018). Savaş Ve Göçlerin Sağlıklı Yaşam Biçimi Davranışlarına Etkisi Ve Halk Sağlığı Hemşireliğin Rolü. Social Sciences Studies Journal. 4(19). 2387-2393

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

SAĞLIK ÇALIŞANLARININ KALİTE ÇALIŞMALARINA YÖNELİK TUTUMLARININ BELİRLENMESİ

Öğr. Gör. Dr. Dilek SAKALLI
Harran Üniversitesi, Sağlık Bilimleri Fakültesi, Hemşirelik Bölümü
ORCID: 0000-0002-9034-2244

Seher DİLEN
Harran Üniversitesi, Sağlık Bilimleri Fakültesi, Hemşirelik Bölümü
ORCID: 0009-0000-5677-0539

Emine BALİ
Harran Üniversitesi, Sağlık Bilimleri Fakültesi, Hemşirelik Bölümü
ORCID: 0009-0003-5975-9003

ÖZET

Giriş ve Amaç: Kalite, beklentilerin karşılanması ve hizmet sunumunun iyileştirilmesi olarak, sağlıkta kalite ise doğru hizmetin, doğru zamanda, doğru kişilere, tek seferde sunulması olarak tanımlamaktadır. Sağlıkla ilgili yapılan bir hata insanın hayatını tamamıyla etkileyebilir ve insanın yaşam hakkını elinden alabilir. Bu nedenle sağlıkta kalite bir zorunluluktur ve kaliteli sağlık hizmeti almak tüm insanların hakkıdır. Tanımlayıcı türde gerçekleştirilen araştırmada sağlık çalışanlarının kalite çalışmalarına yönelik tutum düzeylerinin belirlenmesi amaçlanmıştır.

Yöntem: Araştırmanın evrenini il merkezinde yer alan bir hastanedeki sağlık çalışanları oluşturmuştur. Araştırmanın örneklemini, örneklem seçimine gidilmeden veri toplama zamanında evrende yer alan ve çalışmaya gönüllü olarak katılmayı kabul eden sağlık çalışanları oluşturmaktadır. Veriler Çerçi (2022) tarafından geliştirilen Bilgi Formu ve Kalite Çalışmalarına Yönelik Tutum Ölçeği: Sağlık Çalışanları Sürümü ile araştırmacılar tarafından yüz yüze toplanmıştır. Etik kurul, kurum izni ve anket kullanımı ile ilgili gereken izinler alınmıştır. Verilerin analizi, istatistik paket programında; frekans, yüzde, ortalama ve standart sapma gibi tanımlayıcı istatistikler ile değerlendirilmiştir.

Bulgular:Çalışmaya 269 sağlık çalışanı katılmıştır. Çalışmaya katılan sağlık çalışanlarının ölçek alt boyutlarından ve toplamından aldıkları puanların ortalamalarına bakıldığında kurumsal yaklaşım puanı 3.37, yönetici yaklaşımı 3.37, çalışan yaklaşımı 3.60 ve toplam ölçek puanının 3.40 olduğu belirlenmiştir. Kurumda çalışma yılı ile çalışan yaklaşımı puanları arasında düşük düzeyde pozitif yönlü anlamlı bir ilişki bulunmuştur (r_S=0.121, $p<0.05$). Ölçeğin puan ortalamalarının kalite eğitimi alma duruma göre ise anlamlı olarak farklılaştığı bulunmuştur (kurumsal yaklaşım $t=2.473$, $p<0.05$; yönetici yaklaşımı $t=2.202$, $p<0.05$; çalışan yaklaşımı $t=2.005$, $p<0.05$ ve toplam $t=2.608$, $p<0.05$).

Tartışma ve Sonuç: Araştırmanın sonucunda sağlık çalışanlarının kalite çalışmalarına yönelik tutumlarının yüksek düzeyde olduğu, kurumda çalışma yılı arttıkça çalışan yaklaşımı puanlarının arttığı ve kalite eğitimi alanların kurumsal yaklaşım, yönetici yaklaşımı, çalışan yaklaşımı ve toplam puan ortalamalarının kalite eğitimi almayanlara göre daha yüksek olduğu sonucuna varılmıştır. Gün geçtikçe ihtiyaç haline gelen kalite çalışmalarına farkındalığın arttığı ve eğitimin ve deneyimin bu anlamda destekleyici olduğu düşünülmektedir.

Anahtar Kelimeler: Kalite çalışmaları, Sağlıkta kalite, Toplam Kalite Yönetimi

DETERMINATION OF HEALTH WORKERS' ATTITUDES TOWARDS QUALITY STUDIES

ABSTRACT

Introduction and Objective: Quality is defined as meeting expectations and improving service delivery, and quality in health is defined as providing the right service, at the right time, to the right people, in one go. A health-related mistake can completely affect a person's life and take away their right to life. Therefore, quality in health is a necessity and it is the right of all people to receive quality health care. In this descriptive study, it was aimed to determine the attitude levels of healthcare professionals towards quality studies.

Method: The population of the study consisted of healthcare workers in a hospital located in the city center. The sample of the study consisted of healthcare professionals who were in the population at the time of data collection without sample selection and who voluntarily agreed to participate in the study. The data were collected face-to-face by the researchers with the Information Form and Attitude Towards Quality Studies Scale developed by Çerçi (2022): Health Workers Version were collected face-to-face by the researchers. Ethics committee, institutional permission and necessary permissions for the use of the questionnaire were obtained. Data were analyzed using descriptive statistics such as frequency, percentage, mean and standard deviation in the statistical package program.

Results: 269 health workers participated in the study. Considering the mean scores of the health care workers who participated in the study from the sub-dimensions and total scale, it was determined that the institutional approach score was 3.37, the manager approach was 3.37, the employee approach was 3.60 and the total scale score was 3.40. A low level positive significant relationship was found between years of employment in the organization and employee approach scores ($rS=0.121$, $p<0.05$). It was found that the mean scores of the scale differed significantly according to the status of receiving quality training (organizational approach $t=2.473$, $p<0.05$; manager approach $t=2.202$, $p<0.05$; employee approach $t=2.005$, $p<0.05$ and total $t=2.608$, $p<0.05$).

Discussion and Conclusion: As a result of the study, it was concluded that the attitudes of healthcare workers towards quality studies were at a high level, employee approach scores increased as the years of working in the institution increased, and the mean scores of institutional approach, manager approach, employee approach and total scores of those who received quality training were higher than those who did not receive quality training. It is thought that awareness of quality studies, which are becoming a necessity day by day, is increasing and that training and experience are supportive in this sense.

Keywords: Quality studies, Quality in health, Total Qualıty Management

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

TÜRKİYE'DE HEMŞİRELİK ALANINDA ETİK İLE İLGİLİ YAPILAN LİSANSÜSTÜ TEZLERİN İNCELENMESİ

Öğr. Gör. Dr. Firdevs KUZU
Sivas Cumhuriyet Üniversitesi, Sağlık Bilimleri Fakültesi, Hemşirelik Bölümü
ORCID: 0000-0001-6628-3224

ÖZET
Bu çalışma, etiğe ilişkin hemşirelik alanında Türkiye'de yapılan lisansüstü tezleri incelemek, lisansüstü tezlerin sonuçlarını ortaya koymak, araştırmacılara ve hemşirelere somut veriler sunmak amacıyla yapıldı. Retrospektif tanımlayıcı tipte 01.07.2024-18.07.2024 tarihleri arasında yapılan literatür araştırmasında hemşirelik alanında etik ile ilgili yapılan lisansüstü tezleri belirlemek için Yükseköğretim Kurulu Ulusal Tez Merkezi veri tabanından tarama yapıldı. Veri tabanında; "etik, hemşire", "etik duyarlılık, hemşire", "hemşirelik etiği" ve "etik ilkeler" anahtar kelimeleri kullanılarak tarama yapıldı. Veri tabanında tarama yapılırken lisansüstü tezlerin kapsadığı yıllar açısından herhangi bir sınırlamaya gidilmedi. Hemşirelik alanında etik ile ilgili 01.07.2024-18.07.2024 tarihleri arasında ulaşılan tezlerin "8" i doktora, "34" ü yüksek lisans olduğu görüldü. Taramada "etik, hemşire" anahtar kelimesi ile 37 tez, "etik duyarlılık, hemşire" anahtar kelimesi ile 3 tez, "hemşirelik etiği" anahtar kelimesi ile 10 tez ve "etik ilkeler" anahtar kelimesi ile 500 tez sonucuna ulaşıldı. Taramadaki "etik ilkeler" anahtar kelimesi ile 500 tez içerisinde hemşirelik alanında yapılan 17 tez olduğu görüldü. Yapılan taramalar sonucunda tekrar eden tezler (10 tez) ayıklandı. Bu tezler içerisinde 3 tezin tam metnine ulaşılamaması ve 498 tezin hemşirelik alanında yapılmaması ile araştırmaya dahil edilme kriterlerini sağlamadığı için çalışma dışında tutuldu. Araştırmada dahil edilme kriterlerine uyan 42 lisansüstü tez değerlendirmeye alındı. Tez tarama sonuçları değerlendirilmesinde tezlerin yüksek lisans ya da doktora tezi oluşu, tezlerin yayın yılı, konusu, örneklem grubu, kullanılan yöntem-araştırma deseni ve sonuçları özetlendi.
Anahtar Kelimeler: Etik, hemşirelik, akademik tezler.

REVIEW OF POSTGRADUATE THESES ON ETHICS IN THE FIELD OF NURSING IN TÜRKİYE

ABSTRACT
This study was carried out to review postgraduate theses conducted in Türkiye on ethics in the field of nursing, to present the results of the postgraduate theses, and to provide concrete data to researchers and nurses. In the retrospective descriptive literature research conducted between 01.07.2024 and 18.07.2024, a search was conducted on the National Thesis Center database of Turkish Council of High Education to determine postgraduate theses on ethics in the field of nursing. The database was searched using the keywords "ethics, nurse", "ethical sensitivity, nurse", "nursing ethics", and "ethical principles". While searching the database, no limitations were imposed in terms of the years covered by postgraduate theses. It was found that of the theses regarding ethics in the field of nursing accessed between 01.07.2024 and 18.07.2024, "8" were doctoral theses and "34" were master's theses. In the search, 37 theses were found with the keywords "ethics, nurse", 3 theses with the keywords "ethical sensitivity, nurse", 10 theses with the keyword "nursing ethics", and 500 theses with the keyword "ethical principles". It was seen that among 500 theses, there were 17 theses in the field of nursing with the keyword "ethical principles". As a result of the reviews, duplicate theses (10 theses) were eliminated.

Among these theses, the full texts of 3 theses could not be accessed and 498 theses were not conducted in the field of nursing. Therefore, these theses were excluded from the study because they did not meet the criteria for inclusion in the study. 42 postgraduate theses that met the inclusion criteria were evaluated in the study. While evaluating the thesis reviewing results, whether the theses were master's or doctoral theses, the publication year of the theses, their subject, sample group, the method used-the research design, and the results were summarized.
Keywords: Ethics, nursing, academic theses.

INTRODUCTION

Having nursing ethics is stated to be one of the conditions of nursing discipline (Karadağlı 2016). The concept of nursing ethics involves the moral basis of the nurse-patient relationship, care ethics, organizational/interdisciplinary relationships, and nursing ethics theories (Atay 2019). As a matter of fact, ethical behavior is the activity of nurses to think about their behaviors during care practices and is expressed as protecting the rights of the patient, providing benefit for the patient, together with the patient and without harming the patient (Tazegün 2013). In this context, this study was carried out to review postgraduate theses conducted in Türkiye on ethics in the field of nursing, to present the results of the postgraduate theses, and to provide concrete data to researchers and nurses.

RESEARCH AND FINDINGS

+In the retrospective descriptive literature research conducted between 01.07.2024 and 18.07.2024, a search was conducted on the National Thesis Center database of Turkish Council of High Education to determine postgraduate theses on ethics in the field of nursing. The database was searched using the keywords “ethics, nurse”, “ethical sensitivity, nurse”, “nursing ethics”, and “ethical principles”. While searching the database, no limitations were imposed in terms of the years covered by postgraduate theses. The criteria for inclusion in the study were that the thesis should be in the field of nursing, the full text of the thesis should be accessible, and the thesis should not be a systematic review-meta-analysis. It was found that of the theses regarding ethics in the field of nursing accessed between 01.07.2024 and 18.07.2024, “8” were doctoral theses and “34” were master's theses. In the search, 37 theses were found with the keywords “ethics, nurse”, 3 theses with the keywords “ethical sensitivity, nurse”, 10 theses with the keyword “nursing ethics”, and 500 theses with the keyword “ethical principles”. It was seen that among 500 theses, there were 17 theses in the field of nursing with the keyword “ethical principles”. As a result of the reviews, duplicate theses (10 theses) were eliminated. Among these theses, the full texts of 3 theses could not be accessed and 498 theses were not conducted in the field of nursing. Therefore, these theses were excluded from the study because they did not meet the criteria for inclusion in the study. 42 postgraduate theses that met the inclusion criteria were evaluated in the study. While evaluating the thesis reviewing results, whether the theses were master's or doctoral theses, the publication year of the theses, their aim, sample group, the method used-the research design, and the results were summarized.

It is seen that the master's theses included in the study were between the years 2007-2023. The sample of master's theses included in the review consisted of nurses (n=31), students (n=2), and cases (n=1). The majority of the faculty members who supervised the theses (38.24%) had the title of Prof. Dr. It was determined that the number of samples in the theses was at least 10 and at most 885 (Acar 2023, Sarıyer 2019).

It is stated that the theses included in the study were descriptive (n=10), descriptive and analytical (n=1), descriptive and correlational (n=7), descriptive, correlational, and comparative (n=1), correlational survey design (n=1), cross-sectional (n=1), descriptive-cross-sectional (n=4), descriptive, correlational, and cross-sectional (n=1), descriptive and observational (n=1), qualitative-phenomenological-in-depth interview technique (n=1), and methodological (n=6) research designs. The subjects of the master's theses on ethics in the field of nursing were the relationships between the concepts of job satisfaction and ethical climate (Sonakın 2010), the approaches they suggested for solving ethical problems they identified in sample cases (Avcı 2007), ethical problems (Acar 2023, Büyükkoçak 2023), ethical sensitivities of nurses (Arslan 2017, Atay 2019, Daşbilek 2016, Kaya 2018, Kılıç 2019, Nas 2017, Öztürk 2020, Palazoğlu 2016, Tazegün 2013, Uruf 2022, Yıldız 2023), institutional culture, institutional justice perception, and ethical behavior situations (Özsoy 2017), perceptions of hospital ethical climate regarding physical restraint of nurses (Gökmen 2019), attitudes towards medical errors (Alaman 2018), the effects of moral sensitivities on professional behaviors (Köse 2018), levels of moral distress (İşlek 2021, Taşkıran 2022), the relationship between the ethical values of nursing workforce and whistleblowing intentions and reasons (Çekiç 2020), authority and responsibilities (Bektaş 2017), nursing values, emotional intelligence levels, individualized care perceptions (Çulha 2018), the effect of servant leadership behaviors on nurses' innovative behaviors and job performance (Sarıyer 2019), ethical attitude (Katuk 2021, Özkablan 2023), ethical leadership perceptions (Tut 2023), scale validity and reliability (Kırşan 2019, Namık 2020, Özalp 2021, Özçiftçi 2020, Şermet 2019, Yüce 2023).

It is seen that the doctoral theses included in the study were between the years 2005-2024. The sample of doctoral theses included in the review consisted of nurses (n=5) and students (n=3) groups. The majority of the faculty members who supervised the doctoral theses (75%) had the title of Prof. Dr., too. It was determined that the number of samples in theses was at least 24 and at most 1047 (Kaya 2022, Orak 2005). It is stated that the theses included in the study were methodological, descriptive, and analytical (n=1), descriptive and relational (n=1), quasi-experimental quantitative and qualitative (n=1), randomized pre-test post-test comparative and qualitative mixed design (n=1), phenomenological and Delphi method (n=1), qualitative-individual in-depth interview (n=1), methodological and descriptive (n=1), and methodological (n=1) research designs. The subjects of the doctoral dissertations on ethics in the field of nursing were scale validity and reliability (Kaya 2022, Orak 2005, Orgun 2008), the relationship between professional behaviors and the level of ethical decision-making (Cerit 2010), comparing the effects of students' moral sensitivity, moral reasoning, and ethical decision-making skills with the in-class case analysis method (Erkuş 2018), the effects of students' care-oriented nurse-patient interactions and ethical attitudes (Doğan 2021), the ethical principles that nursing service managers should follow (Ayan 2022), the effects of health policies and legal regulations on the nursing profession (Birbudak 2024).

CONCLUSION

As a result of the study carried out to review postgraduate theses conducted in Türkiye on ethics in the field of nursing, to present the results of the postgraduate theses, and to provide concrete data to researchers and nurses, it is seen that quantitative research methods were used the most in both master's and doctoral theses on ethics in the field of nursing. The study contributes to the national literature by examining postgraduate theses prepared at the national level.

Moreover, it can be said that the study is also guiding in terms of revealing the general appearance and subject distribution of postgraduate theses written with keywords related to ethics in the field of nursing in Türkiye. It is recommended that studies on ethics in the field of nursing be increased.

KAYNAKÇA

Acar C, 2023, Ameliyathane Hemşirelerinin Etik Sorunlara Yaklaşımı; Niteliksel Çalışma, Zonguldak Bülent Ecevit Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Anabilim Dalı, Yüksek Lisans Tezi, Zonguldak.

Alaman O, 2018, Hemşirelerin Tıbbi Hatalara Yönelik Tutumlarının İncelenmesi, İstanbul Üniversitesi-Cerrahpaşa, Lisansüstü Eğitim Enstitüsü, Hemşirelik Esasları Anabilim Dalı, Yüksek Lisans Tezi, İstanbul.

Arslan G, 2017, Hemşirelerin Etik Duyarlılık Düzeylerinin Yoğun Bakıma Özel Etik Konulardaki Yaklaşımları Üzerine Etkisi, Acıbadem Mehmet Ali Aydınlar Üniversitesi, Sağlık Bilimleri Enstitüsü, Yoğun Bakım Hemşireliği Anabilim Dalı, Yüksek Lisans Tezi, İstanbul.

Atay M. E, 2019, Hemşirelerin Etik Duyarlılıkları İle Bireyselleştirilmiş Bakım Algıları Arasındaki İlişkinin İncelenmesi, Atatürk Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Esasları Anabilim Dalı, Yüksek Lisans Tezi, Erzurum.

Avcı K, 2007, Pediatri Alanında Hemşirelerin Etik Sorunların Çözümüne Yönelik Yaklaşımlarının İncelenmesi, Hacettepe Üniversitesi, Sağlık Bilimleri Enstitüsü, Çocuk Sağlığı Ve Hastalıkları Hemşireliği Programı, Yüksek Lisans Tezi, Ankara.

Ayan G, 2022, Hemşirelik Hizmetleri Yöneticilerinin Uyması Gereken Yönetsel Etik İlkelerin Belirlenmesi, İstanbul Üniversitesi-Cerrahpaşa, Lisansüstü Eğitim Enstitüsü, Hemşirelikte Yönetim Anabilim Dalı, Doktora Tezi, İstanbul.

Bektaş N, 2017, Ameliyathane Hemşirelerinin Yetki ve Sorumlulukları Konusundaki Farkındalıklarının İncelenmesi, Bahçeşehir Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Yüksek Lisans Programı, Yüksek Lisans Tezi, İstanbul.

Birbudak S, 2024, 2000 Yılı Sonrası Sağlık Politikaları Ve Yasal Düzenlemelerin Hemşirelik Mesleğine Etkisi, İstanbul Üniversitesi, Lisansüstü Eğitim Enstitüsü Cerrahpaşa, Hemşirelikte Yönetim Anabilim Dal, Doktora Tezi, İstanbul.

Büyükkoçak A, 2023, Acil Serviste Yaşanan Etik Sorunlar: Gözlemsel Bir Çalışma, İzmir Kâtip Çelebi Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Esasları Anabilim Dalı, Yüksek Lisans Tezi, İzmir.

Cerit B, 2010, Hemşirelerin Profesyonellik Davranışları İle Etik Karar Verebilme Düzeyi Arasındaki İlişkinin İncelenmesi, Hacettepe Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Esasları Programı, Doktora Tezi, Ankara.

Çekiç Y, 2020, Hemşirelerin Etik Değerleri İle İhbarcılık Niyetleri Ve Nedenleri Arasındaki İlişki: Kamu Hastanelerinde Bir Araştırma, İstanbul Üniversitesi-Cerrahpaşa, Lisansüstü Eğitim Enstitüsü, Hemşirelikte Yönetim Anabilim Dalı, Yüksek Lisans Tezi, İstanbul.

Çulha Y, 2018, Son Sınıf Hemşirelik Öğrencilerinin Hemşirelik Değerleri, Duygusal Zeka Düzeyleri ve Bireyselleştirilmiş Bakım Algılarının İncelenmesi, İstanbul Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Esasları Anabilim Dalı, Yüksek Lisans Tezi, İstanbul.

Daşbilek F, 2016, Hemşirelerin Kişisel Değerleri İle Etik Duyarlılıklarının Bazı Değişkenler Açısından İncelenmesi, Atatürk Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Esasları Anabilim Dalı, Yüksek Lisans Tezi, Erzurum.

Doğan N, 2021, İki Farklı Öğretim Yöntemi İle Verilen Bakım Davranışları Eğitiminin Hemşirelik Öğrencilerinin Bakım Odaklı Hemşire Hasta Etkileşimlerine Ve Etik Tutumlarına Etkisi, Gazi Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Anabilim Dalı, Doktora Tezi, Ankara.

Erkuş G, 2018, Etik Eğitiminde Standart Hasta Kullanımının Hemşirelik Lisans Öğrencilerinin Ahlaki Duyarlılık, Ahlaki Muhakeme ve Etik Karar Verme Becerilerine Etkisinin İncelenmesi, Hacettepe Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Esasları ve Yönetimi Bütünleşik Doktora Programı, Doktora Tezi, Ankara.

Gökmen B.A, 2019, Hastane Etik İkliminin Hemşirelerin Fiziksel Kısıtlamaya İlişkin Algılarına Etkisi, Bolu Abant İzzet Baysal Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Anabilim Dalı, Yüksek Lisans Tezi, Bolu.

İşlek R, 2021, Bir Üniversite Hastanesinde Covıd-19 Hastalarına Bakım Veren Hemşirelerin Yaşadıkları Ahlaki Sıkıntı İle Tükenmişlik Düzeyleri Arasındaki İlişki, Haliç Üniversitesi, Lisansüstü Eğitim Enstitüsü, Hemşirelik Anabilim Dalı, Yüksek Lisans Tezi, İstanbul.

Karadağlı F, 2016, Students' Professional Value Perception And Affecting Factors, Mersin University Journal of Health Sciences, 9(2), 81-91.

Katuk S, 2021, Covid-19 Sürecinde Çalışan Hemşirelerin Hasta Bakım Uygulamalarında Etik Tutumun Değerlendirilmesi, Hasan Kalyoncu Üniversitesi, Lisansüstü Eğitim Enstitüsü, Hemşirelik Ana Bilim Dalı, Yüksek Lisans Tezi, Gaziantep.

Kaya E, 2018, Yoğun Bakım Hemşirelerinin Etik Duyarlılık Düzeylerinin Ölüme Karşı Tutumları Üzerine Etkisi, Ondokuz Mayıs Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Anabilim Dalı, Yüksek Lisans Tezi, Samsun.

Kaya G, 2022, Hemşirelik Öğrencilerinin Stigmatizasyon Algılarının Belirlenmesi: Bir Ölçek Geliştirme Çalışması, Ondokuz Mayıs Üniversitesi, Lisansüstü Eğitim Enstitüsü, Acil Hemşireliği Ana Bilim Dalı, Doktora Tezi, Samsun.

Kılıç G, 2019, Yoğun Bakım Hemşirelerinin Etik Duyarlılık Durumlarının ve Etkileyen Faktörlerin Belirlenmesi, Aydın Adnan Menderes Üniversitesi, Sağlık Bilimleri Enstitüsü, İç Hastalıkları Hemşireliği Yüksek Lisans Programı, Yüksek Lisans Tezi, Aydın.

Kırşan M, 2019, Hemşirelikte Klinik Öğretimde Etik Sorunlar Ölçeği Geliştirme, İzmir Kâtip Çelebi Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Esasları Anabilim Dalı, Yüksek Lisans Tezi, İzmir.

Köse A, 2018, Hemşirelerin Ahlaki Duyarlılıklarının Profesyonellik Davranışlarına Etkisinin Belirlenmesi, Gazi Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Anabilim Dalı, Yüksek Lisans Tezi, Ankara.

Namık E, 2020, Hemşirelikte Ağrı Yönetiminde Etik Tutum Ölçeği Geliştirme, İzmir Kâtip Çelebi Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Esasları Anabilim Dalı, Yüksek Lisans Tezi, İzmir.

Nas Z, 2017, Hemşirelerin Etik Duyarlılıklarının Belirlenmesi, İstanbul Medipol Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Anabilim Dalı, Yüksek Lisans Tezi, İstanbul.

Orak N.Ş, 2005, İstanbul İli'ndeki Hemşirelerin Profesyonel Hemşirelik Değerleri ve Etkileyen Faktörlerin Analizi, Marmara Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Esasları Anabilim Dalı, Doktora Tezi, İstanbul.

Orgun F, 2008, "Byrd'ın Hemşirelere Yönelik Etik Duyarlılık Testi"Nin Geçerlik ve Güvenirliğinin İncelenmesi, Ege Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Esasları Anabilim Dalı, Doktora Tezi, İzmir.

Özalp G, 2021, Psikiyatri Hastalarına Yönelik Etik Yaklaşım Değerlendirme Ölçeği Geliştirme, İzmir Kâtip Çelebi Üniversitesi, Sağlık Bilimleri Enstitüsü, Psikiyatri Hemşireliği Anabilim Dalı, Yüksek Lisans Tezi, İzmir.

Özçiftçi S, 2020, Hemşirelik Bakımında Etik Tutum Ölçeği Geliştirme, İzmir Kâtip Çelebi Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Esasları Anabilim Dalı, Yüksek Lisans Tezi, İzmir.

Özkablan N, 2023, Pandemi Hastanesinde Çalışan Hemşirelerin Spiritüel Bakım Verme Sıklıkları ve Etik Tutumlarının Değerlendirilmesi, Sivas Cumhuriyet Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Esasları Anabilim Dalı, Yüksek Lisans Tezi, Sivas.

Özsoy Z, 2017, Hastanelerdeki Kurum Kültürünün Hemşirelerin Etik ve Kurumsal Adalet Davranışları Üzerine Etkisi, Gazi Üniversitesi, Sağlık Bilimleri Enstitüsü, Yüksek Lisans Tezi, Hemşirelik Anabilim Dalı, Ankara.

Öztürk Ü.S, 2020, Yaşlı Hastaya Bakım Veren Hemşirelerin Yaşlıya Yönelik Tutumları ve Etik Duyarlılıkları, Ondokuz Mayıs Üniversitesi, Lisansüstü Eğitim Enstitüsü, Hemşirelik Ana Bilim Dalı, Yüksek Lisans Tezi, Samsun.

Palazoğlu C.A, 2016, Acil Serviste Çalışan Hemşirelerin Tükenmişlik ve İş Doyumu Düzeylerinin Etik Duyarlılıkla İlişkisi, Ondokuz Mayıs Üniversitesi, Sağlık Bilimleri Enstitüsü, Acil Tıp Hemşireliği Anabilim Dalı, Yüksek Lisans Tezi, Samsun.

Sarıyer S, 2019, Yönetici Hemşirelerin Hizmetkar Liderlik Davranışlarının Hemşirelerin Yenilikçi Davranışlarına ve İş Performansına Etkisi, İstanbul Üniversitesi-Cerrahpaşa, Lisansüstü Eğitim Enstitüsü, Hemşirelikte Yönetim Anabilim Dalı, Yüksek Lisans Tezi, İstanbul.

Sonakın C, 2010, Hemşirelerin İş Doyumları İle Çalıştıkları Kurumların Etik İklimi Arasındaki İlişki, Marmara Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelikte Yönetim Anabilim Dalı, Yüksek Lisans Tezi, İstanbul.

Şermet E, 2019, Hemşireler İçin Hasta Savunuculuk Ölçeğinin Geliştirilmesi, Marmara Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Anabilim Dalı, Yüksek Lisans Tezi, İstanbul.

Taşkıran G.N, 2022, Yoğun Bakım Hemşirelerinin Etkisiz Uygulamalara İlişkin Tutumu Ve Ahlaki Sıkıntı Düzeyi Arasındaki İlişkinin İncelenmesi, Dokuz Eylül Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Anabilim Dalı, Yüksek Lisans Tezi, İzmir.

Tazegün A, 2013, Çocuk Hemşirelerinin Etik Duyarlılık Düzeyleri ve Etkileyen Faktörler, Atatürk Üniversitesi, Sağlık Bilimleri Enstitüsü, Çocuk Sağlığı ve Hastalıkları Hemşireliği Anabilim Dalı, Yüksek Lisans Tezi, Erzurum.

Tut Y.S, 2023, Hemşirelerin Çatışma Çözme Stratejileri ve Etik Liderlik Algıları İle İş Doyumu Arasındaki İlişki, Necmettin Erbakan Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Anabilim Dalı, Yüksek Lisans Tezi, Konya.

Uruf S, 2022, Cerrahi Hemşirelerinin Etik (Ahlaki) Duyarlılığının Belirlenmesi, Maltepe Üniversitesi, Lisansüstü Eğitim Enstitüsü, Disiplinlerarası Hemşirelik Anabilim Dalı, Yüksek Lisans Tezi, İstanbul.

Yıldız Ö, 2023, Hemşirelerin Etik Duyarlılık ve Empatik Eğilim Düzeylerinin Hasta Savunuculuk Rolleri Üzerine Etkisi, Ondokuz Mayıs Üniversitesi, Lisansüstü Eğitim Enstitüsü, Hemşirelik Ana Bilim Dalı, Yüksek Lisans Tezi, Samsun.

Yüce B, 2023, Hemşirelik Mesleğinde Etik İlkeler Farkındalık Ölçeğinin Geliştirilmesi: Geçerlik ve Güvenirlik Çalışması, Bursa Uludağ Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Anabilim Dalı, Yüksek Lisans Tezi, Bursa.

ŞƏXSİYYƏTDAXİLİ KONFLİKTLƏRİN QABAQLANMASI VƏ ONLARIN HƏLLİ MEXANİZMİ

Musayeva Aygün Cavanşir qızı
Azərbaycan, Şəki, Azərbaycan Dövlət Pedaqoji Universitetinin Şəki filialı

ÖZET
Konflikt mövzusu müasir həyatın norması və ayrılmaz tərkib hissəsi kimi bu gün cəmiyyəti, ölkəmizi və bəşəriyyəti nəinki maraqlandıran həm də narahat məsələlərdən biri kimi aktuallıq kəsb
edir. Cəmiyyət inkişaf etdikcə artan tələbatlar və onların ödənməməsi şəxsiyyətdaxili ziddiyətləri daha da dərinləşdirir. Həmçinin ekoloji problemlər və qlobal proseslər fərqli baxışları ziddiyyətə çevirir. Konfliktologiya bu qisim konfliktləri müxtəlif müstəvilərdə tədqiq edir, konfliktin köklərini araşdırır və mümkün olan həlli yollarını tapmağa çalışır. Şəxsiyyətdaxili münaqişə çətin həll olunan ziddiyyətdir, insanın müxtəlif istiqamətə yönəlmiş maraqlarının, tələbatlarının, məşğuliyyətlərinin eyni gücdə toqquşmasıdır. Şəxsiyyətdaxili konfliktlərin yaranmasına gətirən səbəb və amilləri bilərək bu tip konfliktləri qabaqlamaq mümkündür. Şəxsiyyətdaxili konfliktləri qabaqlamaq üçün ilk növbədə aşağıdakı tələbləri yerinə yetirmək lazımdır: çətin vəziyyətləri varlığın xarakteri kimi qəbul etmək; Həyat meyarlarını müəyyənləşdirib və onlara riayət etmək; Elastik, plastik və adaptiv olmaq; Bəzi güzəştlərə getmək, lakin buna vərdiş etməmək; Hadisələrin əlverişli gedişatına ümidli olmaq; Arzularının qulu olmamaq; Özünü idarə etməyi öyrənmək; İradi keyfiyyətləri inkişaf etdirmək; Rolların iyerarxiyasını qurmaq; Kamilliyi təkmilləşdirməyə çalışmaq; Özünə adekvat vermək; Problemləri üst-üstə yığmamaq; Hər şeyi birdən etməyə çalışmamaq; Yalan danışmamaq; Özündə tələş yaratmamaq.
Şəxsiyyətdaxili konfliktlərin həll deyərkən şəxsiyyətin daxili aləminin ahənginin bərpası, vahid və tam şüurun qurulması, həyat münasibətlərindəki ziddiyətlər kəskinliyinin zəifləməsi, yeni həyat keyfiyyətinin əldə edilməsi nəzərdə tutulur. Şəxsiyyətdaxili konfliktin həlli konstruktiv və destruktiv ola bilər. İnsanlar öz fərdi xüsusiyyətlərindən asılı olaraq daxili ziddiyətlərə müxtəlif reaksiyalar verir. Konfliktdən çıxma yolları eyni zamanda qadın və kişilərdə fərqli şəkildə özünü göstərir. Konfliktdən çıxmaq üçün müdafiə mexanizmlərinin özünəməxsus rolu var. Psixoloji müdafiə psixikanın normal, hər zaman işlək mexanizmidir. Beləliklə, şəxsiyyət daxili ziddiyətləri inkişafa sürükləməyə bacarmalı və lazım gələrsə mütəxəssis köməyindən istifadə etməlidir.
Açar sözlər: şəxsiyyət, konflikt, şəxsiyyətdaxili konflikt, ziddiyyətlər, konstruktiv, destruktiv

PREVENTION OF INTRAPERSONAL CONFLICTS AND THEIR RESOLUTION MECHANISM

ABSTRACT
The topic of conflict as a norm and integral part of modern life today's society, became relevant as one of the issues not only of interest to our country and humanity, but also of concern does. As society develops, increasing demands and their non-fulfillment deepens intrapersonal conflicts. Also, environmental problems and global processes turn different views into conflict. This part of conflictology studies conflicts at different levels, investigates the roots of the conflict and tries to find possible solutions. Intrapersonal conflict is a contradiction that is difficult to resolve, it is a collision of different interests, needs, and

occupations of a person with the same force. It is possible to prevent these types of conflicts by knowing the reasons and factors that lead to the emergence of intrapersonal conflicts. In order to prevent intrapersonal conflicts, the following requirements must first be fulfilled: accepting difficult situations as the nature of existence; Define life standards and adhere to them; To be elastic, plastic and adaptive; Making some concessions, but not making a habit of it; Hoping for a favorable course of events; Not to be a slave to your desires; Learning self-control; To develop voluntary qualities; Build a hierarchy of roles; Strive to improve perfection; Adequate self-giving; Do not pile up problems; Not trying to do everything at once; Not to lie; Do not make a fuss in yourself.
When resolving intra-personal conflicts, restoring the harmony of the inner world of the personality, establishment of a unified and complete consciousness, weakening of the sharpness of contradictions in life relationships, new quality of life is intended to be achieved. The resolution of intrapersonal conflict is constructive and can be destructive. People react differently to internal conflicts depending on their individual characteristics. At the same time, the way out of the conflict manifests itself differently in women and men. Defense mechanisms have a special role to overcome the conflict. Psychological defense is a normal, always working mechanism of the psyche. Thus, the personality should be able to develop internal conflicts and, if necessary, use specialist help.
Keywords: personality, conflict, intrapersonal conflict, contradictions, constructive, destructive

GİRİŞ

Hələ qədim dövrlərin bəzi mütəfəkkirləri konfliktlərin insanın daxilindən doğduğunu, şəxsiyyətin konflikt daşıyıcısı olduğunu hesab edirdilər. Müasir dövrdə də konfliktin yaranmasını insanın onun daxilindəki mənfi enerjidən azad olmasında axtaran nəzəriyyələr mövcuddur. Bu konsepsiyaya görə konfliktlə tələbat bioloji mahiyyət daşıyır və izafi enerjinin neytrallaşması zərurətindən yaranır.
Şəxsiyyətdaxili konflikt insanın daxilindəki ziddiyyət olub onun "Mən"inin müxtəlif cəhətləri, arzuları, ani tələbatları ilə normalar və dəyərlər sistemi arasındakı konfliktin təzahürüdür. Onun əsası uşaq yaşlarından qoyulur. Şəxsiyyətdaxili konfliktlər bir fərdin şüurunda baş verən əks meyllərin mübarizəsidir.
İstənilən şəxsiyyətdaxili konfliktin əsasında seçim problemi dayanır. Praktiki olaraq fərd həmişə fəaliyyətin bir neçə sosial əhəmiyyətə malik variantları ilə qarşılaşır: sərvət (bolluq) və ya məhəbbət, xasiyyət və ya xarici görünüş, şəxsi həyat və ya vəzifə yüksəlişi, ailə və ya iş. Bir-birlərini qarşılıqlı inkar edən meyllərin mübarizəsi şəxsiyyətdaxili konfliktləri yaradan əsas səbəb rolunu oynayır. İki və daha çox pozitiv meyllər də konfliktlərə səbəb olur.

ƏSAS MƏZMUN

İnsan həyatı elə qurulmuşdur ki, şəxsiyyətin optimal inkişaf prosesinə, onun daxili aləminin inkişafına mane olan mümkün şəraitlərin ehtimalı yüksəkdir. Bu maneələrə hazır olmadıqda böhran daha da dərinləşir. Şəxsiyyətdaxili konfliktə malik olmayan insan təsəvvür etmək mümkün deyil. İnsan destruktiv və daxili konfliktə malik olmayan hallarda onları zəiflədib sağalamlığa minimal təsirlə dəf etmək gərəkdir. Şəxsiyyətdaxili konfliktlər, fərdin öz daxili düşüncələri, hissləri və istəkləri arasında yaşadığı ziddiyyətlər və qarşıdurmaların nəticəsidir. Bu cür konfliktlər fərdin emosional və psixoloji vəziyyətinə təsir edə bilər. Şəxsiyyətdaxili konfliktlərin səbəbləri və növləri müxtəlif ola bilər. Əsas növləri bunlardır:

Dəyərlər və İstək Konflikti: Fərd, öz dəyərləri və əxlaqi prinsipləri ilə şəxsi istəkləri arasında ziddiyyət yaşaya bilər. Məsələn, bir şəxs etik prinsiplərə uyğun davranmaq istəyir, lakin şəxsi mənfəəti üçün əxlaqsız bir hərəkət etmək arzusunda ola bilər.
İnkişaf Konflikti: İnsan, özünün müxtəlif mərhələlərindəki inkişaf tələbləri ilə əvvəlki mərhələlərdəki davranış və düşüncələr arasında mübarizə aparır. Məsələn, gənc bir şəxs müstəqil olmağı arzulayır, lakin hələ də valideynlərin nəzarətinə tabe olmaq istəyi ilə mübarizə aparır.
Şəxsiyyət Rolları Konflikti: Bir şəxs müxtəlif sosial rollar arasında (məsələn, işdə lider və evdə valideyn) ziddiyyət yaşaya bilər. Bu, fərdin müxtəlif mühitlərdəki tələblərini yerinə yetirməkdə çətinlik çəkməsinə səbəb ola bilər.
Məqsəd və Daxili İhtiyaclar Konflikti: Fərd, uzunmüddətli məqsədləri ilə gündəlik ehtiyacları arasında qarşıdurma yaşaya bilər. Məsələn, bir şəxs karyera inkişafına yönəlmək istəyir, lakin şəxsi həyatında rahatlıq və təmkinli bir mühit axtarır.
Şəxsiyyətdaxili Konfliktlərin Həlli:Özünü Tanıma: Fərd öz daxili münaqişələrinin səbəblərini və təzahürlərini anlamağa çalışmalıdır.
Düşüncə və Hisslərin İdarə Edilməsi: Öz düşüncə və hisslərini daha yaxşı başa düşmək və idarə etmək üçün müxtəlif psixoloji metodlar istifadə edilə bilər.
Təsirli Kommunikasiya: Öz fikirləri və hissləri haqqında açıq və dürüst ünsiyyət qurmaq, konfliktlərin həllinə kömək edə bilər.
Məqsəd və Prioritetlərin Aydınlaşdırılması: Şəxsi məqsədləri və prioritetləri müəyyən etmək və onlara uyğun davranış sərgiləmək konfliktlərin azalmasına səbəb ola bilər. Bu, şəxsi inkişaf və emosional rifah üçün vacib bir sahədir və fərdin psixoloji sağlamlığına müsbət təsir edə bilər.
K. Levin şəxsiyyətdaxili konflikti öyrənmişdir. Levinə eyni səviyyəli, müxtəlif istiqamətli təsir insanda daxili konflikt yaradır. Şəxsiyyətdaxili konfliktin həll olunması insanda həyəcan hissi, frustrasiya yaradır, onun peşə fəaliyyətinə mənfi təsir göstərir, insanı asılı edir. Bir çox hallarda şəxsiyyətdaxili konflikt başqa adamlar tərəfindən yaradılır. ABŞ-yə gəldikdən sonra Levin qrup differensiyası, ünsiyyət üslubunun tipologiyası problemləri ilə məşğul olur. O təklif edir ki, qrupa dinamik sistem, şəxsiyyətin psixoloji sahəsi kimi baxılmalıdır. İnsanın qrupda sosial davranışı qrupdaxili münasibətlər, qrupdaxili ənənələr, ünsiyyət üslubu ilə formalaşır. Davranış psixoloji sahə və tələbat funksiyası ilə birbaşa bağlıdır. K. Levin demokratik, avtoritar və liberal ünsiyyət üslublarını müəyyən etdi. O həm qrupda liderliyin yaranması məsələlərini öyrənmişdir. Bu sosial psixologiyada yeni bir istiqamətin – qrup dinamikası prosesinin yaranmasını şərtləndirdi. Levinin tədqiqatları şəxsiyyət psixologiyası, sosial psixologiya sahəsində eksperimental metodlardan istifadə etməyin mümkünlüyünü əsaslandırırdı. Beləliklə, geştaltpsixoloqların tədqiqatları yaradıcı təfəkkürdən tutmuş şəxsiyyətin fəallığı kimi çoxsaylı problemləri əhatə edir. Psixikanın öyrənilməsi qavrayışın, təfəkkürün, şəxsiyyətin inkişaf qanunauyğunluqlarını, onların əsaslı fərqini müəyyənləşdirmək imkanı verdi. Onların eksperimental yolla aldıqları nəticələr bu gün də aktual olaraq qalır.
Şəxsdaxili konfliktlər adətən ruhda nizam və ustad olmadıqda, dəyərlərin üstünlüyündə aydınlıq olmadıqda, insan ağlın nə olduğunu unutduqda, bədən və ruhdan başqa ruhun da olduğunu xatırlamayanda baş verir.
Şəxsiyyətdaxili münaqişə təcrübəsi, hər hansı bir münaqişə kimi, çox müxtəlifdir. Təcrübə etməyə meylli insanlar üçün şəxsiyyətdaxili münaqişə güclü emosional təcrübələrlə müşayiət olunur. Təhlil etməyə meylli insanlar üçün şəxsiyyətdaxili münaqişə maraqla özlərini araşdırmaq üçün bir fürsətdir. İnkişaf etmiş yumor hissi və hər şeyə müstəqil münasibəti olan insanlar üçün şəxsiyyətdaxili münaqişə zarafat etmək və əylənmək üçün bir səbəbdir.

Bir insan üçün "şəxsdaxili münaqişə" anlayışının vəziyyətindən də çox şey asılıdır. Çox canlı təxəyyülü olan insanlar üçün bu bir reallıqdır; başqaları üçün şəxsiyyətdaxili münaqişələrdən danışmaq metaforadan başqa bir şey deyil.
Bir tərəfdən, təcrübəli və məsuliyyətli psixoterapevtin əlində bir vasitə kimi, şəxsiyyətdaxili konfliktlərin modelləşdirilməsi müştərini onun üçün vacib olan mövzularda faydalı və konstruktiv düşüncələrə sövq edə bilər. Digər tərəfdən, alt-şəxsiyyətlərin konfliktindən danışmaq, bu münaqişəni yaratmaq və oynamaq bəlkə də mövcud olmayan konfliktin dayanmasına yox, sadəcə onun yaranmasına gətirib çıxara bilər.

NƏTİCƏ

İnsanlar öz fərdi xüsusiyyətlərindən asılı olaraq daxili ziddiyyətlərə müxtəlif reaksiyalar verir. Bir qisim insanlar dərin düşüncələrə dalir, digərləri həmin saat yeni fəaliyyətə başlayır. Üçüncü qisim insanlar isə emosional düşüncələrdə özlərini boğur. Şəxsiyyətdaxili konfliktlərə qarşı vahid bir resept yoxdur. Vacib odur ki, insan gərək konstruktiv yollar axtarsın. Bunun üçün isə insanda yüksək iradə olmalıdır. İradə çətin anlarda daxili istəkləri xarici tələblərə uyğunlaşdırır. Konfliktdən çıxmaq yolları qadın və kişilərdə fərqlidir. Kişilər daha rasionaldırlar. Onlar hər bir yeni şəxsiyyətdaxili təəsürütlar zamanı özlərinin həlletmə arsenallarını genişləndirirlər. Qadınlar isə hər dəfə müxtəlif cür sevinir və kədərlənirlər.qadınlar əldə edilmiş təcrübələri daha çox yeniləşdirir, yenidən baxır.
Təbiətdə,cəmiyyətdə və insanlar arasında ziddiyətlərin olması və onların tənzimlənməsi bu sistemlərdə baş verən keyfiyyət dəyişikliklərinin inkişafının və yeniləşməsinin əsas səbəbi kimi çıxış edir. Cəmiyyətin həyatının bütün sahələrində insanların ,sosial qrupların fəaliyyətlərində, o cümlədən, idarəetmədə yaranan ziddiyətlərin ,problem vəziyyətlərin,problem vəziyyətlərinin həll olunması və tənzimlənməsi mühüm idarəetmə vəzifəsi kimi çıxış edir. Ziddiyətlərin daha kəskin formaları isə bəzən arzu olunmayan nəticələrə yəni tərəflərin bir –birini inkar etməsinə və ya qarşı tərəfin məhv olmasına gətirib cıxardı. Beləliklə,ziddiyətlərin mahiyyətinin ,xarakterinin səbəblərinin qanunauyğunluqlarının öyrənilməsi bialoji və sosial sistemlərdə ,insanlararası münasibətlərdə baş verən proseslərin və bu hadisələrin gələcək inkişaf meyllərini müəyyən etməyə və proqnozlaşdırmağa və müvafiq proflaktik qabaqlayıcı tədbirlərin həyata keçrilməsinə imkan yaradır.

ƏDƏBİYYAT

1. Bayramov Ə. S, Əlizadə Ə. Ə. Sosial psixologiya. Bakı. 2003.
2. Əmirov İ.B.,Hacıyeva Z.E. Menecment. Bakı, 2015
3. Salamova K.B.Menecment psixologiyası. Bakı, 2015
4. Seyidov S. Menecment psixologiyası. Bakı,2011
5. Haqverdiyev B. İdarəetmə psixologiyası, 2008.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

SAĞLIK ÇALIŞANLARINDA DEĞİŞİME DİRENÇ ÖRGÜTSEL ÖĞRENME İLİŞKİSİNDE DÖNÜŞÜMCÜ LİDERLİK ALGISININ VE YAPAY ZEKÂ KAYGISININ ROLÜ

Dr. Öğr. Grv. Cemile ŞEKER
Yakın Doğu Üniversitesi, Turizm Fakültesi, Turizm, Araştırma Merkezi
ORCID: 0000-0002-9150-6845

Dr. Aslı Ercan ÖNBIÇAK
ORCID: 0000-0003-2479-0919

Dr. Öğr. Üyesi Aslı KAYA
İstanbul Gelişim Üniversitesi, Sağlık Bilimleri Fakültesi, Sağlık Yönetimi
ORCID: 0000-0001-6818-3868

Dr. Öğretim Üyesi Ahmet ERKASAP
İstanbul Gedik Üniversitesi
ORCID: 0000-0002-6239-1700

ÖZET
Sürekli değişen çevre koşulları, örgütler için yenilikçi olma ve değişime ayak uydurma zorunluluğunu ortaya koymaktadır. Sağlık sektöründe, değişime direnç gösteren çalışanlar, örgütlerin değişime uyum sağlamasında sorunlar yaratabilir. Bu bağlamda, dönüşümcü liderlik ve örgütsel öğrenme, değişime uyum sağlama ve rekabet avantajı elde etme süreçlerinde kritik öneme sahip olabilir. Yapay zekâ kaygısının ve dönüşümcü liderliğin, değişime direnç ve örgütsel öğrenme ilişkisindeki rolünü ve bu dört değişken arasındaki ilişkileri, etkileri analiz etmek amacıyla yapılan bu çalışma, yöneticilere yol göstererek işletmenin rekabet avantajını artıracaktır. Bu dört değişken arasındaki ilişkiyle ilgili herhangi bir çalışmaya rastlanmamış olması ve literatüre yeni ilişkilerin eklenmesi açısından çalışma, önem arz etmektedir. Çalışma kapsamındaki bütün ölçeklerin iç tutarlılığını ölçmek amacıyla güvenilirlik testi, tüm ölçeklerin yapı geçerliliğini belirlemek amacıyla doğrulayıcı faktör analizi, değişkenler arasındaki ilişkileri tespit etmek amacıyla korelasyon analizi ve son olarak hipotezleri test etmek ve değişkenlerle ilgili doğrudan ve dolaylı etkileri belirlemek amacıyla yapısal eşitlik modeli uygulanacaktır.
Anahtar Kelimeler: Değişime Direnç, Örgütsel Öğrenme, Yapay Zekâ Kaygısı, Liderlik

THE ROLE OF TRANSFORMATIONAL LEADERSHIP PERCEPTION AND ARTIFICIAL INTELLIGENCE ANXIETY IN THE RELATIONSHIP BETWEEN RESISTANCE TO CHANGE AND ORGANIZATIONAL LEARNING IN HEALTH CARE PROFESSIONALS

ABSTRACT
Constantly changing environmental conditions reveal the necessity for organizations to be innovative and keep up with change. In the healthcare sector, employees who are resistant to change can create problems in organizations' adaptation to change. In this context, transformational leadership and organizational learning can be critical in the processes of adapting to change and gaining competitive advantage.

This study, which aims to analyze the role of artificial intelligence concern and transformational leadership in the relationship between resistance to change and organizational learning, and the relationships and effects between these four variables, will increase the competitive advantage of the business by guiding managers. The study is important in terms of not having found any studies on the relationship between these four variables and adding new relationships to the literature. Reliability test will be applied to measure the internal consistency of all scales within the scope of the study, confirmatory factor analysis to determine the construct validity of all scales, correlation analysis to determine the relationships between variables, and finally structural equation modeling will be applied to test the hypotheses and determine the direct and indirect effects related to the variables.

Keywords: Resistance to Change, Organizational Learning, Artificial Intelligence Anxiety, Leadership

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

DEPREMZEDE HEMŞİRELİK ÖĞRENCİLERİNDE SAYILARLA BOYAMA ETKİNLİĞİNİN, PSİKOLOJİK İYİ OLUŞ, DEPREM STRESİ İLE BAŞ ETME STRATEJİLERİ, KLİNİK UYGULAMALARA YÖNELİK TUTUM VE MEMNUNİYET ÜZERİNE ETKİSİ: RANDOMİZE KONTROLLÜ DENEYSEL ÇALIŞMA

Arş. Gör. Dr. Muhammed DENİZ
Kafkas Üniversitesi, Sağlık Bilimleri Fakültesi, Cerrahi Hastalıkları Hemşireliği Anabilim Dalı
ORCID: 0000-0001-6129-9526

Neslihan DURNA
Kafkas Üniversitesi, Sağlık Bilimleri Fakültesi, Hemşirelik Bölümü
ORCID: 0009-0006-1058-5374

ÖZET

Ülkemiz başta depremler olmak üzere, heyelan, su baskını, kaya düşmesi ve çığ gibi çeşitli afetlerle yüz yüze kalmaktadır. Türkiye'de en çok insanı etkileyen afet türü deprem olmuştur. Deprem gibi travmatik bir olay yaşayan öğrencilerde, fiziksel yaralanmalarının yanı sıra yaşadıkları yerden ayrılma, sevdiği ve yakın olduğu kişileri kaybetmeleri gibi durumların yarattığı psikolojik travmalar önemli bir sorundur. Bu nedenle depremin öğrenciler üzerindeki olumsuz etkilerini azaltmak için deprem stresi ile baş etme stratejileri geliştirilmelidir. Öğrencilerin deprem stresini azaltmada kullanılacak yöntemlerden biri de sanatsal faaliyetlerdir. Literatürde, sanat faaliyetlerin stresi azalttığı, bağışıklık sistemini güçlendirdiği, kişinin rahatlamasına ve kendini ifade etmesine yardımcı olduğu bulunmuştur. Bu çalışmanın amacı depremzede hemşirelik öğrencilerinde sayılarla boyama etkinliğinin, psikolojik iyi oluş, deprem stresi ile baş etme stratejileri, klinik uygulamalara yönelik tutum ve memnuniyet üzerine etkisini araştırmaktır. Araştırma Doğu Anadolu ilindeki bir üniversitede öğrenim gören depremzede hemşirelik öğrencilerinde randomize kontrollü deneysel çalışma olarak yapılmıştır. Araştırma örneklemine 27 müdahale ve 27 kontrol grubu olmak üzere toplam 54 öğrenci alınmıştır. Araştırmada veriler; "Tanıtıcı Bilgi Formu", "Psikolojik İyi Oluş Ölçeği", "Deprem Stresi İle Baş etme Stratejileri Ölçeği", "Hemşirelik Öğrencileri için Klinik Uygulamalara Yönelik Tutum Ölçeği" ve "Sayılarla Boyama Memnuniyeti Değerlendirme Formu" kullanılmıştır. Verilerin değerlendirilmesinde sayı, yüzde, bağımsız örnekler t testi ve Man Whitney U testi kullanılmıştır. Öğrencilerin yaş ortalaması 21,48±1,72, % 53,7'sinin kız, %40.7'sinin dördüncü sınıf, %51,9'unun Diyarbakır'da ikamet ettiği, 53,7'sinin gelirinin giderinden az, %77,8'inin daha öncede doğal afet yaşadığı, %61,1'inin depremde evlerinin az hasar gördüğü, %70,4'ünün depremden kaynaklanan maddi sorun yaşamadığı, %74,1'inin depremin insan psikolojisi üzerine etkisi hakkında bilgi sahibi olduğu, %94,4'ünün deprem sonrası anksiyete yaşadığı, %53,7'sinin deprem sonrası uykusuzluk yaşadığı, %70,4'ünün deprem sonrası psikolojik desteğe ihtiyacı olmadığı, %50'sinin deprem stresiyle baş edebildiği, %14,8'inin arkadaş ve aileyle zaman geçirerek stresle baş edebildiği, %64,8'inin sayılarla boyama uygulamasının stresle baş etmede etkili olacağını düşündükleri bulunmuştur. Deney grubu ve kontrol grubunda yer alan depremzede öğrencilerin PİOÖ ön test puan ortalaması ile son test puan ortancası arasında istatistiksel olarak anlamlı fark bulunmamıştır ($p>0,05$). Öğrencilerin DSBESÖ dini baş etme, olumlu değerlendirme ve sosyal destek alt boyutlarının ön test- son test puan ortalaması/ortancası arasında istatistiksel olarak anlamlı fark bulunmamıştır ($p>0,05$).

HÖKUÖ ön test puan ortalaması ile son test puan ortancası arasında istatistiksel olarak anlamlı fark bulunmamıştır (p>0,05). Yapılan bu çalışmada müdahale olarak kullanılan sanat faaliyeti depremzede öğrencilerde istatistiksel fark oluşturmasada sayısal anlamda öğrencilerin psikolojik iyi oluşlarını, deprem stresi ile baş etme stratejilerini ve klinik uygulamalara yönelik tutumlarını arttırdığı ve öğrencilerin sanat faaliyetinden oldukça memnun kaldıkları bulunmuştur. Depremi yaşamış illerdeki hemşirelik öğrencilerinde benzer sanatsal faaliyetlerin yapılması önerilmektedir.
Anahtar Kelimeler: Depremzede, öğrenci, hemşirelik, sanat terapi.

*Bu çalışma "**TÜBİTAK 2209-A Üniversite Öğrencileri Araştırma Projeleri Destekleme Programı**" kapsamında desteklenmektedir.

THE EFFECT OF COLORING BY NUMBERS ACTIVITY ON PSYCHOLOGICAL WELL-BEING, STRATEGIES FOR COPING WITH EARTHQUAKE STRESS, ATTITUDES TOWARDS CLINICAL PRACTICES AND SATISFACTION IN NURSING STUDENTS SURVIVED BY THE EARTHQUAKE: A RANDOMIZED CONTROLLED EXPERIMENTAL STUDY

ABSTRACT

Our country is faced with various disasters, especially earthquakes, landslides, floods, rock falls and avalanches. The type of disaster that affected the most people in Turkey was earthquake. For students who experience a traumatic event such as an earthquake, psychological trauma caused by situations such as leaving their place of residence and losing loved ones and close people, in addition to their physical injuries, is an important problem. Therefore, strategies to cope with earthquake stress should be developed to reduce the negative effects of the earthquake on students. One of the methods to reduce students' earthquake stress is artistic activities. In the literature, it has been found that artistic activities reduce stress, strengthen the immune system, and help people relax and express themselves. The aim of this study is to investigate the effect of coloring by numbers activity on psychological well-being, strategies for coping with earthquake stress, attitudes towards clinical practices and satisfaction among earthquake-affected nursing students. The research was conducted as a randomized controlled experimental study on earthquake-affected nursing students studying at a university in Eastern Anatolia. A total of 54 students, 27 in the intervention group and 27 in the control group, were included in the research sample. Data in the research; "Introductory Information Form", "Psychological Well-Being Scale", "Earthquake Stress Coping Strategies Scale", "Attitude Scale Towards Clinical Practices for Nursing Students" and "Painting by Numbers Satisfaction Evaluation Form" were used. Number, percentage, independent samples t test and Man Whitney U test were used to evaluate the data. The average age of the students is 21.48±1.72, 53.7% are girls, 40.7% are in the fourth grade, 51.9% live in Diyarbakır, 53.7% have an income less than their expenses, 77%, 8 of them had experienced a natural disaster before, 61.1% of them had little damage to their houses in the earthquake, 70.4% had no financial problems resulting from the earthquake, 74.1% had knowledge about the effect of the earthquake on human psychology, % 94.4% of them experienced anxiety after the earthquake, 53.7% had insomnia after the earthquake, 70.4% did not need psychological support after the earthquake, 50% could cope with the earthquake stress, 14.8% had friends. It was found that they could cope with stress by spending time with their children and family, and 64.8% thought that painting by numbers would be effective in coping with stress.

There was no statistically significant difference between the PWB pre-test score average and post-test median score of the earthquake victim students in the experimental group and control group ($p>0.05$). There was no statistically significant difference between the students' pre-test and post-test mean/median scores of the CESS religious coping, positive evaluation and social support sub-dimensions ($p>0.05$). There was no statistically significant difference between the NSCAPS pre-test score average and post-test median score ($p>0.05$). In this study, although the art activity used as an intervention did not create a statistical difference in earthquake-affected students, it was found that it numerically increased the psychological well-being of the students, their strategies for coping with earthquake stress, and their attitudes towards clinical practices, and the students were quite satisfied with the art activity. It is recommended that nursing students in provinces that experienced the earthquake do similar artistic activities.
Keywords: Earthquake survivor, student, nursing, art therapy.

*This study is supported within the scope of " **TÜBİTAK 2209-A University Students Research Projects Support Program**".

CERRAHİ HASTALIKLARI HEMŞİRELİĞİ KLİNİK UYGULAMASINDA ZEKA OYUNUYLA DİKKATİ BAŞKA YÖNE ÇEKME YÖNTEMİNİN ÖĞRENCİLERDE KLİNİK STRES, STRESLE BAŞ ETME DAVRANIŞLARI VE MEMNUNİYET ÜZERİNE ETKİSİ: YARI DENEYSEL ÇALIŞMA

Arş. Gör. Dr. Muhammed DENİZ
Kafkas Üniversitesi, Sağlık Bilimleri Fakültesi, Cerrahi Hastalıkları Hemşireliği Anabilim Dalı
ORCID: 0000-0001-6129-9526

İlknur ÇİÇEK
Kafkas Üniversitesi, Sağlık Bilimleri Fakültesi, Hemşirelik Bölümü
ORCID: 0009-0000-1354-4910

Prof. Dr. Yeliz AKKUŞ
Kafkas Üniversitesi, Sağlık Bilimleri Fakültesi, İç Hastalıkları Hemşireliği Anabilim Dalı
ORCID: 0000-0002-9321-2357

Dr. Öğr. Üyesi Semra ERDAĞI ORAL
Kafkas Üniversitesi, Sağlık Bilimleri Fakültesi, Cerrahi Hastalıkları Hemşireliği Anabilim Dalı
ORCID: 0000-0001-9127-6448

ÖZET

Klinik ortam, öğrencilerin teorik bilgi ve becerilerini klinik uygulamaya aktararak bilişsel, duyuşsal ve psikomotor alanlarda bilgi, beceri ve tutum kazandıkları yerdir. Klinik uygulama ortamları öğrencilerin profesyonel bilgi ve becerilerinin gelişmesine katkı sağlarken diğer taraftan da hemşire öğrenciler için önemli bir stres kaynağıdır. Tanımadığı bir ortamda ilk kez bulunma, kalabalık bir ortamda klinik uygulama, mesleki bilgi ve pratik becerilerin eksikliği gibi faktörler klinik uygulamada öğrencilerde stres yaratan bazı durumlardır. Hemşirelik eğitiminin amacına ulaşması ve öğrencilerin olumlu profesyonel kimlik gelişimleri için öğrencilerin klinik streslerinin azaltılması ya da ortadan kaldırılması ve klinik stres ile öğrencilerin etkin baş etmesi önemlidir. Öğrencilerin klinik stresiyle etkin baş etmede kullanacakları yöntemlerden biri zeka oyunudur. Bu araştırmanın amacı cerrahi hastalıkları hemşireliği klinik uygulamasında zeka oyunuyla dikkati başka yöne çekme yönteminin öğrencilerde klinik stres, stresle baş etme davranışları ve memnuniyet üzerine etkisini araştırmaktır. Araştırma Doğu Anadolu ilindeki bir üniversitede öğrenim gören hemşirelik ikinci sınıf öğrencilerinde yarı deneysel bir çalışma olarak planlanmıştır. Çalışma 51 öğrenci ile tamamlanmıştır. Araştırmada veriler; "Öğrenci Hemşire Bilgi Formu", "Pagana Klinik Stres Anketi", "Hemşirelik Öğrencileri için Stresle Baş etme Davranışları Ölçeği" ve "Zeka Oyunu Memnuniyeti Değerlendirme Formu" kullanılarak toplanmıştır. Zeka oyunu oynatılmadan önce ön test verileri, zeka oyunu oynatıldıktan sonra ise son test verileri toplanmıştır. Verilerin değerlendirilmesinde sayı, yüzde, bağımlı örnekler t testi, Wilcoxon işaretli sıra testi ve Spearman korelasyon analizi kullanılmıştır. Öğrencilerin %74,5'inin kız, %51'inin gelirinin gidere denk, %56,9'unun kendini sakin/rahat olarak tanımladığı, %80,4'ünün akademik başarısının orta düzeyde, %58,8'inin klinik uygulamada stres yaşadığı, %88,2'sinin zeka oyunlarına ilgili olduğu, %64,7'sinin zeka oyunlarının öğrenciler üzerine psikolojik etkisi hakkında bilgisinin olmadığı, %13,7'sinin klinik stresi ile baş etmede nefes

egzersizi kullandığı, %82,4'ünün zeka oyunu ile klinik stresin azalacağını, %88,2'sinin zeka oyununun stresle baş etmeye olumlu katkı sağlayacağını düşündüğü %51'inin zeka oyunu oynamaktan memnun kaldığı bulunmuştur. Öğrenciler 12 tane zeka oyunundan ortalama 10,6471±1,09772 sayıda oyunu doğru çözmüştür. Öğrencilerin PKSA ön test ve son test puan ortalama değerleri arasında istatistiksel olarak anlamlı bir fark bulunmamıştır ($p>0,05$). Ancak PKSA "yarar alt boyutu" puan ortalamaları zeka oyunu sonrasında istatistiksel olarak anlamlı bulunmuştur ($p<0,05$). Öğrencilerin HÖSBEDÖ ön test ve son test puan ortalama değerleri arasında istatistiksel olarak anlamlı bir fark bulunmamıştır ($p>0,05$). Öğrencilerin PKSA ve HÖSBEDÖ toplam puan ortalamaları arasında istatistiksel olarak pozitif yönde çok zayıf düzeyde anlamsız ilişki olduğu bulunmuştur ($r=0,003$, $p>0,05$). Yapılan bu çalışmada zeka oyunu oynamak öğrenciler de klinik stresi istatiksel olarak anlamlı azaltmasada sayısal anlamda azalttığı, stresle baş etmede olumlu etki gösterdiği ve öğrencilerin zeka oyunundan oldukça memnun kaldıkları bulunmuştur. Hemşirelik öğrencilerinde klinik stresi azaltacak farklı zeka oyunlarının oynanması ve farklı üniversitelerde öğrencilerle çalışmanın yapılması önerilmektedir.

Anahtar Kelimeler: Hemşirelik öğrencisi, klinik stres, zeka oyunu, stresle baş etme.

THE EFFECT OF DISTRACTION WITH MIND GAMES IN SURGICAL NURSING CLINICAL PRACTICE ON CLINICAL STRESS, STRESS COPING BEHAVIORS AND SATISFACTION IN STUDENTS: QUASI-EXPERIMENTAL STUDY

ABSTRACT

The clinical environment is the place where students gain knowledge, skills and attitudes in cognitive, affective and psychomotor areas by transferring their theoretical knowledge and skills to clinical practice. While clinical practice environments contribute to the development of students' professional knowledge and skills, they are also an important source of stress for nurse students. Factors such as being in an unfamiliar environment for the first time, clinical practice in a crowded environment, lack of professional knowledge and practical skills are some of the situations that create stress for students in clinical practice. In order for nursing education to achieve its purpose and for students' positive professional identity development, it is important to reduce or eliminate students' clinical stress and to cope with clinical stress effectively. One of the methods that students will use to effectively cope with clinical stress is the mind game. The aim of this study is to investigate the effect of the distraction method with mind games in surgical nursing clinical practice on clinical stress, stress coping behaviors and satisfaction in students. The research was planned as a quasi-experimental study on second-year nursing students studying at a university in Eastern Anatolia. The study was completed with 51 students. Data in the research; It was collected using the "Student Nurse Information Form", "Pagana Clinical Stress Survey", "Stress Coping Behaviors Scale for Nursing Students" and "Brain Game Satisfaction Evaluation Form". Pre-test data was collected before the brain teaser was played, and post-test data was collected after the brain game was played. Number, percentage, dependent samples t test, Wilcoxon signed rank test and Spearman correlation analysis were used to evaluate the data. 74.5% of the students are female, 51% have an income equal to their expenses, 56.9% describe themselves as calm/comfortable, 80.4% have moderate academic success, and 58.8% experience stress in clinical practice. 88.2% of them are interested in mind games, 64.7% have no knowledge about the psychological effects of mind games on students, 13.7% use breathing exercises to cope with clinical stress, 82.4% It was found that 88.2% thought that clinical stress would decrease with the brain teaser and that 51% thought that the brain game would contribute positively to

coping with stress, and 51% were satisfied with playing the brain teaser. Students solved an average of 10.6471±1.09772 games out of 12 brain games correctly. There was no statistically significant difference between the students' PCSS pretest and posttest mean scores ($p>0.05$). However, PCSS "benefit subdimension" mean scores were found to be statistically significant after the brain game ($p<0.05$). There was no statistically significant difference between the students' CBSSNS pre-test and post-test mean scores ($p>0.05$). It was found that there was a statistically very weak and insignificant positive relationship between the students PCSS and CBSSNS total score averages ($r=0.003$, $p>0.05$). In this study, it was found that playing a brain game did not reduce clinical stress in students statistically significantly, but it did reduce it numerically, had a positive effect on coping with stress, and the students were quite satisfied with the mind game. It is recommended that nursing students play different intelligence games to reduce clinical stress and work with students at different universities.
Keywords: Nursing student, clinical stress, mind game, coping with stress.

KPC TİPİ KARBAPENEMAZLARIN POTANSİYEL İNHİBİTÖRLERİ OLARAK İKİ ESKİ İLAÇ: DİFLUNİSAL VE DB01662

Turgay BAL
Adıyaman Üniversitesi, Fen Edebiyat Fakültesi, Biyoloji Bölümü
ORCID: 0000-0002-5529-5809

Doç. Dr. Hesna YİĞİT
Adıyaman Üniversitesi, Fen Edebiyat Fakültesi, Biyoloji Bölümü
ORCID: 0000-0003-0787-9479

ÖZET

KPC (Klebsiella pneumoniae carbapenemase) tip enzimler, karbapenemleri ve genişlemiş spektrumlu β-laktamazları hidroliz edebildiklerinden, son yıllarda enfeksiyon tedavisinde sorun olmaktadırlar. Bugüne kadar hidroliz profilleri farklılıklar gösterebilen 153 KPC varyantı tanımlanmıştır. Dolayısıyla, bu tip enzimleri inhibe eden yeni bileşiklerin geliştirilmesi gerekmektedir. Bu süreçlerde, araştırma maliyetinin ve süresinin azaltılması için son yıllarda geliştirilen, akademisyenlere açık biyoinformatik web sitelerinin kullanımı yaygınlaşmıştır. Çalışmamız bu web siteleri üzerinden yapılmıştır.

Bu programlardan "Binding DB" KPC tip enzimlere bağlanabilen bileşiklerin taranmasında kullanılmıştır. KPC-2 için Ki değeri 1.90 nM olan Xeruborbaktam detaylı araştırılmıştır. Xeruborbaktam çok sayıda serin ve metalo-beta-laktamazın inhibitörüdür.

Yukarıda verilen bilgiler dahilinde, iyi bir başlangıç oluşturacağı prensibiyle Xeruborbaktam benzeri bileşiklerin taraması "SwissSimilarity" web sitesinden "Drugs", "DrugBank, Combined" kriterleri kullanılarak yapılmıştır. Bu bileşiklerden iki tanesi öne çıkmıştır: DB00861 (Diflunisal) ve DB01662 (Trans-o-hidroksi-alfa-metil sinnamat). DB00861 (benzerlik oranı: 0,675) "SwissDock, AutoDock Vina" ile modellenmiş ve KPC-2 varyantına -6,988 kcal/mol bağlanma afinitesi göstermiştir. DB01662 0,576 benzerlik oranı olan diğer bir bileşik olarak karşımıza çıkmıştır. KPC enzimine bağlanma afinitesi -5,863 kcal/mol olarak hesaplanmıştır. Elde edilen bağlanma modellerinde DB00861 ve DB01662 bileşikleri KPC-2 varyantının katalitik Ser-70 amino asidi ile hidrojen bağı yapmaktadırlar. Bu bağlanma enerjileri KPC enziminin inhibitörü olan tazobaktam için aynı şartlarda elde edilen bağlanma afinitesinden daha iyi görünmektedirler (-5,284 kcal/mol). Aynı koşullarda Meropenem için KPC-2 varyantına bağlanma afinitesi -7,353 kcal/mol olarak hesaplanmıştır. DB00861 ve DB01662 bileşiklerinin "SwissADME" verileri incelenmiş ve her ikisinin verilerinin de ilaç araştırma ve geliştirme çalışmaları için yeterli oldukları gözlemlenmiştir.

Diflunisal, non-steroidal anti-inflamatuar bir ilaçtır. "SwissTargetPrediction" web sitesinden insan hedef proteinleri araştırılmış, Karbonik Anhidraz I, II ve Transtiretin'e 0,936 olasılıkla bağlana bileceği gözlenmiştir. Dolayısıyla, hem bakteriyel hem de insan hedefleri için yeni ilaçların geliştirilmesinde kullanılabilir. DB01662, anti-inflamatuar ve analjezik özelliklere sahiptir. Yapılan çalışmada insan hedefi olarak 0,081 olasılıkla Karboksipeptidaz A1'e bağlana bileceği bulunmuştur. Dolayısıyla DB01662 bakteriyel hedeflere spesifik ilaç olarak geliştirilebilir.

Anahtar Kelimeler: Karbapenemaz, KPC, İnhibitör, Diflunisal.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

TWO OLD DRUGS AS POTENTIAL INHIBITORS OF KPC TYPE CARBAPENEMASES: DIFLUNISAL AND DB01662

ABSTRACT

Since KPC type enzymes (Klebsiella Pneumoniae Carbapenemase) hydrolyze, carbapenem and extended spectrum β-lactams, thus are problems in the treatment of infections in recent years. To date, 153 KPC variants with different hydrolysis profiles have been identified. Therefore, new compounds inhibiting these needed. The use of bioinformatics websites developed in recent years open to academicians, to reduce the research cost and duration, has become widespread. Our study was done through these websites.

From these programs, “binding DB” used to scan the compounds specific to KPC type enzymes. Xeruborbactam with Ki value 1.9 nM for KPC-2, was further investigated. Xeruborbactam is the inhibitor of many serine and metallo-beta-lactamases.

Within the scope of the information given above, the screening of Xeruborbactam -like compounds was done by using “Drugs”, “DrugBank, Combined” criteria from the “SwissSimilarity” website. Two of these compounds stand out: DB00861 (Diflunisal) and DB01662 (Trans-O-Hydroxy-Alpha-Methyl Cinnamate). DB00861 (similarity ratio: 0.675) was modeled with “SwissDock, AutoDock Vina and showed -6,988 kcal/mol binding affinity to KPC-2. DB01662 with a similarity ratio of 0.576 is another compound. The binding affinity to the KPC-2 enzyme was calculated as -5.863 kcal/mol. In the binding models, DB00861 and DB01662 make hydrogen bond with the catalytic ser-70 of the KPC-2 enzyme. These binding energies are better than the one obtained for tazobactam (-5.284 kcal/mol). In the same circumstances, the binding affinity of Meropenem was calculated as -7.353 kcal/mol. “SwissADME” data were examined for DB00861 and DB01662 and the results suggested that these compounds could be used for drug discovery and development.

Diflunisal is a non-steroidal anti-inflammatory drug. Human target proteins have been investigated from the website “SwissTargetPrediction” and it was observed that Carbonic Anhydrase I, II and Transthyretin are potential targets with 0.936 probabilities. Therefore, it can be used to develop new drugs for both bacterial and human targets. DB01662 has anti-inflammatory and analgesic properties. In the study, it was found that human targets for this are unlikely (Carboxypeptidase A1 could be a potential target with 0.081 probabiliyt). Therefore, DB01662 can be developed as specific drug for bacterial targets.

Keywords: Carbapenemase, KPC, Inhibitor, Diflunisal.

OKUL ÖNCESİ ÖĞRETMENLERİN İNOVATİF DAVRANIŞLARI ÜZERİNE NİTEL BİR ÇALIŞMA

Doktor Öğretim Üyesi Gülsüm HOŞ
Munzur Üniversitesi, Sağlık Bilimleri Fakülte, Çocuk Gelişimi Bölümü
ORCID: 0000-0002-5335-6778

Doktor Öğretim Üyesi Pınar POLAT
Mardin Artuklu Üniversitesi, Çocuk Bakımı ve Gençlik Hizmetleri Bölümü, Çocuk Gelişimi Programı
ORCID: 0000-0002-5649-376X

Profesör Doktor Ebru DERETARLA GÜL
Çukurova Üniversitesi Eğitim Fakültesi, Temel Eğitim Bölümü, Okul Öncesi Eğitimi Anabilim Dalı
ORCID: 0000-0002-6241-8109

ÖZET
Günümüz dünyası giderek dijitalleşmekte dolasıyla yenileşme ve değişim her geçen gün kaçınılmaz hala gelmektedir. Eğitim sisteminin de mevcut gelişmelere ve yönelimlere uyum sağlaması için yenilikçi davranışlar geliştirmek önemli hale gelmektedir. 21. yüzyılda eğitim sistemindeki hızlı değişiklikler, tüm öğretmenlerden yenilikçi (inovatif) davranışlar geliştirmesini beklemektedir. Öğretmenlerin inovatif ve yaratıcı düşünme becerilerini geliştirmeleri ve uygulamaları, öğrencilerin çağın gereksinimlerine uygun bir şekilde yetişmeleri için kritik bir rol oynamaktadır. Özellikle okul öncesi dönemde çocukların temel bilişsel, duygusal ve sosyal becerilerinin şekillendiği bir evrede, öğretmenlerin inovatif fikirleri benimsemesi büyük bir önem taşımaktadır. Bu bağlamda bu çalışmanın amacı okul öncesi öğretmenlerinin inovatif davranışlarını incelemektir. Nitel araştırma desenlerinden durum çalışmasının kullanıldığı bu çalışmada araştırma verileri yarı yapılandırılmış görüşme yöntemiyle toplanmıştır. Araştırmanın çalışma grubunu 15 okul öncesi öğretmeni oluşturmaktadır. Araştırma sonucunda; öğretmenlerin büyük çoğunluğunun mesleki anlamda inovatif düşünceye sahip olduklarını, yeni ve farklı düşünceler geliştirmek konusunda kendini ilgili ve istekli olarak tanımladıklarını, inovatif düşüncelerini geliştirmek için kişisel çabalarının olduğunu, inovatif yaklaşımlarına yönelik velilerden olumlu geri dönütler aldıklarını ifade ettikleri görülmektedir.
Anahtar Kelimeler: Okul öncesi öğretmenleri, inovatif davranış, okul öncesi eğitim.

A QUALITATIVE STUDY ON THE INNOVATIVE BEHAVIOR OF PRESCHOOL TEACHERS

ABSTRACT
As today's world is becoming increasingly digital, innovation and change are becoming inevitable day by day. It is becoming important to develop innovative behaviors in order for the education system to adapt to current developments and trends. Rapid changes in the education system in the 21st century expect all teachers to develop innovative behaviors. Teachers' development and application of innovative and creative thinking skills play a critical role in students' development in line with the needs of the age.

Especially in the preschool period, at a stage when children's basic cognitive, emotional and social skills are being shaped, it is of great importance for teachers to adopt innovative approaches. In this context, the aim of this study is to examine the innovative behaviors of preschool teachers. In this study, where the case study, one of the qualitative research designs, was used, the research data were collected by semi-structured interview method. The study group consists of 15 preschool teachers. As a result of the research; It was seen that the vast majority of teachers have innovative thinking in a professional sense, define themselves as interested and willing to develop new and different thoughts, make personal efforts to develop their innovative thoughts, and receive positive feedback from parents regarding their innovative approaches.
Keywords: Preschool teachers, innovative behavior, preschool education.

GİRİŞ

Yeni fikirlerin, süreçlerin, ürünlerin veya hizmetlerin geliştirilmesi ve uygulanması süreci olarak tanımlanan inovasyon, günümüzde en popüler temalardan biri olarak karşımıza çıkmaktadır. İnovatif davranış ise yeni fikirlerin bireyler tarafından oluşturulması, yaratılması, geliştirilmesi, uygulanması, teşvik edilmesi, gerçekleştirilmesi ve değiştirilmesi süreci olarak tanımlanmaktadır (Altan, 2018; Baskaran ve Rajarathinam, 2018). Toplumların geleceğini şekillendiren önemli alanlardan biri olan eğitimde de inovasyon fenomeni ve inovatif davranış göz ardı edilemez bir nitelik olarak vurgulanmaktadır. Eğitim alanında öğretmenler inovatif davranışın önemli bir parçası olarak görülmekte, eğitim sisteminin başarısını ve etkinliğini sağlamakta hayati bir role sahip olduğu bilinmektedir (Kundu ve Roy, 2016; Kurtuluş, 2012). İnovasyon eylemleri, eğitim sisteminde kritik değişiklikler yaparak iyileştirmeler sağlayabilmektedir. Özellikle temel eğitimin ilk basamağı olan okul öncesi eğitimde öğretmenlerin inovatif davranışları, çocukların zihinsel, duygusal ve sosyal gelişiminde kritik bir rol oynamaktadır. Bu bağlamda, okul öncesi öğretmenlerinin sahip olduğu bilgi, beceri ve tutumlar, öğrencilerin eğitim yolculuklarının ilk adımlarında büyük önem taşmaktadır.

İlgili alanyazın incelendiğinde yurtiçinde ve yurtdışında öğretmenlerin inovatif davranışlarına yönelik çeşitli araştırmalar yapıldığı görülmüştür. Bu konuda Türkiye'de öne çıkan bir çalışmada, fen bilimleri öğretmenlerinin inovatif düşünme becerilerine ilişkin özyeterlilik algıları incelenmiştir (Erbek, Asiltürk ve Kahyaoğlu, 2023). Araştırma, öğretmenlerin inovatif düşünme becerileri üzerinde çeşitli değişkenlerin etkisini analiz etmektedir. Bir başka araştırmada; Bilir, Ufuk Akbaş ve Darıca (2023), okul öncesi öğretmenlerine yönelik bir inovatif düşünme eğilimi ölçeği geliştirilmiştir. Bu ölçek, öğretmenlerin bireysel yenilikçilik ve değişime direnç seviyelerini ölçmeyi amaçlamaktadır.

Yurtdışında öğretmenlerin inovatif davranışlarına yönelik çeşitli araştırmalar mevcuttur. Bu çalışmalar genel olarak öğretmenlerin inovatif davranışlarını etkileyen faktörleri ve bu davranışların eğitim sistemine katkılarını incelemektedir. Bu çalışmalardan bazıları şunlardır: Trapitsin, Granichin, Granichina ve Zharova (2018), inovatif davranışın tanımı ve analizine yönelik yapmış oldukları çalışmada, öğretmenlerin inovatif davranışları, yeni eğitim ürünleri ve teknolojileri yaratma yetenekleri üzerinden değerlendirilmiştir. Ayrıca öğretmenlerin inovasyona karşı tutumları ve bu tutumların eğitim kurumlarının gelişimine katkıları incelenmiştir. Hsiao, Chang, Tu ve Chen (2011) yaptıkları çalışmada, öğretmen öz-yeterliliğinin inovatif iş davranışı üzerindeki etkisini incelemişlerdir. Araştırma sonuçları, öğretmen öz-yeterliliği ile inovatif iş davranışı arasında güçlü bir pozitif ilişki olduğunu göstermiştir. Daha yüksek öz-yeterliliğe sahip öğretmenlerin daha iyi iş inovasyonu davranışı sergilediği görülmüştür.

Toplumların gelişmesinde büyük sorumlulukları olan öğretmenlerin gelecek nesilleri şekillendirmede mihenk taşı olmaları nedeniyle inovatif düşünceye sahip olmaları önemli olmanın ötesinde bir gerekliliktir artık. Bu bağlamada özellikle okul öncesi öğretmenlerinin inovatif davranışlarının incelenmesi gereklidir. Literatüre baktığımızda okul öncesi öğretmenlerin inovatif davranışlarına yönelik çalışmaların sınırlı olduğunu görmekteyiz (Özer ve Pekşen, 2024; Özer, 2022; Yılmaz, 2013) Bu bağlamda mevcut çalışma okul öncesi öğretmenlerin inovatif davranışlarını incelemeyi amaçlayarak lüteratüre katkı sunacağı düşünülmektedir.

YÖNTEM

Araştırma Modeli

Araştırmanın modeli; bir örneğin, olgunun veya sosyal birimin, yoğun, bütüncül bir biçimde ele alınıp analiz edilmesi olarak tanımlanan nitel araştırma desenlerinden olan durum çalışmasıdır (Yıldırım ve Şimşek, 2016). Bu bağlamada çalışmanın amacı okul öncesi öğretmenlerinin inovatif davranışlarını incelemektir.

Çalışma Grubu

Araştırmanın çalışma grubunu, 15 okul öncesi öğretmeni oluşturmaktadır. Araştırmada katılımcılar amaçlı örnekleme yönteminden ölçüt örneklem yöntemi kullanılarak belirlenmiştir. Amaçlı örnekleme, zengin bilgiye sahip olduğu düşünülen durumların derinlemesine çalışılmasına olanak vermektedir (Yıldırım ve Şimşek, 2016). Örneklem ölçütleri; öğretmenlerin okul öncesi alanında çalışıyor olmaları ve çalışmaya gönüllü olarak katılmaları şeklinde belirlenmiştir.

Veri Toplama Araçları

Araştırmada, veri toplama aracı olarak katılımcılara yönelik araştırmacılar tarafından oluşturulmuş "yarı yapılandırılmış görüşme formu" kullanılmıştır. Formda, araştırmaya katılan öğretmenlere inovatif davranışlarını belirlemek amacıyla 14 soru yöneltilmiştir. Araştırma verileri bireysel görüşmeler şeklinde toplanmıştır. Katılımcılara ait demografik özellikler tablo 1'de sunulmuştur.

Tablo 1. Çalışmaya Katılan Okul Öncesi Öğretmenlere Ait Demografik Özellikler

Demografik Değişkenler	**Grupla**	**n**	**%**
Cinsiyet	Kadın	13	%87
	Erkek	2	%13
Yaş	20-30 yaş	5	%34
	31-40 yaş	10	%66
Eğitim Durumu	Lisans	6	%40
	Lisans üstü	9	%60
Çalışma Süresi	0-5 yıl	5	%34
	6-10 yıl	4	%26
	11-15 yıl	2	%14
	16 yıl ve üzeri	4	%26
Aynı Kurumda Çalışma Süresi	0-5 yıl	8	%54
	6-10 yıl	3	%20
	11-15 yıl	2	%14
	16 yıl ve üzeri	2	%14
Okul Türü	Bağımsız anaokulu	10	%66
	İlköğretime bağlı anasınıfı	5	%34
Kurumun Bulunduğu Yer	İl	9	%60
	İlçe	6	%40

Verilerin Analizi

Araştırma verileri betimsel içerik analizi kullanılarak analiz edilmiştir. Araştırmaya katılan öğretmenlere Ö1, Ö2, Ö3,… Ö15 şeklinde kodlar verilmiştir. Hazırlanan kategoriler içerisinden bulgulara yönelik kodlar ortaya çıkarılmış, katılımcıların vermiş olduğu cevaplar analiz edilerek yorumlanmıştır.

Verilerin Toplanması

Araştırma verileri, araştırmacı tarafından oluşturulmuş yarı yapılandırılmış görüşme formu kullanılarak toplanmıştır. Görüşmeler, gönüllü katılım esas alınarak gerçekleştirilmiştir. Araştırma verileri bireysel görüşmeler şeklinde toplanmıştır.

BULGULAR

Yapılan araştırmada okul öncesi öğretmenlerin inovatif davranışlarını incelemek amaçlanmıştır. Araştırma verileri, öğretmenlerin yarı yapılandırılmış görüşme formuna verdikleri yanıtlar yoluyla toplanmıştır. Öğretmenlerin yanıtlarından elde edilen verilerin betimsel içerik analizi sonrası elde edilen tema ve kategoriler Tablo 2'de sunulmuştur.

Tablo 2. Okul Öncesi Öğretmenlerin Yenilikçi (İnovatif) Davranmaya İlişkin Düşünceleri

Tema	**Kategori**
1.Mesleki Konularda Yenilikçi Düşünme	(a) Değişim ve gelişime uyum sağlama (b) Yaratıcı olma ve düşünme esnekliği
2.Yenilikçi Düşünmede Mesleki Destek Talebi	(a) Mesleki bilgi ve deneyim paylaşımı (b) Farklı bakış açısı ve yaratıcılık paylaşımı
3.Yenilikçi Davranma Motivasyonu	(a) Heyecan duyma ve başlamaya istekli olma (b) Temkinli davranma
4.Yenilikçi Düşünme ve Bireysel Özellikler Arasındaki İlişki	(a) ilgili ve istekli olma (b) ilgili ve istekli olmama
5.Okul Öncesi Eğitimde Yenilikçi Düşünmenin Önemi	(a) Değişim ve teknolojiye uyumu destekleme (b) Yaratıcılık ve farklı düşünme becericini geliştirme
6. Yenilikçi Öğretim Yöntemlerini ve Araçlarını Kullanımı 7. Teknolojinin Sınıf Ortamına Entegrasyonu 8. Yenilikçi Olmada Meslek Gelişim Etkinlikleri	
9. Yenilikçi Projeler veya Programlar Geliştirme	
10. Yenilikçi Yaklaşım Uygulamalarında Karşılaşılan Zorluklar	(a)Teknolojik imkânların yetersizliği ve kısıtlı kaynaklar (b) Öğrenci ve sınıf dinamikleri (c) Toplumsal ve yönetimsel engeller
11. Yenilikçi Uygulamalarını Eğitim ve Öğretime Etkisi	(a) Eğlenceli ve ilgi çekici uygulamalar (b) Çocukların aktif katılımı ve merakı (c) Olumlu dönütler ve motivasyon (d) Okula karşı tutum ve devamlılık (e) Öğretmenin motivasyonu ve rehberliği
12. Okul Öncesi Eğitim Programının Yenilikçilik Bağlamında Değerlendirilmesi	(a) Programın yenilikçi bulunması (b) Programın eleştirisi
13. Yenilikçi Uygulamalar Karşında Öğrenci ve Veli Geri Bildirimi	(a) Öğrenci katılımı ve memnuniyeti (b) Veli geri bildirimleri (c) Öğrenci ve veli etkileşimi (d) Zorluklar ve önyargılar
14. Yenilikçi Uygulamalarda Gelişmeye Yönelik Gelecek Planı	(a) Teknolojik uygulamaları kullanmada gelişim (b) Beceri temelli eğitimde ve yaratıcılıkta gelişim (c)Eğitim materyalleri ve sınıf düzenlemeleri

Birinci Tema: Mesleki Konularda Yenilikçi Düşünme

(a) Değişim ve gelişime uyum sağlama: Bu tema altında öğretmenlerin bir kısmı mesleki anlamda yenilikçi olmayı; çağın değişen gereksinimlerine uyum sağlamak ve mesleki yeterliliklerini geliştirmek, hayatın çeşitli alanlarındaki gelişmeleri takip ederek mesleki anlamda uygulanabilir olanları seçmek ve uygulamak, öğretim yöntemlerini ve materyallerini sürekli olarak güncelleyerek geliştirmek, öğrenme deneyimlerini zenginleştirmek şeklinde tanımlamışlardır. Öğretmenlerin bazıları ise; mesleki uygulamalarda teknolojiyi kullanmak, teknoloji, okul dışı öğrenme ortamları, artık materyaller, akıl zekâ oyunları, kodlama, sanat, doğa, canlılar ve aileyi sürece katmak şeklinde ifade etmiştir. Öğretmenlerin verdikleri yanıtlar ilişkin bazı örnekler aşağıda sunulmuştur.

"*Çağın değişen gereksinimlerine uyum sağlamak ve bunu konuda mesleki yeterliliklerini geliştirmek*" (Ö1).

(b)Yaratıcı olma ve düşünme esnekliği: Bu tema altında öğretmenlerin bir kısmı mesleki anlamada yenilikçi olmayı; yeni fikirlere açık olmak ve yeni fikirler üretebilme becerisine sahip olmak, belirli bir kalıba veya geleneksel öğrenme yöntemlerine bağlı kalmayıp gerektiğinde farklı ve çeşitli yöntemler kullanmak gibi ifadeler kullanarak tanımlamıştır. Bu tanımlara ilişkin öğretmenlerin yanıtlarından bazılarına aşağıda yer verilmiştir.

"Yeni fikirlere açık olmak ve yeni fikirler üretebilme becerisine sahip olmak" (Ö4).

İkinci Tema: Yenilikçi Düşünmede Mesleki Destek Talebi

(a)Mesleki Bilgi ve Deneyim Paylaşımı: Bu tema altında öğretmenlerin bir kısmı; öğrenci davranışları, kaynak paylaşımı, mesleki bilgi ve tecrübe, yeni karşılaşılan durumlar, sınıf içinde yaşanılan zorlayıcı konular, sınıf tertip ve düzeni, etkinlik planları ve veli-idare-yönetim ilişkileri gibi konularda meslektaşların bilgi ve yardım talep ettiği saptanmıştır. Örneğin, Örneğin; Ö8, "Mesleki konularda meslektaşımın bilgilerine her zaman başvururum" şeklinde ihtiyaç duyduğu desteği ifade etmiştir.

(b)Farklı Bakış Açısı ve Yaratıcılık Paylaşımı: Bu tema altında öğretmenlerin bir kısmı ise; farklı bakış açıları görmek istediklerinde meslektaşlarının desteğine ihtiyaç duyduğunu ifade etmiştir. Örneğin, Ö4, "Yaptığım bir iş içime sinmediğinde farklı fikirlere başvurma ihtiyacı duyarım o zaman meslektaşlarımın fikirlerini alırım" şeklinde ifade etmiştir.

Üçüncü Tema: Yenilikçi Davranma Motivasyonu

(a) Heyecan Duyma ve Başlama İsteği: Heyecan duyma ve başlama isteği teması altında bazı öğretmenler**,** yenilikleri hemen öğrenmeye çalışmak ve uygulamak için heyecan duyduklarını ifade etmiştir. Örneğin; Ö3, "Heyecan duyarak hemen başlamak isterim. Alanımla ilgili her türlü eğitime de katılırım" şeklinde görüş bildirmiştir.

(b) Temkinli Davranma: Temkinli olma teması altında ise öğretmenlerin birkaçı yeniliklere karşı şüpheci ve temkinli davrandıklarını ifade etmiştir. Örneğin; Ö4, "İkisinin ortasıyım aslında. Hem temkinli davranırım hem de büyük ihtimalle denerim" şeklinde açıklama yapmıştır.

Dördüncü Tema: Yenilikçi Düşünme ve Bireysel Özellikler Arasındaki İlişki

İlgili ve istekli olma: bu tema altında öğretmenlerin bir kısmı ilgi alanları doğrultusunda yenilikleri takip etmek ve farklı düşünceler geliştirmeye çalıştıklarını, meraklı ve hevesli olduklarını ve gözlem ve araştırma yapmayı sevdiklerini ifade etmiştir. Örneğin Ö1, "*İlgi* alanlarım doğrultusunda yenilikleri takip ederim, bununla birlikte de farklı düşünceler geliştirmeye çabalarım*"* şeklinde yanıt vermiştir.

(b) İlgili ve istekli olmama; bu tema altında öğretmenlerden Ö12, yeni ve farklı düşünceler geliştirmekte yeterli zaman olduğu sürece başarılı olduklarını düşündüğünü ve sınıf içinde anlık gelişen bir durumda yeni ve farklı bir fikir üretmekte zorlandığını belirtmişlerdir.

Beşinci Tema: Okul Öncesi Eğitimde Yenilikçi Düşünmenin Önemi

Değişim ve Teknolojiye Uyumu Destekleme: Bu tema altında öğretmenlerin büyük birçoğu yenilikçi düşünmenin önemini hızla gelişim teknolojik değişimine ayak uydurmak şeklinde açıklamıştır. Öğretmenlerin verdikleri yanıtlar ilişkin bazı örnekler aşağıda sunulmuştur.

Günümüz teknolojileri hızlı değişim göstermektedir. Bireyin bu değişim hızına yetişmesi için de erken çocukluk döneminden başlayarak desteklenmesi gerektiğine inanıyorum (Ö1).

(b) Yaratıcılık ve Farklı Düşünme Becerisini Geliştirme: Öğretmenlerin bir kısmı ise yenilikçi düşünmenin önemini yaratıcılığı arttırıp farklı düşünme becerisini geliştirdiğini ifade ederek açıklamıştır. Örneğin, Ö12, "Okul öncesi eğitim öğretimin ilk basamağı olduğu için çocuklar keşfetmeyi, yaratıcı ve eleştirel düşünmeyi ilk olarak burada deneyimliyorlar. Bu kademede öğrendikleri düşünme biçimiyle diğer kademeleri inşa ediyorlar. Bu yüzden oldukça önemli olduğunu düşünüyorum" şeklinde ifade etmiştir.

Altıncı Tema: Yenilikçi Öğretim Yöntemlerini ve Araçlarını Kullanımı

Öğretmenlerin eğitimde yenilikçi öğretim yöntemleri ve araçlarını kullanımına ilişkin kategori altında, teknolojik araçlar ve yazılımları kullandıkları ortaya çıkmıştır (Ö1, Ö2, Ö3, Ö4, Ö7, Ö15). Öğretmenlerin bir kısmı kodlama robot oyuncakları ve oyun halıları, Code.org sistemi, robotik ve kodlama kitleri, bilgisayarsız kodlama uygulamaları ve proje tabanlı kodlama çalışmaları kullandıklarını (Ö6, Ö7, Ö8, Ö9, Ö13) ifade etmiştir.

Yedinci Tema: Teknolojinin Sınıf Ortamına Entegrasyonu

Bu başlık altında öğretmenlerin pek çoğu (Ö1, Ö2, Ö3, Ö4, Ö5, Ö8, Ö9, Ö10, Ö12, Ö13, Ö14) akıllı tahta, projeksiyon, eğitim uygulamaları ve yazılımlar kullanımı, eğitsel oyunlar ve uygulamalar, Eba üzerinden videolar ve görseller kullanımı, power point sunumları, eğitim videoları ve animasyonlar, dijital hikaye kitapları ve e-kitaplar, projeksiyon ile YouTube videolarını teknolojik açıdan eğitime entegre edildiğinden bahsetmiştir

Sekizinci Tema: Yenilikçi Olmada Mesleki Gelişim Etkinlikleri

Öğretmenlerin çoğu mesleki gelişimlerini; hizmet içi eğitimler, online veya yüz yüze seminerler, konferans ve sempozyumlara katılarak desteklediğini ifade etmiştir. Konuya ilişkin yanıtlarında bazıların aşağıda yer verilmiştir.

"Milli Eğitim Bakanlığının düzenlemiş olduğu hizmetçi eğitimlere kurslara katılıyorum ve üniversitelerin düzenlemiş olduğu online seminerlere katılıyorum" (Ö3).

Dokuzuncu Tema: Yenilikçi Projeler veya Programlar Geliştirme

Bu kategori altında öğretmenlerden Ö1, Ö2, Ö3, Ö4, Ö5, Ö12, Ö13, Ö14 ve Ö15 proje geliştirmediklerini veya bir projede yer almadıklarını belirtmiştir. Örneğin Ö12, "Henüz böyle bir projede yer almadım" ve Ö14 "…Fakat henüz yenilikçi bir proje ya da program geliştirmedim" şeklinde yanıt vermiştir. Öğretmenlerden Ö4 ve Ö7 tek başına projeler yürüttüğünü belirtmiştir. Öğretmenlerin bir kısmı (Ö5, Ö6, Ö8, Ö9, Ö10, Ö11) ise diğer öğretmenler ile iş birliği içinde projeler planlayıp uyguladığını ifade etmiştir.

Onuncu Tema: Yenilikçi Yaklaşım Uygulamalarında Karşılaşılan Zorluklar

(a)Teknolojik İmkânların Yetersizliği ve Kısıtlı Kaynaklar: Öğretmenlerin bir kısmı teknolojik imkânların yetersiz oluşundan bahsetmiş ve bu durumun iyileştirilmesi için yeni öğretim teknolojilerinin öğrenilmesi gerektiğinin önemini vurgulamıştır. Ayrıca materyal eksikliği de bu tema altında ifade edilen bir diğer zorluk olarak ifade edilmiştir (Ö1, Ö2, Ö11, Ö12).

(b) Öğrenci ve Sınıf Dinamikleri: Öğretmenlerden bazıları yenilikçi uygulamalarda karşılaştıkları zorluklar arasında öğrenci özellikleri, sınıf yönetimi ve dinamiklerin ilişkin konuları sıralamıştır. Öğretmenlerin konuya ilişkin açıklamalarından bazı örnekler aşağıda sunulmuştur.

"Çocukların hazır bulunuşluklarının yeterli düzeyde olmaması…" (Ö 11).

(c) Toplumsal ve Yönetimsel Engeller: Bu tema altında öğretmenler sosyo-ekonomik durumun etkisi, kültürel gelişim ve ebeveynlerin etkinliklere karşı tutumları, okul yönetiminin duyarsızlığı veya destek eksikliği ve yenilikçi yaklaşımların tam olarak anlaşılmaması gibi nedenleri sıralayarak bu konuda yaşadıkları güçlüklerden bahsetmişledir. Öğretmenlerin açıklamalarına ilişkin yanıtlardan bazıları aşağıda sunulmuştur.

"Teknolojik donanım ile ilgili sorunlar olabiliyor. Bunun için okul idaresinden destek talep ediyorum veya velilerim ile görüşüp birlikte yapılabilecek şeyler var mı bunu tartışıyoruz" (Ö6).

On Birinci Tema: Yenilikçi Uygulamalarını Eğitim ve Öğretime Etkisi

(*a)Eğlenceli ve İlgi Çekici Uygulamalar:* Öğretmenler yenilikçi uygulamaların sınıf etkinliklerini eğlenceli ve ilgi çekici hale getirdiğini ifade etmiştir. Örneğin, kâğıt üzerinde ve bilgisayarda oynanan kaçış odaları oyununun eğlenceli olduğu, EBA üzerinde sesli hikâye dinlemenin çocuklar için farklı ve ilgi çekici olduğu, sesli hikâyelerdeki farklı seslerin çocukların zihninde canlandırma sürecini kolaylaştırdığını belirtmişlerdir (Ö1, Ö2, Ö5, Ö11).

(b) Çocukların Aktif Katılımı ve Merakı: Öğretmenler yenilikçi uygulamalar karşısında çocukların daha aktif, meraklı ve istekli olduğu, farklı etkinliklere karşı yüksek motivasyon ve istek gösterdiği, kodlama eğitimine istekle katıldığını ifade etmişlerdir (Ö3, Ö6, Ö7, Ö8).

(c) Olumlu Dönütler ve Motivasyon: Öğretmenler, çocuklardan ve velilerden yenilikçi uygulamalara yönelik olumlu dönütler alındıklarını, Türkçe bilmeyen mülteci çocukların da uygulamalara olumlu dönütler vermediğini, çocukların bu tür oyunları ve uygulamaları talep ettiğini, çocuklarda gözlemlenen olumlu değişimler ve motivasyonun attığını, grup çalışmalarında sosyal duygusal beceriler ve arkadaş ilişkilerinin geliştiğini, özgüven, gruba aidiyet, işbirliği, problem çözme, akıl yürütme, dil gelişimi ve zekâ gelişiminde gelişme olduğunu belirtmişlerdir (Ö1, Ö6, Ö12, Ö9, Ö15).

(d) Okula Karşı Tutum ve Devamlılık: Öğretmenler yenilikçi uygulamalar sayesinde çocukların okula karşı tutumlarının olumlu anlamda değiştiğini, okula merak ve ilgiyle geldiklerini rapor etmişlerdir (Ö8, Ö11, Ö7).

(e) Öğretmenin Motivasyonu ve Rehberliği: Öğretmenler yenilikçi uygulamaların kendilerine de olumlu katkıları olduğunu belirterek; çocukların motive olmasının kendilerini de istekli ve heyecanlı hale getirdiğini, uygulamaların öğretmenin rehberlik becerisini geliştirerek çocukların etkinliklere aktif katılım sağladığını ve çocukların hedef konuyu veya kavramı daha kolay algılamasının eğitim ve öğretimi kolaylaştırdığını ve bu bağlamada öğretmenin mesleki doyumunun arttığını ifade etmişlerdir (Ö3, Ö5, Ö13).

On İkinci Tema: Okul Öncesi Eğitim Programının (2024) Yenilikçilik Bağlamında Değerlendirilmesi

(a) Programın Yenilikçi Bulunması: Bu tema altında öğretmenlerin güncel programı yenilikçi buldukları hususlar aşağıda sıralanmıştır:

Programın 21. yüzyıl becerilerini desteklemesi, sınıflarda teknolojinin etkin kullanımı ve dijital okuryazarlık becerilerine önem vermesi (Ö2),

(b) Programın Eleştirisi: Bu tema altında öğretmenlerin güncel programı yenilikçi bulmadıklarına ilişkin veriler saptanmıştır. Öğretmenlerin aşağıda sunulan hususlar açısından programı eleştirmişlerdir. Bu hususlar:

Programın yenilikçiliği uygulama noktasında yeterli bulunmamasıdır (Ö11).

On Üçüncü Tema: Yenilikçi Uygulamalar Karşında Öğrenci ve Veli Geri Bildirimi

(a) Öğrenci Katılımı ve Memnuniyeti: Öğretmenler yenilikçi uygulamaların sonuçlarını; öğrencilerin okula severek gelip mutlu döndüklerini, öğrencilerin etkinlik ve oyunlara aktif katılım gösterdiğini ve bu süreçte eğlenerek ve isteyerek etkinliklere katıldıklarını ve öğrencilerin merak ve ilgiyle etkinliklere katılım sağladıklarını belirtmişlerdir (Ö2, Ö10, Ö14).

(b) Veli Geri Bildirimleri: Öğretmenler yenilikçi uygulamaların veli boyutuna ilişkin sonuçlarını; velilerin, çocuklarının okula isteyerek geldiğini belirterek olumlu geri bildirimde bulunmaları, velilerin, sınıf WhatsApp grubuna günlük bilgilendirme ve uygulama linkleri ile dâhil olup memnuniyetlerini dile getirmeleri, velilerin çocuklarına destek oldukları için memnun olmaları ve eğitim sürecine aktif katılım göstermeleri şeklinde belirtmiştir (Ö8, Ö9, Ö10, Ö12)

(c) Öğrenci ve Veli Etkileşimi: Bu tema altında velilerin, çocuklarının öğrenme ortamında aktif rol aldığı ifade edilmiştir (Ö1, Ö2, Ö4, Ö7, Ö13)

(d) Zorluklar ve Önyargılar: Öğretmenlerden bir kısmı yenilikçi uygulamaların olumsuz birtakım sonuçları olduğundan bahsetmektedir. Bunlar arasında; velilerin bazı yenilikçi uygulamalara önyargılı yaklaşması (Ö6, Ö11), öğrencilerin bir kısmının yenilikçi uygulamalara adapte olamaması ve mülteci öğrencilerin olduğu bir çevrede geri bildirim alınmasının zorluğu da olumsuz sonuçlar arasında sıralanmaktadır (Ö5, Ö3, Ö11).

On Dördüncü Tema: Yenilikçi Uygulamalarda Gelişmeye Yönelik Gelecek Planı

(a) Teknolojik Uygulamaları Kullanmada Gelişim: Öğretmenlerin bir kısmı; okul öncesinde Web 2 araçlarının uygulamalarında deneyim kazanmak, teknolojik uygulamalarla ilgili daha fazla bilgi edinmek, yenilikçi öğretim yöntem ve tekniklerine yönelik eğitimler almak, STEM, kodlama ve akıl-zekâ oyunları ile ilgili kurslara katılmak, robotik kodlama konusunda eğitim almak istediklerini belirtmektedir (Ö1, Ö3, Ö5, Ö6).

(b) Beceri Temelli Eğitimde ve Yaratıcılıkta Gelişim: Öğretmenlerin bir kısmı beceri temelli eğitim alarak, fen ve sanat eğitimine yönelik yöntemler geliştirmek, sayısal yeterlilik anlamında gelişim planlamak, bilişsel gelişim konularında kendini geliştirmek istediğini ifade etmiştir (Ö7, Ö14, Ö15).

(c) Eğitim Materyalleri ve Sınıf Düzenlemeleri: Öğretmenlerin bir kısmı ise eğitim materyalleri hakkında bilgi edinmek ve sınıf içi düzenlemeler ve alanda iş birliği yöntemlerini öğrenmek konularında gelişmek istediğini vurgulamıştır.

TARTIŞMA VE SONUÇ

Okul öncesi öğretmenlerin inovatif davranışlarını incelemek amacıyla, Türkiye'nin farklı illerinde görev yapan 15 okul öncesi öğretmeninden görüşme yöntemi ile veriler toplanmış ve betimsel analiz yoluyla elde edilen bilgiler yorumlanmıştır.

Araştırma neticesinde elde edilen bilgiler ışığında öğretmenlerin mesleki konularda yenilikçi düşünmeyi; değişim ve gelişime uyum sağlama, yaratıcı olma ve düşünme esnekliği şeklinde tanımladıklarını görmekteyiz. Öğretmenlerin büyük bir kısmının içinde bulunulan çağa uyumu yenilikçilik olarak tanımladıklarını söyleyebiliriz. Öğretmenleriz bazıları yenilikçiliği yaratıcılık olarak tanımlamışlardır. Literatüre baktığımızda araştırmaların yenilikçilik ve yaratıcılık arasında ilişki olduğunu görmekteyiz. Örneğin, Yüner ve Özdemir (2019) yenilikçi okul ile öğretmenlerin bireysel yaratıcılıkları arasında anlamlı ilişkilerin olduğu saptanmıştır.

Genel olarak öğretmenlerin öğrenci davranışları, kaynak paylaşımı, mesleki bilgi ve tecrübe, yeni karşılaşılan durumlarda, sınıf içinde yaşanılan zorlayıcı konular, sınıf tertip ve düzeni, etkinlik planları ve veli-idare-yönetim ilişkileri gibi konularda meslektaşlarından bilgi aldıklarını görmekteyiz. Öğretmenlerin eğitim ortamında her türlü konuda meslektaşlarının bilgisine başvurduklarını söyleyebiliriz. Yapılan araştırmalara göre öğretmenlerin büyük çoğunluğu meslektaşlarıyla iş birliği yapmaya çok fazla ihtiyaç duyduğunu belirtmiştir (Özdoğru, 2021).

Öğretmenlerin yenilikçi davranma motivasyonunları noktasında farklı görüşün görmekteyiz. Öğretmenlerin büyük çoğunluğunun mesleki anlamda yeni ve farklı düşünceler geliştirmek konusunda kendini ilgili ve istekli olarak tanımlamakta. Bu bağlamda okullarda yenilikçi bir atmosferin oluşmasında öğretmenin yenilikçiliği benimseme ve uygulama davranışı oldukça önemli olmaktadır (Kocasaraç, 2018). Bu sonuçtan anlıyoruz ki genel olarak öğretmenleri mesleki inovasyon konusunda kendilerine güven duymaktadırlar. Okul öncesi öğretmenleriyle yapılan benzer araştırmalarda genel olarak bireysel yenilikçilik tutumlarının yüksek olduğu bulgulamıştır (Köroğlu & Demiriz, 2015; Yüner & Özdemir, 2019; Görgel, 2018). Öğretmenlerin bazıları inovasyon konusunda kendini yeterli bulmadığını belirtmiştir. Bu bağlamda öğretmenlerin yeniliği benimseme, bir yeniliğe inanma durumlarının yeniliğin sonucu ile ilgili olarak değişebileceği ve bundan dolayı onları yeniliği uygulama noktasında temkinli olmaya itebilmektedir (Uras, 2000).

Öğretmenlerin büyük çoğunluğunun değişim ve teknolojiye uyumu destekleme ile yaratıcılık ve farklı düşünme becerisini geliştirme adına okul öncesi eğitimde yenilikçi düşünmenin önemli olduğunu belirtmişlerdir. Öğretmenlerin teknolojiyi eğitim ortamlarına dâhil ederek inovatif eğitim ortamları sağlayabileceklerini dile getirmişlerdir. Simsar ve Kadim (2017) de mevcut çalışma bulgularını benzer şekilde, öğretmenlerin çoğunun bilişim teknolojilerini aktif olarak kullandıkları sonucuna ulaşılmıştır (Simsar ve Kadim, 2017).

Eğitim ortamlarında kullanılan yenilikçi öğretim yöntemleri ve araçlarını baktığımızda öğretmenlerin birçoğunun tabletler, interaktif beyaz tahtalar, çevrimiçi kaynaklar ve uygulamalar, EBA sistemi, sanal uygulamalar (artırılmış gerçeklik gibi), dijital kitaplar, wordwall gibi teknolojik araçlar ve uygulamalar kullandıklarını ifade etmişlerdir. Bu bulgulardan yola çıkarak öğretmenlerin büyük bir kısmının eğitim ortamlarında teknolojiyi aktif olarak kullandıkları sonucuna ulaşılmıştır. Özellikle çağımız bilişim teknolojilerinin eğitimin diğer basamaklarında olduğu gibi okul öncesinde de kullanılmasına duyulan ihtiyaçtan dolayı öğretmenlerin özellikle teknolojik cihazlara vurgu yaptıklarını düşünülebiliriz. Daha önceden yapılan birçok çalışmada benzer sonuçlara ulaşılmıştır. Demir (2015)'in okul öncesi öğretmenlerin bilişim teknolojilerini kullanma durumlarını araştırdığı çalışmasında, öğretmenlerin büyük çoğunluğunun sınıflarında eğitim ve öğretim teknolojisi olarak bilgisayar ve TV kullandıklarını belirlemiştir.

Benzer şekilde, Köroğlu ve Demiriz (2015) okul öncesi öğretmenlerinin teknolojik araç gereç kullanımına yönelik tutumlarının yüksek olduğunu belirlemiştir. Ayrıca öğretmenleri yaratıcı proje tabanlı öğrenme, STEM ve doğa eğitimi uygulamaları olduğunu bildirmişlerdir.

Öğretmenlerin yenilikçi yaklaşımlarını geliştirmek için hizmet içi eğitimler, çevrimiçi veya yüz yüze seminerler, konferans ve sempozyumlara katıldıklarını görmekteyiz. Yıldırım, öğretmenlerin yönetimce desteklenen kurslara, seminerlere katılmalarının, güncel kitaplarla kendilerini geliştirmelerine olanak sağlanmasının yaratıcılığı artıracağını ifade ettiklerini belirtmiştir (Yıldırım, 2007). Yaratıcılığın inovasyonun başlıca kaynağı (Council of EU, 2008:2 akt: Özmusul, 2011) olduğunu düşünürsek bu tarz eğitimlere katılmak öğretmenlerin inovatif düşüncelerini de geliştireceği sonucuna ulaşabiliriz. Öğretmenlerin yenilikçi projeler veya programlar geliştirme ilişkin olarak birçoğu herhangi bir eğitim projesinde yer almadığını bunun yanında bazı öğretmenlerin tek başına ve işbirliği içinde projelere dâhil olduklarını görmekteyiz. Farklı proje yaklaşımlarına dâhil olmak öğretmenlerin inovatif düşüncelerini destekleyecektir. Bu bağlamda özellik proje çalışmalarının desteklenmesi önemlidir.

Öğretmenlerin inovatif girişimlerini engelleyen faktörlere baktığımızda öncelikli olarak teknolojik imkânların yetersizliği ve kısıtlı kaynaklar olduğunu görmekteyiz. Öğretmenlerin teknolojik cihazların ve uygulamaların yenilikçi eğitim ortamları için önemli gerekliliklerden olduğunu belirtmeleri bu bulguyu destekler niteliktedir. Ayrıca öğrenci ve sınıf dinamikleri, toplumsal ve yönetimsel dirençler de bu engeller arasında yer almaktadır. Okul öncesi eğitim ortamlarında yenilikçiliğin önünde birçok farklı engelin olduğunu söyleyebiliriz. Örneğin, Taş (2007) ekonomik, kültürel, psikolojik ve siyasal kaynaklı engellerin yenileşmeye engel olabileceğini, yenilikçilik ile bütünleşmiş bir eğitim sistemi için bu engellerin en aza indirilmesi gerektiğini belirtmiştir. Çelik (2006) araştırmasında sonuçlarında değişimin ve yeniliklerin uygulanmasını engelleyen en önemli faktörün kaynak yetersizliği olduğu ifade edilmiştir.

Öğretmenlerin inovatif girişimleri sonrasında çocukların etkinlikleri eğlenceli ve ilgi çekici bulduğu, onların aktif katılımını desteklediği, onlarda merak uyandırdığı, okula karşı daha istekli olduklarını ve motivasyonlarının artığını dile getirmişlerdir. Bu bulgular doğrultusunda teknolojik cihazların ve yazılımların eğitim ortamına dâhil edilmesi çocukların istekliliğini artırma konusunda önemlidir diyebiliriz. Mamirova ve Abdullaeva (2024) araştırmalarında, teknolojiden yararlanarak çocukların merakını, çevresel farkındalığını ve doğaya olan takdirini teşvik edebilirken, bilişsel ve sosyo-duygusal gelişimlerini de destekleneceğini bulgulamışlardır.

Öğretmenler yeni okul öncesi eğitim programını 21. yüzyıl becerilerini desteklemesi, sınıflarda teknolojinin etkin kullanımı, bilgi, dijital, görsel ve veri okuryazarlığına yer verilmesi, programın çok kültürlü sınıflarda çocukların kaynaşmasını ve yardımlaşmasını sağlaması bağlamında eğitimde inovasyonu destekleyecek bir program olarak nitelendirmişlerdir. Gül (2018) tarafından Cumhuriyetten günümüze ilkokul eğitim programları ve inovatif etkisini incelenmiştir. Çalışmada farklı dönemlere ait ilkokul eğitim programların karşılaştırmaları yapılmıştır. Yapılan karşılaştırma sonucunda eğitimde her yeni dönemde biraz daha inovatif programların olduğu ve günümüze kadar gelen sürede programların çağın getirdiklerine uygun şekilde tasarlandığı belirtilmiştir. Öğretmenlerden biri yenilikçi bulunmadığını belirtmiştir. Yeni okul öncesi eğitim programı ilk kez 2024-2025 eğitim-öğretim döneminde uygulanması planlanmaktadır. Uygulandıktan sonra öğretmenlerin programın yenilikçilik bağlamında daha derinlemesine inceleme fırsatı bulacaklarını söyleyebiliriz.

Yenilikçi uygulamalar karşında öğrenci ve veli geri bildirimleri olumlu ve olumsuz olarak ayırabiliriz. Veliler genel olarak memnuniyetlerini dile getirmişlerdir. Literatürde bu bulguyu destekler nitelikte çalışmalar mevcuttur. Örneğin Papadakis ve Kalogiannakis (2017), Eğitim ortamlarındaki İnternet kullanımına yönelik olarak ebeveyn görüşlerini inceledikleri araştırmalarında; ebeveynlerin küçük çocukların öğrenme becerilerini geliştirmek için İnternet ile ilgili uygulamaları öğretime entegre etmenin pedagojik avantajlarını kabul ettiklerini bulgulamışlardır. Bunun yanında velilerin bazı yenilikçi uygulamalara önyargılı yaklaşması olduğu belirtilmektedir. Yenilikçi yaklaşımlarda özellikle kaynağa ihtiyaç duyulması bu önyargıların sebeplerindendir diyebiliriz. Öğretmenlerin inovatif eğitim ortamları yaratmak adına planları olduğunu görmekteyiz. Bunların teknolojik uygulamaları kullanmada gelişim, beceri temelli eğitimde ve yaratıcılıkta gelişim, eğitim materyalleri ve sınıf düzenlemeler noktalarında olduğunu belirtmişlerdir.

Araştırma sonucunda; öğretmenlerin büyük çoğunluğunun mesleki anlamda inovatif düşünceye sahip olduklarını, yeni ve farklı düşünceler geliştirmek konusunda kendini ilgili ve istekli olarak tanımladıklarını, inovatif düşüncelerine geliştirmek için kişisel çabalarının olduğunu, inovatif yaklaşımlarına yönelik velilerden olumlu geri dönütler aldıkları görülmüştür.

KAYNAKÇA

Altan, S. (2018). Türkiye'deki yenilikçi örgütleri arttırabilmek için, eğitim sistemine inovasyon kavramı üzerinden bir bakış ve çözüm önerileri. *Journal of Management Marketing and Logistics, 5*(2), 124-139.

Baskaran, K., & Rajarathinam, M. (2018). Innovative Teaching Practices in Educational Institutions (ITPEI). *International Journal of Educational Sciences, 20*, 72-76.

Bilir, B. Ufuk Akbaş, U. & Darıca, N. (2023) Okul öncesi öğretmenlerine yönelik inovatif düşünme eğilimi ölçeğinin geliştirilmesi. *Eğitim Teknolojisi Kuram ve Uygulama 13*(1), 233-253.

Çelik, M. (2006). İlköğretim Okullarında Değişimin ve Yeniliklerin Uygulanmasını Engelleyen Faktörlerin Öğretmen ve Yönetici Algılarına Göre Belirlenmesi. [Yayınlanmamış yüksek lisans tezi]. Gaziantep Üniversitesi.

Demir, O. (2015). Okul öncesi öğretmenlerin bilişim teknolojilerini kullanma durumları ve bunun öğretime etkisi (nitel bir çalışma). Uluslararası Eğitim Bilimleri Dergisi (4), 466-479.

Erbek, N., Asiltürk, E. & Kahyaoğlu, M. (2023). Fen bilimleri öğretmenlerinin inovatif düşünme becerilerine ilişkin özyeterlilik algılarının çeşitli değişkenler açısından incelenmesi. *Fen Bilimleri Öğretimi Dergisi 11*(1), 153-179.

Görgel, H. M. (2018). Okul yöneticilerinin yenilik yönetimi yeterliklerine ilişkin öğretmen ve okul yöneticisi algılarının incelenmesi. [Yayınlanmamış yüksek lisans tezi]. Kahramanmaraş Sütçü İmam Üniversitesi.

Hsiao, H-C, Jen-Chia Chang, J-C., Tu, Y-L & Chen, S-C. (2011). The Influence of Teachers' Self-efficacy on Innovative Work Behavior. *International Conference on Social Science and Humanity 5,* 232-237.

Kocasaraç, H. (2018). *Fen ve sosyal bilimler lisesi öğretmenlerinin yenilikçilik durumlarının değerlendirilmesi* [Yayınlanmamış doktora tezi]. Yıldız Teknik Üniversitesi.

Köroğlu, A., & Demiriz, S. (2015). Okul öncesi öğretmen adaylarının bilişim teknolojileri özyeterlik algıları teknolojik araç gereç kullanım tutumları ve bireysel yenilikçilik düzeylerinin incelenmesi. EJER CONGRESS- 2. Uluslararası Avrasya Eğitim Araştırmaları Kongresi, 2015.

Kundu, A., & Roy, D. D. (2016). School Climate Perception and Innovative Work Beha viour of School Teachers. *International Journal of Education and Psychological Re search, 5*, 129-133.

Kurtuluş, M. F. (2012). *Eğitimde inovasyon: öğretmen ve öğrencilerin inovasyona bakışı ve yeterliliğinin sorgulanması*. Yüksek Lisans Tezi. Kocaeli.

Mamirova, Z., & Abdullaeva, F. (2024). Innovatıve approaches ın preschool educatıon: utılızıng technology to foster nature exploratıon. *Евразийский Журнал Академических Исследований*, *4*(2), 26-31.

Özdoğru, M. (2022). Türkiye'de öğretmen motivasyonunu etkileyen örgütsel faktörler: bir meta-analiz çalışması. *Trakya Journal of Education 12*(3), 1737-1749.

Özer, D. (2022). *Okul öncesi öğretmenlerinin bireysel yenilikçilik düzeylerinin bazı demografik değişkenler açısından incelenmesi.* [Yayınlanmamış yüksek lisans tezi]. Pamukkale Üniversitesi.

Özer, D., & Pekşen, H. (2024). Okul Öncesi Öğretmenlerinin Bireysel Yenilikçilik Düzeyleri. *Ulusal Eğitim Toplum ve Dünya Dergisi*, *1*(2), 1-23.

Özmusul, M. (2012). Öğretmen Eğitiminde Yaratıcılık Ve İnovasyon. Kastamonu Eğitim Dergisi, 20(3), 731-746.

Papadakis, S., & Kalogiannakis, M. (2017). Mobile educational applications for children: what educators and parents need to know. *International Journal of Mobile Learning and Organisation*, *11*(3), 256-277.

Simsar, A., & Kadim, M. (2017). Okul öncesi öğretmenlerinin bilişim teknolojilerini kullanma durumları ve bunun öğretime etkisi. *Kilis 7 Aralık Üniversitesi Sosyal Bilimler Dergisi*, *7*(14), 127-146.

Taş, S. (2007). Eğitimde yenilemenin önündeki engeller (Dört köşe tekerlekler). Süleyman Demirel Üniversitesi Fen-Edebiyat Fakültesi Sosyal Bilimler Dergisi, 2007(15), 4-13.

Trapitsin, S. Granichin, O., Granichina, O. & Zharova, M. (2018). Innovatıve behavıor of teachers: defınıtıon and analysis. *The European Proceedings of Social & Behavioural Sciences.* 350-359. Erişim adresi: file:///C:/Users/asus/Downloads/10.15405_epsbs.2018.12.02.37.pdf

Uras, M. (2000). Lise öğretmenlerinin örgüt sağlığının moral, yenilikçilik, özerklik, uyum ve problem çözme yeterliği boyutlarına ilişkin algıları. Pamukkale Üniversitesi Eğitim Fakültesi Dergisi, 7(7), 124-131.

Yıldırım, E. (2007). Bilgi çağında yaratıcılığın ve yaratıcılığı yönetmenin önemi. Selçuk Üniversitesi Karaman İ.İ.B.F. Dergisi, 12(9), 109-120.

Yıldırım, A. & Şimşek, H. (2016). Sosyal Bilimlerde Nitel Araştırma Yöntemleri. Ankara: Seçkin Yayıncılık.

Yılmaz, N. (2013). *Okul öncesi öğretmen adaylarının bireysel yenilikçilik düzeyleri ve öğretim amaçlı bilgisayar kullanımına yönelik algılanan özelliklerin araştırılması.* [Yayınlanmamış doktora tezi]. Ortadoğu Teknik Üniversitesi.

Yüner, B., & Özdemir, M. (2020). Okul yenilikçiliği ile öğretmen yaratıcılığı arasındaki ilişkinin incelenmesi. Pamukkale Üniversitesi Eğitim Fakültesi Dergisi, doi: 10.9779/pauefd.538207

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

KENTSEL ALANLARDA KOKU DAĞILIMININ HARİTALANMASI

Mehmet ÇELİK
Niğde Ömer Halisdemir Üniversitesi, Mühendisli Fakültesi, Harita Mühendisliği
ORCID: 0009-0008-9536-2122

Doçent Dr. Aslı BOZDAĞ
Niğde Ömer Halisdemir Üniversitesi, Mühendislik Fakültesi, Harita Mühendisliği
ORCID: 0000-0003-2178-6527

ÖZET
Koku, mekandan koku alma duyusuyla hissedilen ve o mekana karakteristik bir nitelik verebilen kimyasal maddelerin hissediliş halidir. Kokular kişilerin yaşamdaki ve mekandaki karşılaştıkları tecrübeleri ve davranışları ile değişebilir ve zamana dayalı olarak yansıtılabilir. Kentsel tasarımda yer alan tüm görsel imgelerin kentte oluşturduğu kimliğin yanında gözle görülmeyen ancak kentte yaşayanlar üzerinde belirli bir olumlu ve olumsuz mekânsal imge oluşturan unsurlar bulunmaktadır. Koku; kentin coğrafi-beşeri özellikleri, yapılaşma gibi yapay özellikleri, gürültü ve ışık gibi diğer etkileyen özellikleri dışında tanımlanan ve kentin sosyal yaşamına dair görünmez sınırlar oluşturan bir etkendir. Koku etkisinin, dağılımının ya da tahmin edilmesi; kentin karmaşıklığı, çok sayıda potansiyel kaynak bulunması ve rüzgar ve coğrafi değişimi gibi faktörler nedeniyle zor olabilir. Bu kapsamda koku değişiminin ortaya konulmasında öncelikli olarak kokuyu etkileyen faktörlerin belirlenmesi ve bu faktörler çerçevesinde kentin sayısal arazi ve yükseklik modeli ile değerlendirilerek analiz edilmesi önem taşımaktadır. Literatür çerçevesinde ortaya konan sosyal medya verileri ve çeşitli koku ölçme yöntemleri ile zamansal olarak bu değişim belirlenerek haritalandırılabilir.
Bu çalışmada, koku kavramı, koku etkisinin değerlendirilmesi, koku dağılımının ve haritalandırılması ve koku haritasının avantajları ve veri toplama tekniklerine yönelik genel çerçeve oluşturulacaktır. Bu çerçevede incelenen çalışmalar kapsamında yaşadığımız coğrafyada koku etkilerine ve zamansal modellenmesine yönelik gerçekleştirilecek çalışmalar için öneriler geliştirilecektir. Kentin çok boyutlu coğrafyasının ve kentsel imgenin görünmez sınırlarının ortaya konulmasında koku boyutunu önemi ortaya konularak bilimsel katkı sunulacaktır.
Anahtar Kelimeler: Koku, koku haritası, koku ölçümü, kentsel kimlik, Coğrafi Bilgisi Sistemleri (CBS).

MAPPING ODOR DISTRIBUTION IN URBAN AREAS

ABSTRACT
Odor is the feeling of chemical substances that are felt in a place by the sense of smell and can give a characteristic quality to that place. Odors can change with people's experiences and behaviors in life and space, and can be reflected over time. In addition to the identity created by all visual images in urban design in the city, there are elements that are invisible but create a certain positive and negative spatial image on those living in the city. Odor; is a factor that is defined as the geographical-human characteristics of the city, artificial features such as construction, and other affecting features such as noise and light, and creates invisible boundaries for the social life of the city. Estimation of odor effect, distribution or odor; This can be difficult due to the complexity of the city, the large number of potential resources, and factors such as wind and geographic variation.

In this context, it is important to determine the factors affecting the odor and analyze the city's digital terrain and elevation model within the framework of these factors. This change can be determined and mapped temporally with social media data and various odor measurement methods presented in the literature.

In this study, the general framework for the concept of odor, evaluation of odor effect, odor distribution and mapping, advantages of odor map and data collection techniques will be created. Within the scope of the studies examined in this context, suggestions will be developed for studies on odor effects and temporal modeling in the geography we live in. Scientific contribution will be made by revealing the importance of the odor dimension in revealing the multidimensional geography of the city and the invisible boundaries of the urban image.

Keywords: Odor, Odor Mapping, Odor Measurement, Urban Identity, Geographic Information Systems (GIS).

GİRİŞ

Koku, kimyasal hava parçacıklarının canlı duyu organı olan burun ile teması sonucu ortaya çıkan bir algı şeklidir. Kokular, yaşamın bir getirisi olmakla birlikte, kişilerin deneyimleri ve anlık tecrübelerinin zamansal olarak değişimi ile ortaya çıkar ve mekân veya kent ile bütünleştir (Henshaw, 2011; Quercia ve diğerleri, 2015; McLean, 2019; Young, 2020).

Mekân veya daha geniş bir çerçevede kente yönelik yapılan pek çok çalışmada görsel imge ve boyutlara yönelik araştırmalar ve teoriler ortaya atılmıştır. Bunlardan en çok tanınan Lynch (1960), kentin kimlik yapısının tanınmasına ilişkin 5 görsel imgeden (yollar, kenarlar, bölgeler, düğümler ve landmarklar) bahsetmiştir. Jacobs (1961)'de kenti tanıtan ve birbirinden ayıran özellikteki kriterler ile görsel bir çerçeve sunmuştur. Ancak bu görsel ve sosyal nitelikli kriterler dışında duyusal özelliklerin koku niteliğinde gösterildiği çalışmalar oldukça az bulunmaktadır (Quercia ve diğerleri, 2015). Bununla birlikte kentsel alanda bulunan çiftlik hayvanlarının, arıtma tesislerinin ve katı atık deponi alanlarının oluşturduğu uyumsuz kokuların tespiti ve belirli bir emisyona göre koku düzeyi limit sorunlarının çözülmesi yanı sıra kokusal etkilerin insanların sinerjik sağlığı ve çevrenin sürdürülebilir nitelikli planlanması için iyileştirilmesi gerekmektedir (Pettarin ve diğerleri, 2015; Licen ve diğerleri, 2018; Guo vd., 2019; De Sanctis ve diğerleri, 2022).

Literatürde; koku dağılımının modellenmesi (Pettarin ve diğerleri, 2015), kokuya yönelik peyzaj planlaması (He ve diğerleri, 2022), koku kaynaklarının mekânsal ve iklimsel özelliklere dayalı olarak incelenmesi (Çeven ve diğerleri, 2022) ve çöp konteynırları boyunca kokunun konumsal olarak yoğunluğu ve etkilendiği bölgelerin tespitine (Monroy ve diğerleri, 2024) yönelik çalışmalar yer almaktadır.

Bu çalışmada, literatürdeki kentsel alanda gerek peyzaj gerekse kirlilik yönüyle konumsal olarak koku dağılımını inceleyen çalışmalar; kullanılan teknikler ve koku dağılımının haritalanması süreciyle değerlendirilmiştir. Türkiye'de kentsel alanda spesifik bölgeler haricinde koku dağılımının araştırılması ve haritalandırılmasına yönelik çalışmalar oldukça azdır. Bu kapsamda bu çalışmada kentsel alanda koku algısını ortaya çıkaran ve buna yönelik duyusal haritaların üretilmesi sürecinde literatüre katkı sağlayacaktır.

KOKU KAVRAMI VE MEKÂNDAKİ ÖNEMİ

Koku, nefes alma ile eş zamanlı, istemsiz, özne ve kişisel deneyimlere göre değişken bir algıdır (Blanes-Vidal ve diğerleri., 2012; Quercia ve diğerleri, 2015). Koku; olası bir uyarı durumuyla ilişkili olarak yoğunluğuna, maruz kalma süresine, sıklığına, rahatsız ediciliğine ve uyandırılan hissin hoşluğuna / hoşnutsuzluğuna bağlı olarak ortaya çıkan endişe durumudur (Blanes-Vidal ve diğerleri, 2012; Licen ve diğerleri, 2018).

Koku görsel imgelere göre hâfızada daha uzun kalıp görsel olarak etkilenilen mekâna ilişkin olumlu ve olumsuz etkiler bırakabilir (Engen 1991). Çevreyi tam olarak algılamak için alternatif boyut sağlayan koku göz ardı edilmemelidir (Xiao ve diğerleri, 2021). Bu kapsamda kentsel ekosistemleri, çevreyi tanımlamak, ziyaretçileri motive etmek, insanların çevresel yaşanabilirlik düzeyini artırmak, kentsel alanların planlama ve yönetimini anlamak ve izlemek için koku planlaması oldukça önem taşımaktadır (Vautz ve diğerleri, 2018; Xiao ve diğerleri, 2021; Ren ve diğerleri, 2021; He ve diğerleri, 2022).

KOKU ETKİSİNİN KENTSEL ALANDA DEĞERLENDİRİLMESİ VE HARİTALANDIRILMASINDA KULLANILAN YÖNTEMLER

Bir mekân pek çok imgeyle görsel olarak ifade edildiği gibi çeşitli kokularla olumlu ve olumsuz nitelikte kendisinin kollektif imajını etkileyebilir. Bu durum yaşayanların mekân ya da kentin bir bölümü için o alanda yaşanabilirliğini etkiler. Bu nedenle sürdürülebilir kentlerin oluşturulmasında ve planlanmasında kentin tüm görsel imgeleri dışında yaşayanları ve ziyaretçileri etkileyecek duyusal algılarında incelenmesi ve haritalandırılması gerekmektedir.

Literatürde bu kapsamda duyusal algıların haritalandırılmasına yönelik çalışmalar bulunmaktadır. Bu çalışmada kokuya duyarlı olarak kentlerin haritalandırılmasına ilişkin literatür özeti sunulmaktadır (Tablo 1).

Tablo 1. Kokuya duyarlı olarak kentlerin haritalandırılmasına ilişkin literatür özeti

Referans	Amaç	Parametre	Yöntem	Sonuç
Pettarin ve diğerleri, 2015	Kentsel çevrede kokuların kısa süreli dağılımını tahmin etmek için sayısal bir yaklaşım önerilmektedir.	Restoranlar, fast food ve barlar	QUIC, Reynolds Averaged Naviere Stokes (RANS) denklemleri, Matlab, Koku dağılımı Lagrangian yaklaşımı kullanılarak hesaplanmıştır.	Sonuçlar, bu tür koku dağılım simülasyonlarının (i) kentsel alanlardaki koku emisyonlarının etkisini değerlendirmek ve (ii) koku azaltma sistemleri tarafından üretilen potansiyel azaltımı değerlendirmek için kullanılabileceğini doğrulamaktadır.
Licen ve diğerleri, 2018	Kendini organize eden Haritalar olarak bilinen yapay sinir ağlarına dayalı kemometrik bir yaklaşımla bir model oluşturulmasını tartışıyoruz. Bunlar elektronik burun sürekli izleme ile toplanan verilere uygulanmıştır.	Endüstriyel tesislerdeki kokular, E-burun ile her sensör için dakika başına veri kaydı	MSEM-32 Çevre İzleme Sistemi cihazı	Koku Kontrol Haritası, endüstriyel tesislere yakın konutları içeren karmaşık çevresel olaylar hakkında daha kapsamlı bilgi edinmek için farklı ve bağımsız analizlerden/izlemelerden elde edilen verileri entegre etmek için uygun bir araçtır.

Çeven ve diğerleri, 2022	Kentsel deneyim ve tercihleri etkileyen iklimsel ve mekânsal faktörlere bağlı olarak kentsel peyzajdaki koku kaynaklarındaki değişimlerin peyzaj planlama ve tasarım süreçleri ile entegrasyonunu ve kent merkezi bütününde vurgulanabilecek koku kaynaklarının mekânsal kurgularını belirlemektir.	Çalışma, kokuların insan değerlendirici ve koku ölçüm cihazı kombinasyonu ile belirlenmesi ile gerçekleştirilmiş tir.	CBS, Ters mesafe ağırlıklı (IDW) ve kriging yöntemleri, El Tipi Koku Ölçer OMX-ADM	İnsan değerlendirmesinde kokuların araç trafiğine bağlı egzoz kokusu olduğu, ticari bölgede ise perde ve yemek kokuları olduğu tespit edilmiştir.
He ve diğerleri, 2022	Bu çalışma, kentsel yeşil ortamlardaki çeşitli kokuların ilk sistematik araştırmasını ortaya koymakta ve mekansal-zamansal koku dağılım modellerini ortaya çıkararak koku manzarası tasarımına yeni bakış açıları sunmaktadır.	Trafik emisyonları, yiyecek ve içecekler, temizlik malzemeleri, atıklar, doğa kokuları ve yapı malzemeleri ve inşaatlar	Nicel koku yürüyüşü yöntemini geliştirmiştir. Gaofen No.6 ArcGIS 10.6, Fragstats 4.2 küme analizi ve Karma model ANOVA analizlerinden yararlanılmıştır.	Sonuçlar şunu göstermiştir: (i) insan faaliyetleri ve doğa kokularının kent parkı koku ortamlarına hakim olduğu, (ii) kent parkı koku manzarasının zamansal değişiminin esas olarak insan faaliyetleri tarafından yönlendirildiği, (iii) kent parkının farklı alan türlerinin koku manzarasının bileşimi üzerinde önemli bir etkiye sahip olduğu ve (iv) orman, çalı, çim, su, binalar ve yolların peyzaj desen özelliklerinin farklı koku türleri üzerinde önemli etkileri olduğu.
Monroy ve diğerleri, 2024	Çöp konteynırları boyunca konumları ve yoğunluklar gibi bilgiler ile günlerine göre etkilenen bölgelerin e-burun ölçümlerinden çıkarılabilmesidir.	Çöp konteynerlerine bırakılan atıklardan kaynaklanan hoş olmayan kokular ve bisikletle e burun kullanımı	GPS (DeluoGPS), Gaz dağılım haritaları kernelDM+V yöntemi kullanılarak oluşturulmuştur.	Yaklaşımın uygulanabilirliği ve potansiyelinin yanı sıra hassas bir sensör karakterizasyonu ve gaz sınıflandırması ihtiyacını da ortaya koymuştur.

Literatürde ifade edilen veriler dışında koku etkisini değerlendirmek ve kontrol etmek için pek çok veri bulunmaktadır. Bunlar aşağıdaki tabloda özetlenmiştir (Tablo 2).

Tablo 2. Koku etkisini değerlendirmek ve kontrol etmek için kullanılan veriler

Parametreler	**Referans**
Sigara dumanı,	Cain ve ark., 1983
Sıcaklık dalgalanmaları, rüzgâr hızı, bağıl nem ve/veya atmosferik basınç,	Pearce, 2006
Rüzgâr, restoranlar, fast food ve barlar,	Pettarin ve diğerleri, 2015
Sosyal medya verileri (Flicker, Instagram ve Twitter),	Quercia ve diğerleri, 2015
Su/sıcaklık/buharlaşma ilişkisine dayanan nem,	Badach vd., 2018
Evsel atık kokuları, atık su ve katı ve sıvı atıklardan kaynaklanan kanalizasyon kokuları, sanayi bölgelerinde emisyon ve atık kokular, katı ve sıvı atık tesisi kokuları,	Muallim Mubina Auwal, 2019
Kanalizasyon, arıtma tesisi, hayvan işleme tesisi, mezbaha, çöp sahası ve kompost tesisleri gibi endüstriyel kaynaklar ile mağaza ve restoranlar,	Çeven ve diğerleri, 2022; Çevre Koruma Ajansı (EPA)

Çalışmalarda literatürden farklı olarak kullanılan yöntemler; sayısal modeller (Sironi ve diğerleri, 2010), sabit durum gauss duman modelleri (Latos ve diğerleri, 2011), dalgalanan duman modelleri (Dourado ve diğerleri, 2014), ve enterpolasyon yardımıyla duyusal yürüyüş yöntemi (McLean 2019; Xiao ve diğerleri., 2021) bulunmaktadır. Ancak yapılan çalışmalar koku haritalarının yaygınlaştırılması ve kullanımına yönelik yeterli değildir. Bu kapsamda literatürün artırılarak kentsel alanlarda koku duyarlı haritaların üretilmesine ilişkin çalışmalar yapılması hedeflenmelidir.

SONUÇ

Kentsel alanın kimlik bilgisinin ifadesinde görsel imgeler kadar gürültü, ışık ve koku gibi duyusal imgelerin kullanımı yaygınlaşmaktadır. Koku, ışık ve gürültüye göre daha zor belirlenen ve pek çok parametreden etkilenebilen bir özellikte olup zamansal ve mekânsal değişim göstermektedir. Özellikle haritalama süreci ve buna yönelik veri toplama sürecinde son teknolojilere ihtiyaç bulunmaktadır. Bununla birlikte koku mekanın tanıtılmasında bireylerin ve toplumun yargılarıyla da bütünleşmektedir. Bu nedenle çalışmalarda teknolojik ölçümler ile birlikte sosyal yargıların da ele alınması gerekmektedir. Ayrıca bu çalışmada elde edilen bilgiler dahilinde koku haritalamasında rüzgar, nem, sıcaklık, veya mekandaki restaurant gibi unsurların varlığı önemli parametreler olarak belirlenerek yerele özgü bu parametreler ile haritalanma gerçekleştirilmelidir. Sonuç olarak bu çalışma koku haritalamasına yönelik okuyuculara kavramsal bir çerçeve ve genel bir literatür sunmakta ve gelecek çalışmalar için ön bir değerlendirme yapmaktadır.

KAYNAKLAR

Badach J, Kolasińska P, Paciorek M, Wojnowski W, Dymerski T, Gębicki J, Dymnicka M, & Namieśnik J (2018) A case study of odour nuisance evaluation in the context of integrated urban planning. J Environ Manage 213:417–424. https://doi.org/10.1016/J.JENVMAN.2018.02.086

Blanes-Vidal, V., Suh, H., Nadimi, E.S., Løfstrøm, P., Ellermann, T., Andersen, E.V., & Schwartz, J., (2012). Residential exposure to outdoor air pollution from livestock operations and perceived annoyance among citizens. Environ. Int. 40, 44e50.

Cain WS, Leaderer BP, Isseroff R, Berglund LG, Huey RJ, Lipsitt ED, & Perlman D (1983) Ventilation requirements in buildings—I. Control of occupancy odor and tobacco smoke odor. Atmospheric Environ (1967) 17(6):1183–1197. https://doi.org/10.1016/0004-6981(83)90341-4

Çeven, E. A., Belkayalı, N., & Aydın, M. (2022). Analysis of odor distribution in urban landscape with GIS.

De Sanctis, M., Murgolo, S., Altieri, V.G., De Gennaro, L., Amodio, M., Mascolo, G., & Di Iaconi, C., (2022). An innovative biofilter technology for reducing environmental spreading of emerging pollutants and odor emissions during municipal sewage treatment. Sci. Total Environ. 803, 149966 https://doi.org/10.1016/j. scitotenv.2021.149966

Dourado, H., Santos, J.M., Reis, N.C., & Mavroidis, I., (2014). Development of a fluctuating plume model for odour dispersion around buildings. Atmos. Environ. 89, 148e157 Engen, T. (1991). Odor Sensation and Memory. Praeger.

EPA 373/07 Guidelines: Odour Assessment Using Odour Source Modelling, (2007). www.epa.sa.gov.au/files/477172_guide_odour.pdf

Guo, Q., Yu, J., Su, M., Wang, C., Yang, M., Cao, N., Zhao, Y., & Xia, P., (2019). Synergistic effect of musty odorants on septic odor: verification in Huangpu River source water. Sci. Total Environ. 653, 1186–1191. https://doi.org/10.1016/j. scitotenv.2018.11.062.

He, J., Hao, Z., Li, L., Ye, T., Sun, B., Wu, R., & Pei, N. (2022). Sniff the urban park: Unveiling odor features and landscape effect on smellscape in Guangzhou, China. Urban Forestry & Urban Greening, 78, 127764.

Henshaw, V. (2011). The Role Of Smell In Urban Desıgn

Jacobs, J. (1961). Jane jacobs. The Death and Life of Great American Cities, 21(1), 13-25.

Latos, M., Karageorgos, P., Kalogerakis, N., Lazaridis, M., 2011. Dispersion of odorous gaseous compounds emitted from wastewater treatment plants. Water Air Soil Pollut. 215, 667e677.

Licen, S., Barbieri, G., Fabbris, A., Briguglio, S. C., Pillon, A., Stel, F., & Barbieri, P. (2018). Odor control map: Self organizing map built from electronic nose signals and integrated by different instrumental and sensorial data to obtain an assessment tool for real environmental scenarios. Sensors and Actuators B: Chemical, 263, 476-485.

Lynch, K. (1960). The image of the environment. The image of the city, 11, 1-13.

McLean KJ (2019) NOSE-FIRST Practices of smellwalking and smellscape mapping

Monroy, J. G., Gonzalez-Jimenez, J., & Sanchez-Garrido, C. (2014, November). Monitoring household garbage odors in urban areas through distribution maps. In SENSORS, 2014 IEEE (pp. 1364-1367). IEEE.

Muallim Mubina Auwal (2019) An Analysıs Of Land Use Associated Smell In Kano Metropolıs Mubına Auwal Muallım Ees/14/Urp/00028 Bachelor Of Urban And Regıonal Plannıng Thesıs Submıtted To The Department Of Urban And Regıonal Plannıng, Faculty Of Earth And Envıronmental Scıences, Bayero Unıversıty Kano, Nıgerıa In Partıal Fulfillment Of The Requırements For The Award Of Bachelor Of Urban And Regıonal Plannıng

Pearce TC, S. S. S., N. H. T., & G. J. W. (eds). (2006). Handbook of Machine Olfaction: Electronic Nose Technology- Google Kitaplar. John Wiley, Sons (2006) https://books.google.com.tr/books?hl=tr&lr=&id=HS6zzpPSgHcC&oi=fnd&pg=PR5&dq=Pearce,+T.+C.,+Schiffman,+S.+S.,+Nagle,+H.+T.,+%26+Gardner,+J.+W.+(Eds.).+(2006).+Handbook+of+machine+olfaction:+electronic+nose+technology.+John+Wiley+ve+Sons.&ots=oCMBtnU_7x&sig=7ZrWn5koz5o7ySy4P5zA4vSFqd

Pettarin, N., Campolo, M., & Soldati, A. (2015). Urban air pollution by odor sources: Short time prediction. Atmospheric Environment, 122, 74-82.

Quercia, D., Schifanella, R., Aiello, L. M., & McLean, K. (2015). Smelly maps: the digital life of urban smellscapes. In Proceedings of the International AAAI conference on Web and Social Media (Vol. 9, No. 1, pp. 327-336).

Ren, Z., Zhao, H., Fu, Y., Xiao, L., & Dong, Y., (2021). Effects of urban street trees on human thermal comfort and physiological indices: a case study in Changchun city, China. J. For. Res. 33 (3), 911–922. https://doi.org/10.1007/s11676-021-01361-5.

Sironi, S., Capelli, L., Centola, P., Del Rosso, R., & Pierucci, S., (2010). Odour impact assessment by means of dynamic olfactometry, dispersion modelling and social participation. Atmos. Environ. 44 (3), 354e360.

Vautz, W., Hariharan, C., & Weigend, M., (2018). Smell the change: on the potential of gaschromatographic ion mobility spectrometry in ecosystem monitoring. Ecol. Evol. 8 (9), 4370–4377. https://doi.org/10.1002/ece3.3990.

Xiao, J., Aletta, F., Radicchi, A., McLean, K., Shiner, L.E., & Verbeek, C., (2021). Recent advances in smellscape research for the built environment. Front. Psychol. 12, 700514 https://doi.org/10.3389/fpsyg.2021.700514.

Young BD (2020) Perceiving Smellscapes. Pac Philos Q 101(2):203–223. https://doi.org/10.1111/PAPQ.12309

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

DOLMALIK BİBER (*Capsicum annuum* L.) MEYVELERİNDE KİMYASAL VE ORGANİK GÜBRE KOMBİNASYONLARININ MAKRO-MİKRO BESİN DEĞERLERİ ÜZERİNE ETKİLERİ

Dr. Öğr. Üyesi Selma KIPÇAKBİTİK
Van YYU, Başkale Myo, Bitkisel ve Hayvansal Üretim Bölümü
ORCID: 0000 0002 0563 1130

Doç. Dr, Aytekin EKİNCİALP
Van YYU, Başkale Myo, Bitkisel ve Hayvansal Üretim Bölümü
ORCID: 0000 0003 1500 3215

ÖZET
Bu çalışmada, yetiştiricilikte önemli bir girdi olan gübre kullanımında kimyasal içeriklerin minumuma indirilebilir durumunun tespiti amaçlanarak kimyasal ve organik gübre çeşitleri ve kombinasyonlarının biber meyvelerinde N, P, K, Ca, Mg, Fe, Zn, Cu, Mn ve protein içeriklerine etkileri araştırılmıştır. Yetiştirme aşaması deneme parsellerinde sıra arası ve sıra içi mesafeler 100x50 cm olacak şekilde tamamen tesadüf blokları deneme desenine göre 3 tekerrürlü ve her tekerrürde 20 bitki olacak şekilde planlanmıştır. Araştırmanın gübreleme programı kontrol grubu ile birlikte 3 farklı gübre çeşidi ve bunların kombinasyonları ile toplam 10 uygulama şeklinde yürütülmüştür. Elde edilen sonuçlarda gübre uygulamaları arasında önemli istatistiksel farklılıklar oluşmuş olup, özellikle vermikompostun organomineral gübre ve kimyasal gübre ile kombinasyon halinde farklı dozlarda olduğu 5, 7, 8, ve 9 numaralı uygulamalarda en yüksek değerler görülmüştür. Biber yetiştiriciliğinde organik gübrelerin karışım halinde verilmesinin meyvelerdeki besin elementi düzeylerine etkisinin olduğunu ve kimyasal gübrelerin ekolojide meydana getirdiği olumsuz etkilerin minumuma indirilebileceği düşünüldüğünde, tarımsal üretimde pratikte kullanılabileceği sonucuna varılmıştır.
Anahtar Kelimeler: Besin elementi, *Capsicum annuum* L., Gübre, Vermikompost

THE EFFECTS OF CHEMICAL AND ORGANIC FERTILIZER COMBINATIONS ON MACRO-MICRO NUTRIENT IN BELL PEPPER (Capsicum annuum L.) FRUITS

ABSTRACT
In this study, the research focuses on investigating the impact of various chemical and organic fertilizer types, as well as their combinations, on the levels of essential nutrients (N, P, K, Ca, Mg, Fe, Zn, Cu, Mn) and protein content in pepper (*Capsicum annuum* L.) fruits. The primary objective is to identify strategies for reducing the dependence on chemical fertilizers, a crucial component in cultivation. The experimental design involved a cultivation phase organized under a completely randomized experimental block design, comprising 3 replications with 20 plants in each replication. The experimental plots were established with inter-row and intra-row distances of 100x50 cm. The study implemented a fertilization program consisting of 10 Treatments, including 3 distinct fertilizer types and their respective combinations, in addition to a control group. The results revealed significant and noteworthy statistical variances among the different fertilizer treatments. Particularly, treatments 5, 7, 8, and 9, where vermicompost was utilized in conjunction with organomineral and chemical fertilizers at varying dosages, exhibited the highest nutrient levels.

Consequently, the application of organic fertilizers in combination with pepper cultivation demonstrated a tangible influence on the nutrient composition of the fruits. This finding suggests the practical viability of employing organic fertilizers in agricultural production. Furthermore, this approach offers the potential to mitigate the adverse ecological impacts associated with chemical fertilizers, thereby enhancing the sustainability of agricultural practices.

Keywords: *Capsicum annuum* L., Fertilizer, Nutrient, Vermicompost

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

DOĞAL PARÇACIKLARIN PATOJENİK PYTHİUM DEBARYANUM'A KARŞI ANTİFUNGAL AKTİVİTESİNİN İN VİTRO OLARAK BELİRLENMESİ

Dr. Öğr. Üyesi, Selma KIPÇAK BİTİK
Van YYU, Başkale MYO, Bitkisel ve Hayvansal Üretim Bölümü
ORCID: 0000-0002-0563-1130

Doç. Dr. Duygu ALPASLAN
Van Yüzüncü Yıl Üniversitesi, Mühendislik Fakültesi, Kimya Mühendisliği Bölümü
ORCID:0000-0002-6007-3397

Doç. Dr. Tuba ERŞEN DUDU
Van Yüzüncü Yıl Üniversitesi, Mühendislik Fakültesi, Kimya Mühendisliği Bölümü
ORCID: 0000-0001-5564-2834,

Prof. Dr. Nahit AKTAŞ
Van Yüzüncü Yıl Üniversitesi, Mühendislik Fakültesi, Kimya Mühendisliği Bölümü
ORCID: 0000 0001 9341 607x

ÖZET

Tarımsal kaynaklarda ürün kayıplarına neden olan en önemli faktörlerden biri de bitki hastalıklarıdır. Pythium debaryanum; özellikle düşük sıcaklık ve yüksek toprak nem koşullarında tohum ve kökçüklere bulaşarak tohum çürüklüğüne ve çıkış öncesi kök ve gövde çürüklüğüne neden olur. Etken toprak seviyesinde fide gövdesine (hipokotil) bulaşarak çıkıştan sonra kök ve gövde çürüklüğüne neden olur. Hafif enfeksiyonda, Pythium ile enfekte olmuş bitkiler hayatta kalabilir ancak yeterince gelişemeyebilir ve yapraklarda kloroz belirtileri gösterebilir. Toprağın sıcaklığına ve nemine bağlı olarak toprağın yapısı ve organik madde içeriği de enfeksiyonlarda önemli rol oynar. Kök ve gövde çürüklüğüne neden olan bu hastalık etkenleri, çoğu zaman önlem alınmadığında ve salgın koşulları oluştuğunda üreticilerin tarlayı tahrip etmesine ve yeniden ekim yapmak zorunda kalmasına neden olmaktadır. Soruna katkıda bulunan en önemli faktörlerden biri, antifungal ilaçların yaygın ve kontrolsüz kullanımının getirdiği direnç ve kontaminasyondur. Raporlara göre, yukarıda bahsedilen mantar enfeksiyonu durumu, yeni ve güçlü mantar önleyicilerin araştırılmasını gerektiriyor ve bu ihtiyacın zamanla artması bekleniyor. Güncel raporlara göre, yeni mantar önleyici alternatif arayışındaki en önemli kaynaklar, bitkiler ve bitkisel yağlar gibi doğal bileşiklerdir. Nane Yağı (PmO), Susam Yağı (SO), Soğan Yağı (OO), Sarımsak Yağı (GO), Tatlı Badem Yağı (SAO) Hint Yağı (Hint) Yağı (CO), Hindistan Cevizi Yağı (CnO), Karanfil Yağı (ClO) Bu çalışmada Kakao Yağı (CcO), Kekik Yağı (TO), Limon Yağı (LO), Ardıç Yağı (JO), Rosa Yağı (RO), Zencefil Yağı (GgO) ve Agolich Yağı (AO) bitkisel yağları kullanılmıştır. Bu bitkisel yağlardan sentezlenen organopartiküllerin kök çürüklüğüne neden olan Pythium debaryanum'a karşı antifungal etkisinin araştırıldığı literatürlerde ilk kez rapor edilmiştir. Sentezlenen organopartiküller Fourier Transform-Kızılötesi (FTIR), boyut analizi (DLS), yüzey yükü (ZETA potansiyeli) cihazları ve ayrıca parçacıkların biyoaktivite özellikleri de incelenmiştir. Bu çalışmanın sonuçları p(OO), p(GO) ve p(AaO) organopartiküllerinin Pythium debaryanum fungusunun kontrolünde kullanılabileceğini göstermektedir.

Anahtar Kelimeler: Hastalık, Organopartikül, *Pythium debaryanum*.

IN VITRO DETERMINE OF ANTIFUNGAL ACTIVITY OF NATURAL PARTICLES AGAINST PATHOGENIC *PYTHIUM DEBARYANUM*

ABSTRACT
Many plant diseases are one of the most important factors causing crop losses in agricultural resources. *Pythium debaryanum;* it causes seed rot and pre-emergence root and stem rot by infecting seeds and radicles, especially in conditions of low temperatures and high soil moisture. The agent can cause root and stem rot after emergence by infecting the seedling body (hypocotyl) at the soil level. In mild infection, Pythium-infected plants may survive but fail to develop adequately and show signs of chlorosis on the leaves. Depending on soil temperature and moisture, soil structure and organic matter content also play an important role in infections. These disease factors, which cause root and stem rot, often cause producers to destroy the field and have to re-plant when precautions are not taken and epidemic conditions occur. One key contributing factor to the issue is the resistance and contamination brought on by the pervasive and unchecked use of antifungal medications. According to reports, the aforementioned fungal infection condition calls for the hunt for novel and potent antifungals, and this need is anticipated to grow with time. According to current reports, the most significant sources in the hunt for novel antifungal alternatives are natural compounds like plants and vegetable oils. Peppermint Oil (PmO), Sesame Oil (SO), Onion Oil (OO), Garlic Oil (GO), Sweet Almond Oil (SAO) Castor (Hint) Oil (CO), Coconut Oil (CnO), Clove Oil (ClO), Cacao Oil (CcO), Thyme Oil (TO), Lemon Oil (LO), Juniper Oil (JO), Rosa Oil (RO), Ginger Oil (GgO) and Agolich Oil (AO) herbal oils were used in this study. The investigation of the antifungal effect of organoparticles synthesized from these herbal oils against *Pythium debaryanum*, which causes root rot, was reported for the first time in the literature. Synthesized organoparticles Fourier Transform-Infrared (FTIR), size analysis (DLS), surface charge (ZETA potential) devices. In addition, the bioactivity (antifungal and antioxidant) properties of the particle were examined. The results of this study show that organoparticles p(OO), p(GO) and p(AO) can be used in the control of root and stem rot *Pythium debaryanum* fungus.
Keywords: Disease, Organoparticle, *Pythium debaryanum.*

GİRİŞ
Bitkilerde önemli kayıplara neden olan biyotik faktörlerin başında hastalıklar gelmektedir. Pythium türleri dünyanın her yerinde farklı habitatlarda yaygın olarak bulunan saprobik ve parazitik özellikte fungus benzeri organizmalardır. Pythium türleri geniş bir konukçu yelpazesine sahiptirler ve genellikle fidelerde çökerten hastalığına neden olmaktadırlar (Stanghellini 1974). Pythium türlerinin önemli türlerden bazıları *Pythium ultimum Trow, Pythium deliense Meurs, Pythium debaryanum Hesse, Pythium graminicola Subramaniam* ve *Pythium irregulare Buisman*'dir (Ağaner ve Karaca, 2017). Pythium türleri olumsuz koşullarda oosporları sayesinde toprakta uzun süre canlılıklarını koruyabilirler. Eşeysiz çoğalma yapılarıyla (zoosporlar) toprakta su varlığında kolaylıkla hareket etmekte ve geniş alanlara yayılmaktadırlar. Sahip oldukları bu özelliklerinden dolayı nedeniyle mücadelesi oldukça zordur (Ağaner ve Karaca, 2017).
Tarımsal mücadelede kimyasal, biyolojik ve kültürel önlemler olmasına rağmen, uygulama kolaylığı ve iyi sonuçlar vermesi nedeniyle daha çok kimyasal savaş yöntemi kullanılmaktadır. Bu nedenle pestisit (pestisit) kullanımı oldukça yaygındır. Pestisitlerin kullanımının artmasıyla birlikte hem uygulamadaki yanlışlıklar hem de ileri aşamadaki zararları oldukça büyük boyutlara ulaşmıştır.

Son zamanlarda hastalık etkenleriyle mücadelede doğal malzemeler kullanılmaya başlanmıştır. Bitkisel ekstraktlar ve yağlar, doğal olmaları, kolay bulunabilmeleri, çevre dostu olmaları ve düşük maliyetli olmaları nedeniyle mücadelede oldukça fazla kullanılmaya başlanmıştır. Hastalıklarla mücadelede sentetik herbisit ve pestisitlere alternatiftirler (Tripathi ve diğerleri, 2008). Bu çalışma kapsamında sentezlenen doğal partiküllerin yani biyoaktivatörlerin önemli kayıplara neden olan bitki patojeni *Pythium debaryanum* 'a karşı etkileri araştırılmıştır.

YÖNTEMLER

Malzemeler

Araştırmada kullanılan *Pythium debaryanum* patojeni Van Yüzüncü Yıl Üniversitesi Ziraat Fakültesi Bitki Koruma Bölümünden temin edilmiştir. Organopartiküllerin (biyoaktivatör) antifungal etkisini belirlemek için Malt Dextose Agar (MEDA) besiyeri kullanılmıştır. Besiyerleri otoklavda 121 ºC'de 15 dakika süreyle sterilize edilmiş ve sterilizasyon sonrası 60 ºC'ye soğutulmuştur. Soğutulan ortam 6 mm çapındaki steril petri kaplarına her biri 25 ml olacak şekilde eklenmiştir.

Organo parçacıklarının hazırlanması

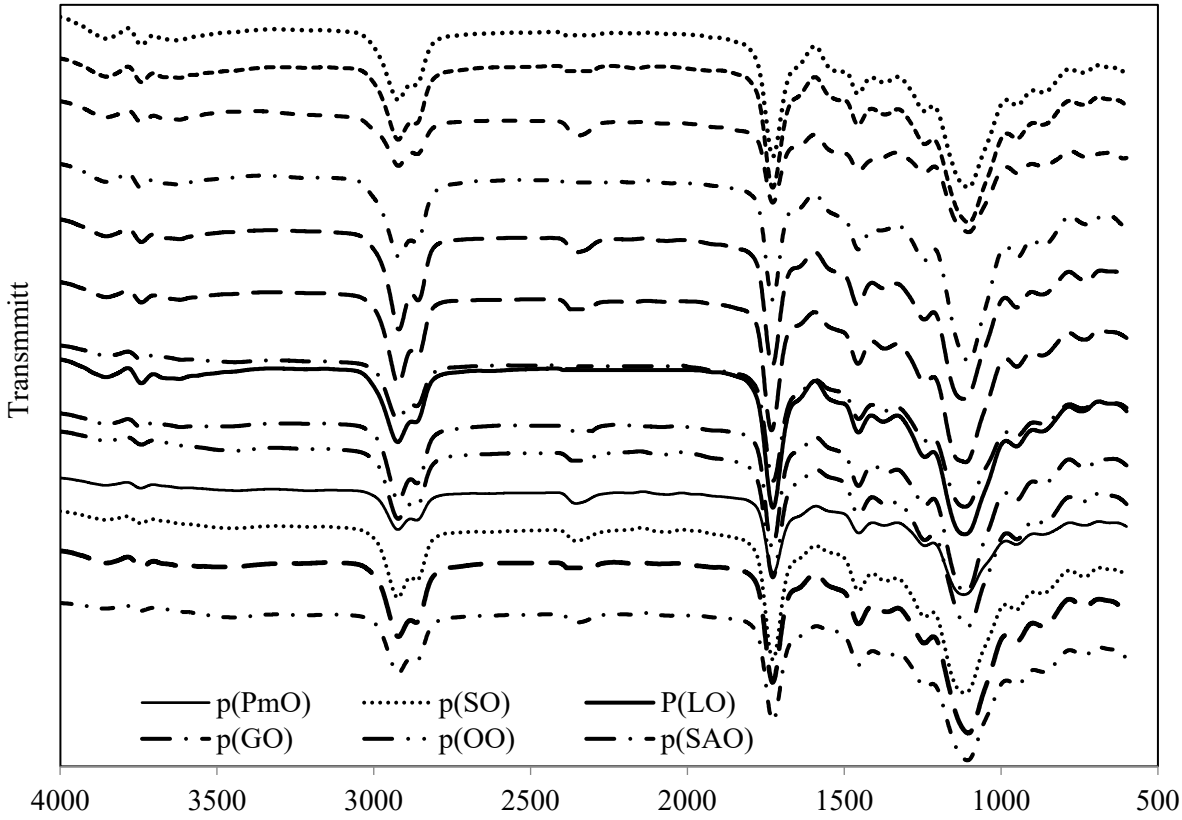
Organo parçacıkların hazırlanması Alpaslan ve ark. (2023) göre yapılmıştır.

Organopartiküllerin karakterizasyonu

Organopartiküllerin karakterizasyonu Alpaslan ve ark. (2023) göre yapılmıştır.

BULGULAR VE TARTIŞMA

Şekil 1 organo parçacıkların FTIR spektrumlarını göstermektedir. Yağların ve yağ asitlerinin bileşimlerine, uzunluklarına, doymamışlık derecelerine ve zincirdeki konumlarına göre farklılık gösterdiği yaygın olarak bilinmektedir. Spektrumda bitkisel yağlarda sentezlenen organo parçacıkların önemli bir bileşeni olan trigliserit hakimdir. Trigliserit fonksiyonel gruplarını temsil eden ana pikler, 2937, 2856, 1749 1454 ve 709 cm-1 dalga boylarında C–H gerilmesine (asimetri), C–H gerilmesine (simetri), (CO gerilmesine), (C–H) kadar gözlemlenebilir, sırasıyla bükülme (kesme), C–O gerilmesi ve C–H bükülmesi ve C–H bükülmesi (sallanma) dikkate alınan CC çift bağ titreşimine özgü bölgelerdeki tepe noktalarının yoğunlukları, alanları veya yükseklikleri (bu, doymamış bir bağ) yağ asitlerini, sterolleri ve doymamışlık derecesini gösterebilir. Bu nedenle bitkisel yağlarda sentezlenen organo parçacıkları spektrumlara göre ayırt etmek çok zordur.

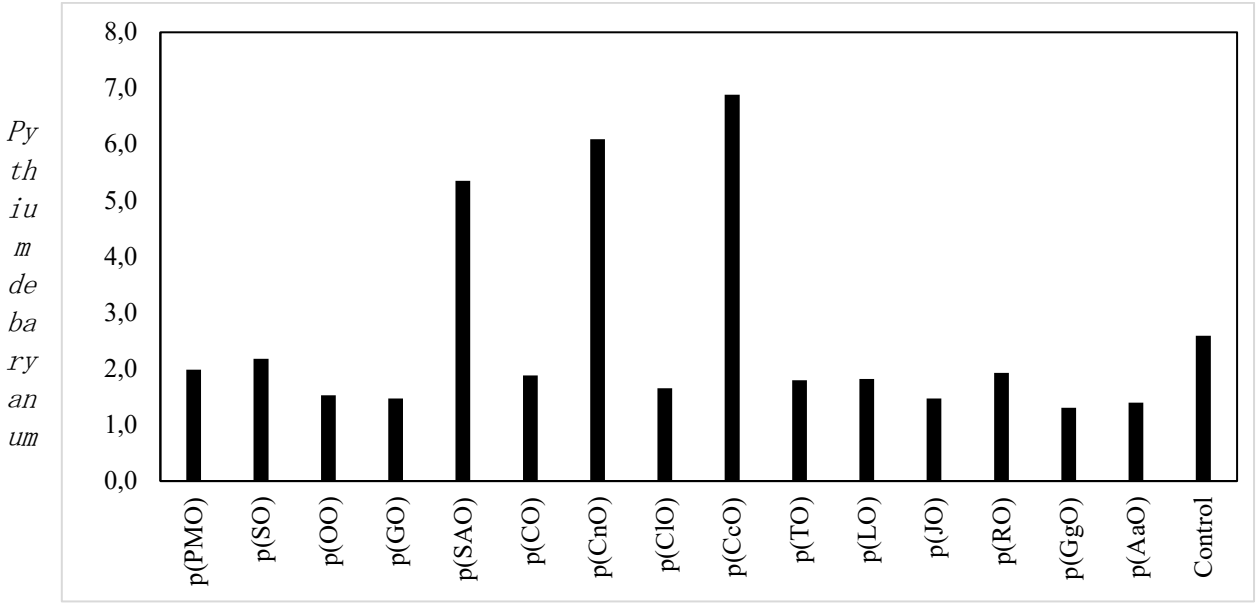


Şekil 1. Organopartiküllerin FTIR spektrumları p(PmO), p(SO), p(OO), p(GO), p(SAO), p(CO), p(CnO), p(ClO), p(CcO), p(TO), p(LO), p(JO), p(RO), p(GgO) ve p(AaO).

Bu çalışmada p(PmO), p(SO), p(OO), p(GO), p(SAO), p(CO), p(CnO), p(ClO), p(CcO), p(15 organopartikül TO), p(LO), p(JO), p(RO), p(GgO) ve p(AO)'nun *Pythium debaryanum'*a karşı antifungal aktivitesi araştırılmıştır. Organopartiküllerin *Pythium debaryanum'*a karşı antifungal etkileri Şekil 2'de gösterilmiştir. Organopartiküller arasında p(SAO), p(CnO) ve p(CCO) organopartiküllerin *Pythium debaryanum'*a karşı diğer organopartiküllere kıyasla yüksek antifungal aktiviteye sahip olduğu bulunmuştur.

Tablo 1. Zeta, DLS and antioxidant values of organoparticles p(PmO), p(SO), p(OO), p(GO), p(SAO), p(CO), p(CnO), p(ClO), p(CcO), p(TO), p(LO), p(JO), p(RO), p(GgO), p(AaO).

Organoparticles	ZETA (mV)	DLS (nm)	Total fenol (GAE/mg)
p(PmO)	16.96	368-404	390.3
p(SO)	10.08	400-673	455.5
p(OO)	30.1	600-900	796.2
p(GO)	-353.96	220-500	796.2
p(SAO)	14.15	200-350	374.0
p(CO)	2.98	300-750	354.0
p(CnO)	169.77	20-530	665.9
p(ClO)	-868.53	300-506	1107.3
p(TO)	-120.02	150-347	217.7
p(CcO)	-563.42	300-506	858.8
p(LO)	-1414.71	40-50	469.2
p(JO)	-0.98	1000	772.9
p(RO)	-146.23	126.1-96.96	544.4
p(GgO)	-162.48	500-915	574.0
p(AaO)	-563.42	150-347	745.1



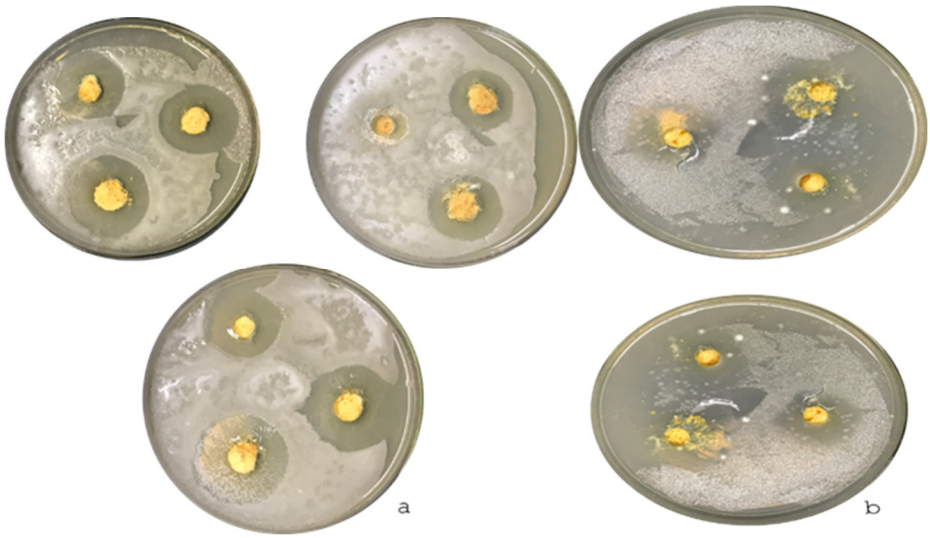
Şekil 2. On beş farklı organopartikülün *Pythium debaryanum* 'a karşı inhibisyon oranı.

Çalışmanın bulgularına dayanarak, *Pythium debaryanum* izolatına çeşitli konsantrasyonlarda organopartiküllerin uygulanmasını içeren deneyin ikinci aşaması, bu partiküllerin optimal dozunu belirlemek amacıyla başlatılmıştır (Tablo 2). Çalışmanın sonuçlarına göre ikinci aşamada *Pythium debaryanum* üzerinde organopartiküllerin en etkili dozunun belirlenmesine yönelik çalışmalara başlanmış ve kullanılan *Pythium debaryanum* izolatı üzerinde farklı miktarlarda organopartiküllerin uygulandığı denemeler yapılmıştır.

Tablo 2. p(OO), p(GO), p(TO), p(JO), p(GgO) ve p(AaO) organopartikülere ait zon genişlikleri

	Organoparticle					
	p(OO)	p(GO)	p(TO)	p(JO)	p(GgO)	p(AaO)
	Inhibition Zone Diameters (cm)					
Pythium debaryanum	2.83	2.33	1.33	0.50	1.33	2.33

	Pythium debaryanum		
Organoparticle	0.1 g	0.2 g	0.3 g
p(OO)	3	3.5	4
p(GO)	2	3	3.5
p(GgO)	2	2	2
p(AaO)	2.5	3	4



Şekil 3. *Pythium debaryanum* izolatının petri kabında zon genişlikleri.

Antifungal maddeler, mantar hücre zarlarının veya organellerinin yapı-fonksiyonlarını, nükleer materyali ve protein sentezini inhibe ederek mantarları birçok farklı mekanizma ile inhibe eder.(Freiesleben ve Jäger, 2014a; Nazzaro ve diğerleri, 2017). Antifungal materyallerin inhibitör etkisi 6 farklı etki mekanizması ile açıklanmaktadır. Hücre duvarı oluşumunun inhibisyonu: Mantarların hücre duvarı çoğunlukla β-glukanlardan oluşur ve β-glukanlardan sentez inhibe edildiğinde hücre duvarı bütünlüğü bozulur. Hücre zarının bozulması: Ergosteroller mantarların hücre zarı için önemlidir.

Bu ergosteroller antifungallere bağlanırsa veya ergosterol biyosentezi inhibe edilirse hücre zarının bütünlüğü tehlikeye girer ve hücre zarı sızıntı yapabilir. Fungal mitokondriyal fonksiyon bozukluğu: Solunum zincirindeki proton pompalarının inhibisyonu ile ATP üretiminin azalmasına ve hücre ölümüne yol açar, bunun sonucunda mitokondriyal membran potansiyelinin azalmasına ve hücre ölümüne yol açar. Hücre bölünmesinin engellenmesi, mikrotübül polimerizasyonunun ve mitotik iğ oluşumunun engellenmesi yoluyla olabilir. RNA/DNA sentezinin veya protein sentezinin inhibisyonu: Antifungal ajanlar aktif taşıma yoluyla ATPazlara bağlanarak hücreye girerse ve RNA'ya müdahale ederse, hatalı RNA sentezine ve DNA transkripsiyonunun ve protein sentezinin inhibisyonuna neden olabilir. Akış pompalarının inhibisyonu: Canlı hücrelerdeki akış pompaları, toksik maddeleri hücrenin dışına taşır. Bunları inhibe ederek antifungal ajanlara karşı direncin azaltılabileceğine inanılmaktadır.(Ghannoum ve Rice, 1999; Odds ve diğerleri, 2003; Kang ve diğerleri, 2010; Kim ve diğerleri, 2013; Freiesleben ve Jäger, 2014; Abd Rashed ve diğerleri, 2021).

Yapılan çalışmalar incelendiğinde bitkilerin ve bitkisel yağların antifungal etkilerinin genellikle in vitro olarak test edildiği görülmektedir. İn vitro etkili olduğu tespit edilen bitkiler ve uçucu yağlar, in vivo koşullarda genellikle çok az veya tamamen başarısız olmuştur. İn vivo çalışmaların sayısının az olması ve başarısız sonuçlar alınması, uçucu yağların tarla, bahçe gibi açık ve geniş alanlarda kullanılma ihtimalinin düşük olmasına bağlanabilir. Bitki ve bitkisel yağların antifungal etkilerinin in vivo ve pratikte kullanılabileceği alanlarda test edilmesi gerektiği açıktır.

SONUÇLAR

Sonuç olarak organo partiküllerin *Pythium debaryanum* üzerinde antifungal etkiye sahip olduğu belirlenmiştir. Organopartiküllerin insan ve çevre sağlığına olumsuz etkisi olmadığından dolayı yetiştirilen ürünlerde kalıcılık riski olmayacaktır. Bu sonuçların bitki patojeni mantarlara karşı kimyasal kullanımını en aza indirmeyi amaçlayan kontrol yöntemlerinde ve organik tarımda *Pythium debaryanum* 'un kontrolünde kullanılabileceği düşünülmektedir.

KAYNAKLAR

Abd Rashed, A., D.G. Rathi, N.A.H. Ahmad Nasir and A.Z. Abd Rahman, 2021. Antifungal properties of essential oils and their compounds for application in skin fungal infections: Conventional and nonconventional approaches. Molecules, 26(4). Available from https://www.ncbi.nlm.nih.gov/pubmed/33669627. DOI 10.3390/molecules26041093.

Ağaner, G. T., and Karaca, G. 2017. Possibilities of using Pythium oligandrum against fungal plant pathogens in biological control. *Türkiye Biyolojik Mücadele Dergisi*, *8*(2), 185-198.

Alpaslan, D.,Bitik Kipcak S., Ersen Dudu T and Aktas, N, 2023. International Ege Agriculture Congress.

Ersen Dudu, T., D. Alpaslan and N. Aktas, 2021. Application of poly (agar-co-glycerol-co-sweet almond oil) based organo-hydrogels as a drug delivery material. J Polym Environ, 30(2): 483-493. Available from https://www.ncbi.nlm.nih.gov/pubmed/34177399. DOI 10.1007/s10924-021-02212-4.

ErsenDudu, T., D. Alpaslan and N. Aktas, 2022. Hydrogen production from methanolysis of sodium borohydride by non-metal p(co) organo-particles synthesized from castor oil. Journal of Polymers and the Environment, 30: 4562-4570. DOI 10.1007/s10924-022-02521-2.

Freiesleben, S.H. and A.K. Jäger, 2014. Correlation between plant secondary metabolites and their antifungal mechanisms–a review. Medicinal & Aromatic Plants, 03(02). DOI 10.4172/2167-0412.1000154.

Ghannoum, M.A. and L.B. Rice, 1999. Antifungal agents: Mode of action, mechanisms of resistance, and correlation of these mechanisms with bacterial resistance. American Society for Microbiology, 12(4): 501-517.

Kang, K., W.P. Fong and P.W. Tsang, 2010. Novel antifungal activity of purpurin against candida species in vitro. Med Mycol, 48(7): 904-911. Available from https://www.ncbi.nlm.nih.gov/pubmed/20392152. DOI 10.3109/13693781003739351.

Kim, J.H., R.P. Haff, N.C. Faria, L. Martins Mde, K.L. Chan and B.C. Campbell, 2013. Targeting the mitochondrial respiratory chain of cryptococcus through antifungal chemosensitization: A model for control of non-fermentative pathogens. Molecules, 18(8): 8873-8894. Available from https://www.ncbi.nlm.nih.gov/pubmed/23892633. DOI 10.3390/molecules18088873.

Nazzaro, F., F. Fratianni, R. Coppola and V. Feo, 2017. Essential oils and antifungal activity. Pharmaceuticals (Basel), 10(4). Available from https://www.ncbi.nlm.nih.gov/pubmed/29099084. DOI 10.3390/ph10040086.

Odds, F.C., A.J. Brown and N.A. Gow, 2003. Antifungal agents: Mechanisms of action. Trends Microbiol, 11(6): 272-279. Available from https://www.ncbi.nlm.nih.gov/pubmed/12823944. DOI 10.1016/s0966-842x(03)00117-3.

Stanghellini, M. E. 1974. Spore germination, growth and survival of Pythium in soil.

Tripathi, A., N. Sharma and V. Sharma, 2008. In vitro efficacy of hyptis suaveolens l. (poit.) essential oil on growth and morphogenesis of fusarium oxysporum f.Sp. Gladioli (massey) snyder & hansen. World Journal of Microbiology and Biotechnology, 25(3): 503-512. DOI 10.1007/s11274-008-9916-y.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

CİN VE ILGAR DAĞLARI PERİGLASYAL ŞEKİLLERİNDE OLUŞMUŞ TOPRAKLARIN EROZYON DUYARLILIK PARAMETRELERİNİN KARŞILAŞTIRILMASI

Prof. Dr. Orhan DENGİZ
Ondokuz Mayıs Üniversitesi, Ziraat Fakültesi, Toprak Bilimi ve Bitki Besleme Bölümü
ORCID: 0000-0002-0458-6016

Doç. Dr. İnci DEMİRAĞ TURAN
Samsun Üniversitesi, İnsan ve Toplum Bilimleri Fakültesi, Coğrafya Bölümü
ORCID: 0000-0002-5810-6591

Volkan DEDE
Doç. Dr., Ardahan Üniversitesi, İnsani Bilimler ve Edebiyat Fakültesi, Coğrafya Bölümü
ORCID: 0000-0003-4523-1390

ÖZET
Yerküre üzerinde soğuk ortama sahip alanlar periglasyal şekillerin gelişimi için elverişli koşulları bünyesinde barındırmaktadır. Bu nedenle periglasyal şekiller, yüksek enlemler ile dağların yüksek kesimlerinde oluşmakta ve yoğunluk göstermektedir. Geçmiş döneme ait soğuk iklim koşullarında meydana gelen periglasyal şekiller, günümüz iklim koşullarında da gelişimine devam etmektedir. Türkiye'nin kuzeydoğusunda, Ardahan ili sınırları içerisinde yer alan dağlık kütlelerden Cin Dağı (2957 m) ile Ilgar Dağı (2918 m) da soğuk ortam koşullarına bağlı olarak periglasyal şekillerin gelişimine uygun zemin oluşturmaktadır. Dağlık kütlelerin her ikisi de volkan konisi özelliği göstermektedir. Bahsi geçen kütlelerde girland, çember ve taş kümesi olarak adlandırılan periglasyal şekiller bulunmaktadır. Cin Dağı ile Ilgar Dağı'nın jeolojik yapısı temelde Üst Miosen-Alt Pliosen yaşlı bazalt, tüf, aglomeralar; zirvelerde ise Pleistosen yaşlı andezitlerden oluşmaktadır. Periglasyal şekiller, Pleistosen yaşlı andezitler üzerinde meydana gelmiştir. Bu çalışmada, söz konusu farklı dağlık kütlelerde periglasyal şekiller bünyesinde oluşan topraklarda, agregat stabilitesi, dispersiyon oranı ve strüktür stabilite indeksi arasındaki ilişkinin incelenmesi amaçlanmıştır. Bu amaçla, periglasyal şekillerin topraklarının çeşitli tanımsal istatistikleri, korelasyon analizleri ve erozyon duyarlılık parametreleri ile periglasyal şekillerin anlamlı farklılaşıp farklılaşmadığını karşılaştırmak amacıyla Kruskal-Wallis ve Mann Whitney U-testi kullanılmıştır. Cin Dağı ile Ilgar Dağı periglasyal şekillerinde agregat stabilitesi ve dispersiyon oranı arasında anlamlı farklılaşma olduğu belirlenmiştir. Girlandlar üzerinde Cin Dağı'nın agregat stabilitesi ve strüktür stabilite indeksi değerleri anlamlı olarak daha yüksektir. Çemberlerde Ilgar Dağı'nın Cin Dağı'na göre agregat stabilite değerleri anlamlı olarak daha yüksektir. Ayrıca taş kümelerinde Cin Dağı strüktür stabilite indeksi değerleri Ilgar Dağı'na göre anlamlı olarak daha yüksektir.
Anahtar Kelimeler: Periglasyal şekiller, Toprak analizleri, Erozyon duyarlılık, Cin Dağı, Ilgar Dağı, Kuzeydoğu Türkiye.

COMPARISON OF EROSION SENSITIVITY PARAMETERS OF SOILS FORMED ON THE PERIGLACIAL LANDFORMS OF CİN AND ILGAR MOUNTS

ABSTRACT
Areas with cold environments on Earth contain favorable conditions for the development of periglacial landforms. For this reason, periglacial landforms are formed and concentrated in high latitudes and high parts of the mountains. Periglacial landforms, which occurred in the cold climate conditions of the past, continue to develop in today's climate conditions. Mount Cin (2957 m a.s.l.) and Mount Ilgar (2918 m a.s.l.), which are mountainous masses located within the borders of Ardahan province in the northeast of Türkiye, also form suitable grounds for the development of periglacial landforms due to cold environmental conditions. Both mountainous masses have volcanic cone characteristics. There are periglacial landforms called non-sorted steps, mud circles and stony earth circles in the mentioned masses. The geological structure of Mount Cin and Mount Ilgar is basically Upper Miocene-Lower Pliocene aged basalt, tuff and agglomerates; at the peaks, it consists of Pleistocene aged andesites. Periglacial shapes were formed on Pleistocene aged andesites. In this study, it was aimed to examine the relationship between aggregate stability, dispersion rate and structure stability index in the soils within the periglacial landforms in the mountainous masses in question. For this purpose, Kruskal-Wallis and Mann Whitney U-test were used to compare whether periglacial landforms differ significantly with various descriptive statistics, correlation analyses and erosion sensitivity parameters of the soils of periglacial landforms. It was determined that there was a significant difference between aggregate stability and dispersion rate in the periglacial landforms of Mount Cin and Mount Ilgar. Aggregate stability and structure stability index values of Mount Cin on the non-sorted steps are significantly higher. In the mud circles, aggregate stability values of Mount Ilgar are significantly higher than Mount Cin. In addition, in the stony earth circles, the structure stability index values of Mount Cin are significantly higher than those of Mount Ilgar.
Keywords: Periglacial landforms, Soil analyses, Erosion sensitivity, Mount Cin, Mount Ilgar, Northeastern Türkiye.

GİRİŞ
Periglasyal alanlar, kalıcı olarak donmuş durumda olan ancak zemin yüzeyinde kalıcı buz örtüsü olmayan alanlardır. Periglasyal koşullar, ağırlıklı olarak ortalama yıllık sıcaklığın donma noktasının altında olduğu bölgelerde bulunmaktadır ve bu da permafrostun varlığına yol açmaktadır. Periglasyal süreçler, soğuk iklim koşullarının egemen olduğu alanlarda kendini göstermektedir. Küresel ölçekte bu alanlar, yüksek dağlık alanlar ile kutup çevrelerindeki yüksek enlemlerdir. Donma ve çözülme olayları periglasyal şekillerin gelişiminde önemli rol oynamaktadır. Geçmiş dönemde oluşan periglasyal şekiller günümüzde de gelişimine devam ettiği için araştırmacılar tarafından onlarca yıldır çalışılmaktadır (Dede vd., 2024, 2022a, b; Öztürk ve Taşoğlu, 2024; Walther ve Kamp, 2023; Dede, 2023; Türkeş vd., 2023; Fleischer vd., 2023; Kamp vd., 2022; Jambaljav vd., 2022; Knight vd., 2019; Uxa vd., 2017; Vaks vd., 2013; Shur vd., 2011…). Anadolu'nun kuzeydoğusunda yer alan Cin Dağı ile Ilgar Dağı üzerindeki periglasyal şekillerin gelişiminin değerlendirildiği çalışmalar da yakın zaman dilimi içerisinde gerçekleştirilmiştir (Dede, 2023; Dede vd., 2022a, 2022b).
Toprak erozyonu, toprağın verimliliğine doğrudan zarar veren ve insan refahını etkileyen, Dünya'daki en ciddi felaketlerden biridir. Toprak erozyonunun etkili bir şekilde nasıl azaltılacağı Dünya'daki tüm ülkelerin karşılaştığı bir sorundur (Wen vd., 2023).

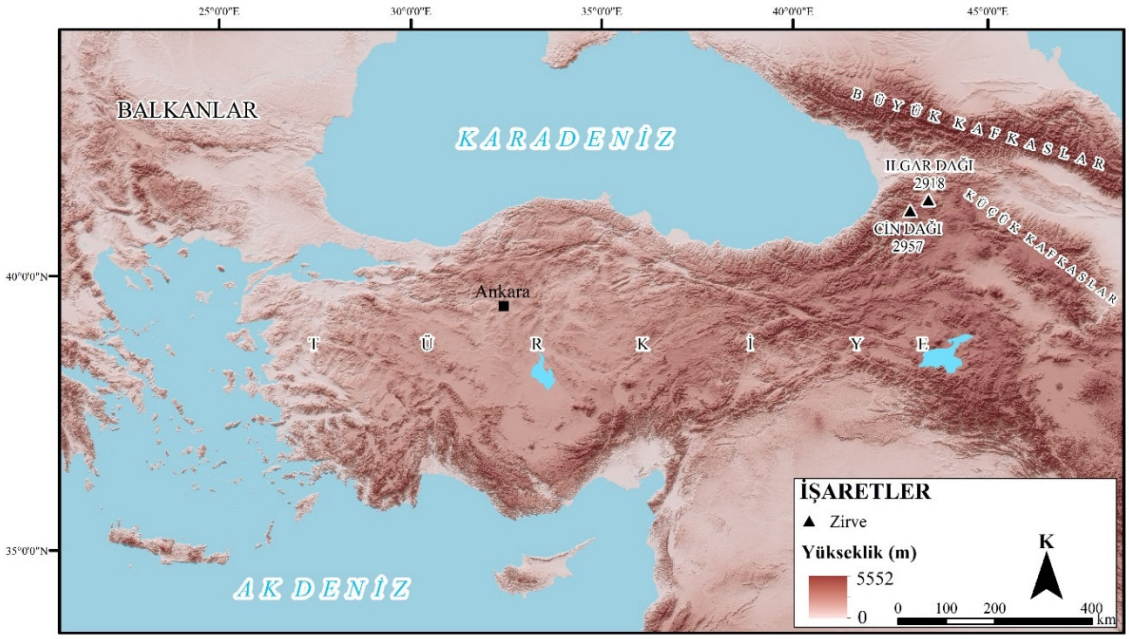
İnsan faaliyeti ve buna bağlı arazi kullanımındaki değişiklikler, besin ve karbon döngüsü, arazi verimliliği ve dolayısıyla Dünya çapındaki sosyoekonomik koşullar üzerinde önemli etkileri olan hızlandırılmış toprak erozyonunun birincil nedenidir (Borelli vd., 2017). Arazi kullanımındaki değişiklikler, tarım alanlarının ormanlık alanların zararına artması ve tarım arazilerinin kötü yönetimi, iklimdeki değişikliklerin etkisi (iklim saldırganlık endeksinin artışına yansıyan) ile toprak erozyonunu en önemli sorunlardan biri haline getirmektedir (Costea vd., 2022). Toprakların erozyona uğrama eğilimleri, kalite unsuru olarak değerlendirilen parametrelerden biri olup, arazi ve toprak yönetimi, toprak özellikleri (toprak tekstürü, strüktürü, organik madde içeriği, kimyasal bileşimi), topoğrafya ve iklimsel faktörlerden etkilenmekte ve dinamik bir karakter taşımaktadır (Öztürk, 2013). Toprak yüzeyinde kabuk oluşumu, su infiltrasyonunun ve yarayışlı su kapasitesinin azalması, besin elementlerinin kaybı ile topraktaki biyolojik aktivitedeki düşüş toprak kalitesini olumsuz yönde etkilemekte ve bu toprakların erozyona karşı hassasiyetini arttırmaktadır (Özdemir, 2013; Çelik ve Dengiz, 2018).

Bu nedenle mevcut çalışmada Cin Dağı ile Ilgar Dağı'nda dağılım gösteren periglasyal şekiller üzerinde oluşmuş toprakların bazı erozyon duyarlılık parametrelerine yönelik ilişkilerine odaklanılmıştır. Bahsi geçen iki dağlık kütledeki periglasyal şekillerde agregat stabilitesi, dispersiyon oranı ile strüktür stabilite indeksi arasındaki ilişkinin ve dağlar arasındaki farkın incelenmesi amaçlanmıştır. Bu amaçla, toprakların farklı fiziksel özelliklerinin çeşitli tanımsal istatistikleri ve korelasyon analizleri kullanılmıştır. Söz konusu özellikler arasındaki ilişkiler literatürle birlikte değerlendirilmiştir.

MATERYAL VE METOD

Çalışma Alanı

Cin Dağı (2957 m) ile Ilgar Dağı (2918 m) Anadolu'nun kuzeydoğusunda Ardahan platosu üzerinde yer almaktadır (Şekil 1). Bu iki dağlık kütleden Cin Dağı Hanak ilçesinin, Ilgar Dağı ise Damal ilçesinin batısında bulunmaktadır. Her iki dağlık kütlenin jeolojik yapısının temelinde Üst Miosen ve Alt Pliosen yaşlı bazalt, tüf, aglomeralar; zirvelerinde ise Pleistosen yaşlı andezitler yer almaktadır (Keskin, 2013).



Şekil 1. Cin Dağı ile Ilgar Dağı'nın yer bulduru haritası.

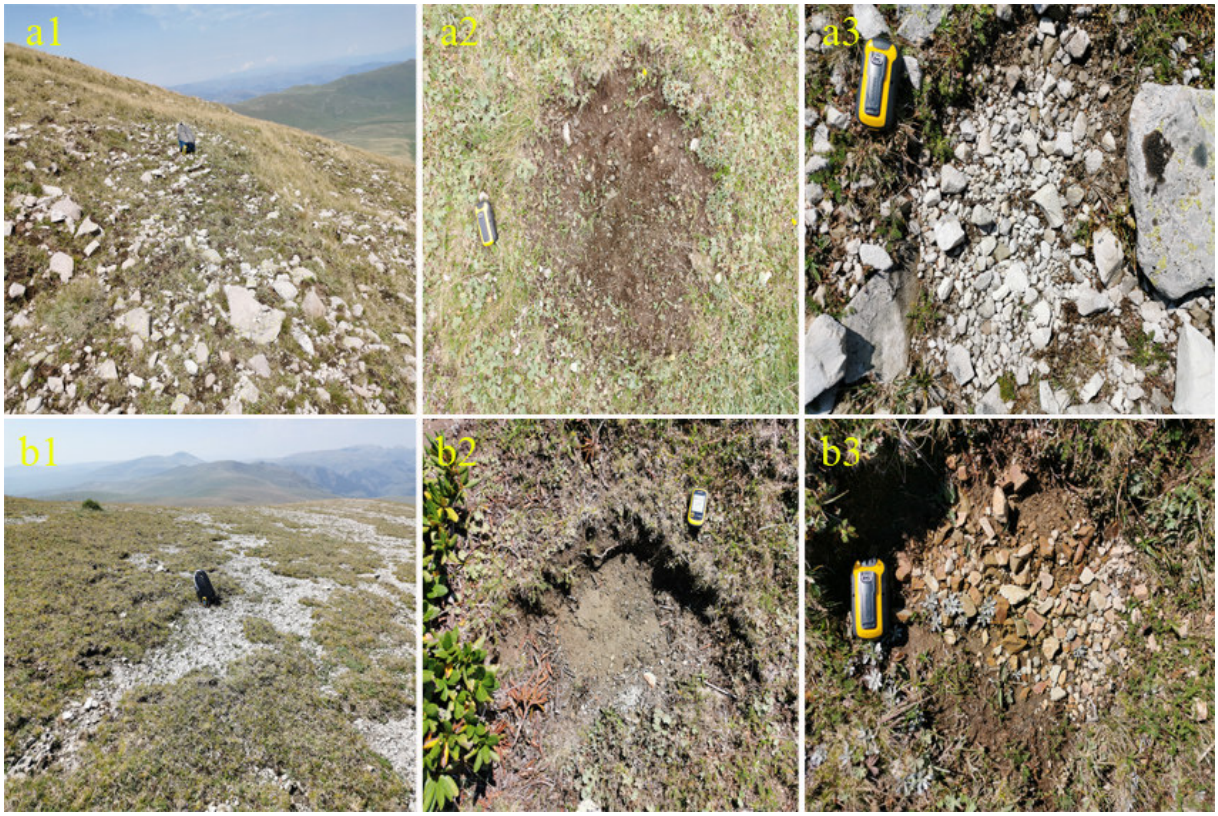
Metod

Araştırmanın ilk aşamasında arazi çalışmaları ile periglasyal şekillerden Cin Dağı'ndan 25, Ilgar Dağı'ndan da 25 örnek olmak üzere toplam 50 toprak örneği alınmıştır (Şekil 2). Bu örnekler her bir dağ için; 5'i taş kümelerinden, 5'i çemberlerden, 15'i ise girlandlardan elde edilmiştir. Örnekler çekiç, keski ve kürek yardımıyla numune torbalarına etiketlenerek konulmuştur. Örnekleme esnasında orijinal toprak yüzeyleri tercih edilmiş, yaklaşık 500-700 gram olacak şekilde örnek alınmıştır. Araziden alınan örneklere analizlerin uygulanması için öncelikle toprak örnekleri laboratuvar ortamında hava kuru hale getirilmiştir. Sonrasında kurutulan örnekler öğütülerek 2 mm'lik elekten geçirilmiş, agregat stabilitesi (AS), dispersiyon oranı (DO) ve strüktür stabilite indeksi (SSI) analizleri yapılmıştır.

- Agregat stabilitesi (AS): Yoder tipi eleme setinde ıslak eleme yöntemine göre (Kemper ve Rosenau, 1986),
- Dispersiyon oranı (DO): Süspansiyonda dispers edilmeden ölçülen silt+kil % değerinin, mekanik analizde ölçülen silt+kil % değerine oranlanmasıyla (Lal, 1988),
- Strüktür stabilite indeksi (SSI): Hidrometre ölçümlerine dayanarak ve aşağıdaki denklem kullanılarak bulunabilir (Leo, 1963).

$$SSI = \boldsymbol{\Sigma n - \Sigma b}$$

Σn: Mekanik analiz ile elde edilen fraksiyonlar, silt (%) ve kil (%) toplamını ifade eder.
Σb: Agregatlardan (%) süspansiyona dağılmış silt (%) ve kil (%) fraksiyonlarının toplamına eşittir.



Şekil 2. Periglasyal şekillerin genel görünümleri, Cin Dağı (a1-girland, a2-çember, a3-taş kümesi) ve Ilgar Dağı (b1-girland, b2-çember, b3-taş kümesi).

Cin Dağı ile Ilgar Dağı'ndaki periglasyal şekillerden alınan örneklerden yapılan analiz sonucunda AS, DO ve SSI sonuçları için tanımsal istatistik ve korelasyon analizleri ve iki dağ için bu verilerin karşılaştırılması yapılmıştır. Temel tanımlayıcı istatistikler ve korelasyon analizleri için IBM SPSS Statistics 23v. programı kullanılmıştır (IBM Corp, 2015). Korelasyon analizi, en az iki değişken arasındaki ilişkinin yönünü ve şiddetini belirlemek için kullanılmaktadır. Analizler sonrasında elde edilen bulgular anlamlılık seviyelerine göre değerlendirilerek çıkarımlarda bulunulmaktadır. Çıkan sonuçlara göre değerler pozitif olarak gerçekleşirse ilişki arasında aynı yönde bir artış olduğu, eğer negatif olarak gerçekleşirse zıt yönde bir azalış olduğu ifade edilerek, değişkenler arasındaki bağlantılar değerlendirilmektedir. Tanımsal istatistik değerlendirmesinde ortalama standart sapma, değişkenlik katsayısı, varyans, en düşük ve en yüksek değerler, çarpıklık ve basıklık özellikler değerlendirmeye alınmıştır. Normal dağılım simetrik bir dağılımdır. Normal dağılımda simetrikliğin bozulma derecesine çarpıklık (skewness) denir. Dağılış sağa uzun kuyruklu ise sağa (pozitif) çarpık, sola uzun kuyruklu ise sola (negatif) çarpık olarak adlandırılır. Normal dağılım eğrisinin sivrilik veya yuvarlaklık derecesine basıklık (kurtosis) denir (Yıldız vd., 1998). Ayrıca Wilding (1985), toprak özelliklerindeki değişimlerin açıklanmasında önemli bir gösterge olarak kabul edilen değişkenlik katsayısını, aldığı değerlere göre düşük (<% 15), orta (% 15-35) ve yüksek (>% 35) olarak sınıflandırmaktadır (Mallants vd., 1996).

Çalışmada toprakların hem Cin Dağı hem de Ilgar Dağı için erozyon duyarlılık parametrelerinden AS, DO ve SSI ile periglasyal şekiller arasındaki ilişkileri karşılaştırılarak incelenmiş ve anlamlı düzeyde farklılık olup olmadığını test etmek için varyansların homojen olmaması ve verilerin normal dağılmaması gibi sebeplerle nonparametrik test olan Kruskal-Wallis testi yapılmıştır. Periglasyal şekiller ile anlamlı farkın görüldüğü erozyon duyarlılık parametrelerinin hangi periglasyal şekiller ile farklılaşma gösterdiğini bulmak için ise Post hoc testinden Tamhane's T2 testi uygulanmıştır. Ayrıca erozyon duyarlılık parametrelerini periglasyal şekiller ile Cin Dağı ve Ilgar Dağı arasında karşılaştırma yapılmıştır. Yine verilerin normal dağılmamasından dolayı ve iki ayrı dağı karşılaştırıldığından dolayı Mann Whitney U-testi uygulanmıştır.

BULGULAR VE TARTIŞMA

Cin Dağı ve Ilgar Dağı'ndaki periglasyal şekillerden alınan toprak örneklerinin erozyon duyarlılık parametrelerinin analizleri yapılmış ve tanımsal istatistik sonuçları Tablo 1 ve Tablo 2'de verilmiştir. Buna göre Cin Dağı'ndaki örneklerde AS en düşük 29,49 en yüksek 80,20 iken Ilgar Dağı'nda ise bu değerler en düşük 24,34 en yüksek 89,00'dır. Cin Dağı SSI değerleri 10,79-44,06, Ilgar Dağı 12,40-34,05; DO değerleri ise Cin Dağı'nın 4,25-53,63 Ilgar Dağı'nın ise 9,01-61,42 arasında değişiklik göstermektedir. Cin Dağı'ndan alınan örneklerden AS ve DO normal dağılım gösterirken Ilgar Dağı'ndaki AS, SSI ve DO sonuçları normal dağılım göstermektedir. Hem Cin Dağı örneklerinin hem de Ilgar Dağı örneklerinin AS ve DO yüksek değişkenlik gösterirken, SSI orta değişkenliktedir.

Tablo 1. Cin Dağı periglasyal şekillerinden alınan toprak örneklerinin AS, DO ve SSI özelliklerinin tanımlayıcı istatistikleri (n:25).

Parametreler	Ortalama	Standart Sapma	Değişkenlik Katsayısı *	Varyans	En Düşük Değer	En Yüksek Değer	Çarpıklık **	Basıklık
AS	57,34	12,28	50,71	150,81	29,49	80,20	-0,44	0,15
SSI	29,65	7,18	33,27	51,60	10,79	44,06	-0,80	1,70
DO	28,36	11,19	49,38	125,25	4,25	53,63	0,36	0,53

AS: Agregat stabilitesi, **SSI:** Strüktür stabilite indeksi, **DO:** Dispersiyon oranı.

Tablo 2. Ilgar Dağı periglasyal şekillerinden alınan toprak örneklerinin AS, DO ve SSI özelliklerinin tanımlayıcı istatistikleri (n:25).

Parametreler	Ortalama	Standart Sapma	Değişkenlik Katsayısı *	Varyans	En Düşük Değer	En Yüksek Değer	Çarpıklık **	Basıklık
AS	53,39	18,45	64,66	340,63	24,34	89,00	0,08	-1,24
SSI	23,50	6,02	21,65	36,25	12,40	34,05	-0,08	-1,08
DO	32,16	13,75	52,41	189,27	9,01	61,42	0,42	-0,59

AS: Agregat stabilitesi, **SSI:** Strüktür stabilite indeksi, **DO:** Dispersiyon oranı.

Hem Cin Dağı hem de Ilgar Dağı'ndan alınan örneklerin korelasyon analizleri de yapılmıştır. Bunlarda Tablo 3 ve Tablo 4'te verilmiştir. Buna göre Cin Dağı için AS ile SSI arasında 0,05 düzeyinde (0,402) pozitif yönde anlamlı bir ilişki belirlenirken, AS ile DO arasında 0,01 düzeyinde (-0,511) negatif yönde anlamlı bir ilişki tespit edilmiştir. Ayrıca SSI ile DO arasında da 0,01 düzeyinde (-0,767) anlamlı bir ilişki vardır (Tablo 3).

Tablo 3. Cin Dağı erozyon duyarlılık parametrelerinin korelasyon analizleri.

Parametreler	AS	SSI	DO
AS	1,000	0,402*	-0,511**
SSI	0,402*	1,000	-0,767**
DO	-0,511**	-0,767**	1,000

(*). (**) : Sırasıyla 0.05, 0.01 ve seviyelerinde istatistiksel olarak anlamlı korelasyon katsayıları
AS: Agregat stabilitesi, **SSI:** Strüktür stabilite indeksi, **DO:** Dispersiyon oranı.

Ilgar Dağı için yapılan korelasyon sonuçlarında ise Cin Dağı'nda olduğu gibi AS ile SSI arasında 0,05 düzeyinde pozitif yönde, AS ile DO arasında 0,001 düzeyinde negatif yönde (-0,750) SSI ile DO arasında ise 0,05 düzeyinde negatif (-0,748) yönde ilişkiler tespit edilmiştir (Tablo 4). Dede ve ark. (2020) Ilgaz Dağları'nda yaptıkları çalışmada erozyon duyarlılık parametrelerinin diğer toprak özellikleriyle olan korelasyonlarına bakmışlardır. Ayrıca aynı çalışmada erozyon parametrelerinin yükselti basamakları ile dağılışının rastgele olup olmadığına bakılmış ve yükseklik ile agregat stabilitesi (AS), dispersiyon oranı (DO) ve kabuk oluşumu (CF) arasında anlamlı farklılaşma olduğu belirlenmiştir.

Tablo 4. Ilgar Dağı erozyon duyarlılık parametrelerinin korelasyon analizleri.

Parametreler	**AS**	**SSI**	**DO**
AS	1,000	0,472*	-0,750**
SSI	0,472*	1,000	-0,748**
DO	-0,750**	-0,748**	1,000

(*). (**) : Sırasıyla 0.05, 0.01 ve seviyelerinde istatistiksel olarak anlamlı korelasyon katsayıları

AS: Agregat stabilitesi, **SSI:** Strüktür stabilite indeksi, **DO:** Dispersiyon oranı.

Bu çalışmada Cin Dağı ve Ilgar Dağı için ayrı ayrı toprakların erozyon duyarlılık parametrelerinden AS, SSI ve DO ile periglasyal şekillerin dağılışlarının rastgele olup olmadığının belirlenebilmesi amacıyla Kruskal-Wallis testi de yapılmıştır (Tablo 5). Tablodan da görüldüğü gibi Cin Dağı için erozyon duyarlılık parametreleri açısından periglasyal şekillere göre anlamlı bir farklılaşma görülmemiştir (AS P:0,134>0,05, SSI P:0,178>0,05, DO P: 0,964 >0,05). Ilgar Dağı için ise periglasyal şekillere göre Ki-kare puanları AS göstergesi için 10,087 (P: 0,006, p<0,05), SSI için 1,349 (P: 0,506, p>0,05), DO için 8,793 (P: 0,012, p>0,05) bulunmuştur. Bu sonuca göre periglasyal şekiller ile AS ve DO arasında anlamlı farklılaşma olduğu belirlenmiştir. Ancak periglasyal şekiller ile SSI arasında anlamlı farklılaşma göstermediği tespit edilmiştir.

Tablo 5. Toprakların erozyon duyarlılık parametrelerinin periglasyal şekillere göre Kruskal-Wallis testi puanları.

Cin Dağı				
Duyarlılık parametreleri	**Periglasyal şekiller**	**N**	**Kruskal-Wallis Ki-Kare**	**P**
AS	Girland	15	4,017	0,134
	Taş kümesi	5		
	Çember	5		
SSI	Girland	15	3,454	0,178
	Taş kümesi	5		
	Çember	5		
DO	Girland	15	0,074	0,964
	Taş kümesi	5		
	Çember	5		
Ilgar Dağı				
AS	Girland	15	10,087	0,006
	Çember	5		
	Taş kümesi	5		
SSI	Girland	15	1,349	0,509
	Çember	5		
	Taş kümesi	5		
DO	Girland	15	8,793	0,012
	Çember	5		
	Taş kümesi	5		

AS: Agregat stabilitesi, **SSI:** Strüktür stabilite indeksi, **DO:** Dispersiyon oranı.

Cin Dağı ile Ilgar Dağı için periglasyal şekillere göre anlamlı farkın görüldüğü AS ve DO göstergelerinin hangi periglasyal şekil ile farklılaşma gösterdiğini bulmak için ise Post hoc testinden Tamhane's T2 testi uygulanmış ve elde edilen değerler Tablo 6'da verilmiştir. Periglasyal şekillerden çember ve taş kümesi AS bakımından daha yüksek değerler vermiştir. AS değeri girlandlarda daha düşüktür. DO değerine bakılacak olunursa girlandlarda hem çemberlere hem de taş kümelerine göre daha yüksektir.

Tablo 6. AS ve DO parametrelerinin periglasyal şekilere göre farklılaşıp farklılaşmadığını belirlemek üzere yapılan Tamhane's T2 testi değerleri.

Duyarlılık parametreleri	**Periglasyal şekiller**		**Ortalama fark**	**P**
AS	1	2	-23,497*	0,001
		3	-25,843*	0,000
	2	1	23,497*	0,001
		3	-2,346	0,929
	3	1	25,843*	0,000
		2	2,346	0,929
DO	1	2	16,236*	0,005
		3	13,922*	0,015
	2	1	-16,236*	0,005
		3	-2,314	0,870
	3	1	-13,922*	0,015
		2	2,314	0,870

1: Girland, **2:** Çember, **3:** Taş kümesi, *: Ortalama fark 0,05 düzeyinde anlamlıdır.
AS: Agregat stabilitesi, **DO:** Dispersiyon oranı.

Dağlar arasındaki periglasyal şekillerin karşılaştırıldığı Mann Whitney U-testi sonuçları Tablo 7, 8 ve 9'da verilmiştir. Girlandlar karşılaştırıldığında AS ve SSI bakımından anlamlı bir farklılık görülmektedir (P<0,05) (Tablo 7). Cin Dağı'nın AS ve SSI değerleri anlamlı olarak daha yüksektir.

Tablo 7. Erozyon duyarlılık parametrelerinin girlandlar ile Cin Dağı ve Ilgar Dağı değişkenlerine ilişkin Mann Whitney U-testi sonuçları.

Girland							
Erozyon parametreleri	**Dağlar**	**N**	**Sıra ortalaması**	**Sıra Toplamı**	**U**	**Z**	**P**
AS	Cin Dağı	15	19,67	295,00	50,000	-2,592	0,010
	Ilgar Dağı	15	11,33	170,00			
SSI	Cin Dağı	15	19,33	290,00	55,000	-2,385	0,017
	Ilgar Dağı	15	11,67	175,00			
DO	Cin Dağı	15	12,87	193,00	73,000	-1,639	0,101
	Ilgar Dağı	15	18,13	272,00			

Erozyon duyarlılık parametrelerinin çemberler ile Cin ve Ilgar Dağı karşılaştırıldığında sadece AS bakımından anlamlı bir farklılık görülmektedir (P<0,05) (Tablo 8). Ilgar Dağı'nın AS değerleri anlamlı olarak daha yüksektir.

Tablo 8. Erozyon duyarlılık parametrelerinin çemberler ile Cin Dağı ve Ilgar Dağı değişkenlerine ilişkin Mann Whitney U-testi sonuçları.

Çember							
Erozyon parametreleri	**Dağlar**	**N**	**Sıra ortalaması**	**Sıra Toplamı**	**U**	**Z**	**P**
AS	Cin Dağı	5	3,40	17,00	2,000	-2,193	0,028
	Ilgar Dağı	5	7,60	38,00			
SSI	Cin Dağı	5	6,60	33,00	7,000	-1,149	0,251
	Ilgar Dağı	5	4,40	22,00			
DO	Cin Dağı	5	6,80	34,00	6,000	-1,358	0,222
	Ilgar Dağı	5	4,20	21,00			

Erozyon duyarlılık parametrelerinin taş kümeleri ile Cin ve Ilgar Dağı karşılaştırıldığında sadece SSI bakımından anlamlı bir farklılık görülmektedir (P<0,05) (Tablo 9). Cin Dağı'nın SSI değerleri anlamlı olarak daha yüksektir.

Tablo 9. Erozyon duyarlılık parametrelerinin taş kümeleri ile Cin Dağı ve Ilgar Dağı değişkenlerine ilişkin Mann Whitney U-testi sonuçları.

Taş kümesi							
Erozyon parametreleri	**Dağlar**	**N**	**Sıra ortalaması**	**Sıra Toplamı**	**U**	**Z**	**P**
AS	Cin Dağı	5	4,00	20,00	5,000	-1,567	0,117
	Ilgar Dağı	5	7,00	35,00			
SSI	Cin Dağı	5	7,80	39,00	1,000	-2,402	0,016
	Ilgar Dağı	5	3,20	16,00			
DO	Cin Dağı	5	6,40	32,00	8,000	-0,940	0,347
	Ilgar Dağı	5	4,60	23,00			

Dede ve ark. (2022a) tarafından Cin Dağı'nda yapılan çalışmada strüktür stabilite indeksi (SSI), dispersiyon oranı (DO) ve kabuk oluşumu (CF) erozyon duyarlılık parametrelerini diğer toprak parametrelerini kullanarak yapay sinir ağı (YSA) ile tahmin etmişlerdir. Elde ettikleri sonuçta en yüksek tahmin oranı SSI (% 78) ve en düşük DO (% 57) için elde edilmiştir.

Yine Dede ve ark. (2022b) Ilgar Dağı'nda da yaptıkları çalışmada bazı erozyon duyarlılık parametrelerini kullanmışlardır. Bu çalışmada toprakların fiziko-kimyasal özelliklerini saptamışlar ve toprak özellikleri girdi olarak kullanılarak, erozyon duyarlılık parametrelerini (strüktür stabilite indeksi-SSI, dispersiyon oranı-DO ve kabuk oluşumu-CF) yapay sinir ağı (YSA) ile tahmin etmişlerdir. Bu çalışmada ise CF % 82 ile en yüksek tahmin edilen parametre olmuştur.

4. SONUÇ

Kuzeydoğu Anadolu'da yer alan Cin Dağı (2957 m) ile Ilgar Dağı (2918 m) periglasyal şekillerin gelişimi yönünden uygun koşulları sağlamaktadır. Yapılan bu çalışmada söz konusu iki dağlık kütledeki periglasyal şekillerde agregat stabilitesi, dispersiyon oranı ve strüktür stabilite indeksi arasındaki ilişkinin incelenmesi amaçlanmıştır. Yapılan değerlendirme sonucu mikro topografik yerel oluşumlarda gelişen toprakların erodobilite (erozyon duyarlılık) özelliklerinde farklılıklar oluşabildiği gibi farklı dağ kütleleri arasında da erozyon duyarlılık parametrelere ait değerlerin farklılıklar gösterdiği belirlenmiştir. Cin Dağı ile Ilgar Dağı periglasyal şekillerinde agregat stabilitesi ve dispersiyon oranı arasında anlamlı farklılaşma olduğu tespit edilmiştir. Girlandlar üzerinde Cin Dağı'nın agregat stabilitesi ve strüktür stabilite indeksi değerleri anlamlı olarak daha yüksektir. Çemberlerde Ilgar Dağı'nın Cin Dağı'na göre agregat stabilite değerleri anlamlı olarak daha yüksektir. Taş kümelerinde ise Cin Dağı strüktür stabilite indeksi değerleri Ilgar Dağı'na göre anlamlı olarak daha yüksektir. Dağ kütleleri arasında benzer periglasyal şekillerdeki farklılıkların büyük olasılıkla şekillerin bulunduğu yükselti, bakı ve sıcaklık gibi faktörlerden kaynaklanabileceği düşünülmektedir. Çünkü bu faktörler, toprak oluşumunda özellikle bio-fiziko-kimyasal süreçleri doğrudan etkilemektedir.

KATKI BELİRTME

Yazarlar, çalışmayı 2020-001 numaralı proje ile destekleyen Ardahan Üniversitesi, Bilimsel Araştırma Projeleri Koordinatörlüğü'ne ve doktora öğrencileri Soner Serin ile Sena Pacci'ye içtenlikle teşekkür eder.

KAYNAKÇA

Borrelli, P., Robinson, D.A., Fleischer, L.R., Lugato, E., Ballabio, C., Alewell, C., Meusburger, K., Modugno, S., Schütt, B., Ferro, V., Bagarello, V., Oost, K., Montanarella, L., & Panagos, P. (2017). An assessment of the global impact of 21st century land use change on soil erosion. Nature Communications, 8, 2013.

Çelik, P., & Dengiz, O. (2018). Akselendi ovası tarım topraklarının temel toprak özellikleri ve bitki besin elementi durumlarının belirlenmesi ve dağılım haritalarının oluşturulması. Türkiye Tarımsal Araştırmalar Dergisi, 5(1), 9-18.

Dede, V. (2023). Cin Dağı'nın Periglasyal Jeomorfolojisi (Küçük Kafkaslar-Türkiye). 1. Baskı, 104 s., Kriter Yayınevi, No: 45353. ISBN: 978-625-6894-41-9.

Dede, V., Demirağ Turan, İ., Dengiz, O., Serin, S., & Pacci, S. (2022a). Effects of periglacial landforms on soil erosion sensitivity factors and predicted by artificial intelligence approach in Mount Cin, NE Turkey. Eurasian Soil Science, 55(12), 1857-1870.

Dede, V., Dengiz, O., Demirağ Turan, İ., Türkeş, M., Gökçe, C., & Serin, S. (2020). Ilgaz Dağları periglasyal şekillerinde oluşmuş toprakların fizikokimyasal özellikleri ile bazı erozyon duyarlılık parametreleri arasındaki ilişkilerin belirlenmesi. Coğrafi Bilimler Dergisi, 18(1), 99-123.

Dede, V., Dengiz, O., Demirağ Turan, İ., Türkeş, M., Şenol, H., & Serin, S. (2024). Development of periglacial landforms and soil formation in the Ilgaz Mountains and effect of climate (Western Black Sea Region-Türkiye). Journal of Geographical Sciences, 34(3), 543-570.

Dede, V., Dengiz, O., Demirağ Turan, İ., Zorlu, K., Pacci, S., & Serin, S. (2022b). Ilgar Dağı periglasyal şekilleri üzerinde oluşmuş toprakların erozyon duyarlılıklarının belirlenmesi ve yapay sinir ağı (YSA) ile tahmin edilmesi. International Journal of Geography and Geography Education (IGGE), 47, 258-279.

Fleischer, F., Haas, F., Altmann, M., Rom, J., Ressl, C., & Becht, M. (2023). Glaciogenic Periglacial Landform in the Making-Geomorphological Evolution of a Rockfall on a Small Glacier in the Horlachtal, Stubai Alps, Austria. Remote Sensing, 15(6), 1472.

IBM Corp, (2015). IBM SPSS Statistics for Windows, Version 23.0. IBM Corp, Armonk, NY.

Jambaljav, Y., Gansukh, Y., Temuujin, K., Tsogt-Erdene, G., Undrakhtsetseg, T., Saruulzaya, A., Amarbayasgalan, Y., Dashtseren, A., & Sharkhuu, N. (2022). Spatial distribution mapping of permafrost in Mongolia using TTOP. Permafrost and Periglacial Processes, 33, 386-405.

Kamp, U., Walther, M., & Dashtseren, A. (2022). Mongolia's cryosphere. Geomorphology, 410, 108202.

Kemper, W.D., & Rosenau, R.C. (1986). Aggregate Stability and Size Distribution. Klute, A. (Ed.), In Methods of Soil Analysis, Part I-Physical and Mineralocigal Methods (2nd Edition) (425-442). SSSA Book Series No: 5, SSA and ASA, Madison, Wisconsin.

Keskin, İ. (2013). 1/ 100.000 ölçekli Türkiye Jeoloji Haritaları, Ardahan F-49 (E-49) Paftası, MTA Genel Müdürlüğü, Jeoloji Etütleri Dairesi, No: 181.

Knight, J., Harrison, S., & Jones, D.B. (2019). Rock glaciers and the geomorphological evolution of deglacierizing mountains. Geomorphology, 324, 14-24.

Lal, R. (1988). Soil Erosion Research Methods. Soil and Water Conservation Society, USA.

Leo, W.M. (1963). A rapid method for estimating structural stability of soils. Soil Science, 96, 342-346.

Mallants, D., Mohanty, B. P., Jacques, D., & Feyen, J. (1996). Spatial variability of hydraulic properties in a multi-layered soil profile. Soil Science, 161(3), 167-181.

Özdemir, N. (2013). Toprak ve su koruma. Ondokuz Mayıs Üniversitesi Ziraat Fakültesi Yayınları, No: 22, Üçüncü Baskı, 232s, Samsun.

Öztürk, E. (2013). Organik düzenleyicilerin toprak kaybı ve toprak kalitesi üzerindeki etkilerinin laboratuvar koşullarında belirlenmesi. Doktora Tezi, Ondokuz Mayıs Üniversitesi Fen Bilimleri Enstitüsü, 151 s., Samsun.

Öztürk, M.Z., & Taşoğlu, E. (2024). Alpine periglacial zones in Anatolia: spatial distribution and main characteristics. Mediterranean Geoscience Reviews, 6(1).

Shur, Y., Jorgenson, M.T., & Kanevskiy, M.Z. (2011). Permafrost. In Encyclopedia of Snow, Ice and Glaciers; Singh, V.P., Singh, P., Haritashya, U.K., Eds.; Springer: Berlin, Germany.

Türkeş, M., Dede, V., Dengiz, O., Şenol, H., & Serin, S. (2023). Periglacial landforms and soil formation on summit of the Mount lda (Kaz Dağı), Biga Peninsula-Turkey. Physical Geography, 44(5), 531-580.

Uxa, T., Mida, P., & Krizek, M. (2017). Effect of climate on morphology and development of sorted circles and polygons. Permafrost and Periglacial Processes, 28, 663-674.

Vaks, A., Gutareva, U.S., Breitenbach, S.F.M., Avirmed, E., Mason, A.J., Thomas, A.L., Osinzev, A.V., Kononov, A.M., & Henderson, G.M. (2013). Speleothems reveal 500.000-year history of Siberian permafrost. Science, 340, 183-186.

Walther, M., & Kamp, U. (2023). Mountain Permafrost: A Reflection on the Periglacial Environment in Mongolia. Geosciences, 13(9), 274.

Wen, L., Peng, Y., Zhou, Y., Cai, G., Lin, Y., & Li, B. (2023). Study on soil erosion and its driving factors from the perspective of landscape in Xiushui watershed, China. Scientific Reports, 13, 8182.

Wilding, L.P. (1985). Spatial variability: It's documentation, accommodation and implication to soil surveys. In: Soil Spatial Variability. (Eds: Nielsen, D.R. and Bouma, J.) Pudoc, Wageningen, The Netherlands, p. 166-194.

Yıldız, N., Akbulut, Ö., & Bircan, H. (1998). İstatistiğe Giriş. Şafak Yayınevi, Erzurum.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

FULVIC ACID AS A BIOSTIMULANT IN TOMATO SEEDLING GROWTH

Prof. Dr. Ertan YILDIRIM
Atatürk University, Agriculture Faculty, Department of Horticulture
ORCID: 0000-0003-3369-0645

Prof. Dr. Melek EKİNCİ
Atatürk University, Agriculture Faculty, Department of Horticulture
ORCID: 000-0002-7604-3803

Prof. Dr. Metin TURAN
Yeditepe University, Faculty of Economy and Administrative Sciences, Department of Agricultural Trade and Management
ORCID: 000-0002-4849-7680

Prof. Dr. Selda ÖRS
Atatürk University, Agriculture Faculty, Department of Agricultural Structures and Irrigation
ORCID: 0000-0001-6789-8642

Assoc. Prof. Dr. Halil İbrahim ÖZTÜRK
Vocational School of Health Services, Erzincan Binali Yıldırım University
ORCID: 0000-0002-8977-0831

ABSTRACT
Many inputs are used in agricultural production for healthy plant development, productivity and quality increase. Intensive input use has caused many problems to arise. For this reason, various plant biostimulants are used for sustainable production. Applications of fulvic acid (FA), one of the humic substances, is also a good biostimulant for plant growth and development. In this study, the effect of FA application at different doses (0, 3%, 5% and 7%) on tomato seedling development was examined. The applications were repeated three times with one-week intervals, and the effects of the applications on plant growth and mineral content were examined. Plant height, stem diameter, leaf area, plant fresh and dry weight, root fresh and dry weight and plant mineral substance content increased depending on FA doses. With the application of FA at the optimum dose, a significant increase in seedling development of tomato can be achieved, thus increasing the yield and quality of production.
Key words: biostimulant, seedling, quality, productivity

INTRODUCTION
Due to the increasing world population, some of the negative effects of intensive farming practices have begun to attract attention. For this purpose, sustainable agriculture principles that provide increased efficiency and quality in production without negative effects on the environment and human health have begun to be adopted. In this context, an approach regarding the use of biostimulants, which have significant effects on plant growth and development, has come to the fore. The use of plant biostimulants based on humic substances is one of them (Canellas et al., 2015).
Humic substances are formed from the biological and chemical transformations of animal and plant substances and microbial metabolism and represent the main source of organic carbon (Canellas et al., 2015).

Humic substances formed as a result of the decomposition of any organic matter mainly consist of humin, humic (HA) and fulvic acids (FA). Because FAs generally have small residue amounts and strong bioactivity potential, the effectiveness of FA application for plants and soils is being investigated. Lignite, peat and compost are the most common materials in FA production (Goenadi, 2021). FA are natural, water-soluble polymers ranging from yellow to black and are complex substances found in trace amounts in soil and plants. They naturally contain many amino acids, sugars, peptides, nucleic acids, phytochemical compounds and vitamins. Due to their low molecular weight, they carry minerals to plant cells in roots, stems and leaves and perform basic functions such as absorption of nutrients and trace substances in the plant. Plants participate in the carbon cycle because they are constantly recycled between soil and water (Alvarez-Puebla et al., 2006; Swat et al., 2019). Fulvic acid promotes plant growth and development by accelerating cellular division, and also increases tolerance to many biotic and abiotic stresses (Husein et al., 2015).

Tomato is one of the most grown and consumed vegetables worldwide. Fertilization during production significantly increases tomato yield and quality. However, the negative effects of the use of chemical fertilizers on the environment and human health have brought the use of organic fertilizers to the fore. As a matter of fact, tomato is one of the vegetables that responds best to organic fertilization, and it is known that organic fertilizers increase tomato productivity and fruit quality (Gao et al., 2023). Many fertilizers and biostimulants of plant and animal origin are used for this purpose in tomato cultivation. In this sense, humic substances are important in plant cultivation due to the many functions they contain. Fulvic acid is also a biostimulant that makes important contributions to plant growth and development. It has been stated that the use of fulvic acids extracted from lignite in tomato cultivation has an effect on the photosynthesis process and fruit quality characteristics by increasing the nutritional content and pigment content of the leaves, and therefore, fertilization containing fulvic acid extract can increase the quality of tomatoes (Carmen and Traian, 2019).

For this reason, this study was aimed improved seedling growth and development of tomato with applications of fulvic acid (FA), one of the humic substances.

MATERIALS AND METHODS

Research was carried out in greenhouse conditions (25°C/18°C ±2 day/night temperature, 50%±5 humidity). Seedlings of tomato (*Solanum lycopersicum* L.) were grown in a multi-celled seedling tray. The homogenous seedlings were transplanted into the pots that filled with the medium prepared with a mixture of soil: peat: sand (3: 1: 1, v: v: v) after about 30 days. Fulvic acid (FA; Fulvagra, Humintech GmbH) solutions prepared in 0, 3%, 5% and 7% doses and applied to root zone, the applications were repeated three times with one-week intervals.

The experiment was designed according to the random plot design with 3 replications and 6 plants in each replication and completed 40 days after planting the seedlings in pots. The effects of the treatments on plant height, stem diameter, leaf area, plant fresh and dry weight, root fresh and dry weight and plant mineral content of plant were examined. Determination of the total N was achieved by the Kjeldahl method using a Vapodest 10 Rapid Kjeldahl Distillation Unit (Gerhardt, Konigswinter, Germany) (Brenmer, 1996). An inductively coupled plasma spectrophotometer (Optima 2100 DV, ICP/OES; Perkin-Elmer, Shelton, CT) was used to determine mineral content (Mertens, 2005a; Mertens 2005b).

For statistically analysis, data were subjected to variance analysis and the differences between the applications were determined by Duncan multiple comparison test.

RESULTS AND DISCUSSION

In our study, it was determined that the FA applications had positive effects on seedling growth and quality.

With FA application, plant height, stem diameter, SPAD and leaf area of tomato seedlings increased by 12-30%, 14-19%, 11-16% and 5-50%, respectively (Figure 1). Plant fresh and dry weight, root fresh and dry weight with FA applications increased by 60-95%, 26-95%, 30-78% and 21-41%, respectively, compared to the control. Especially, the effect of 5% FA application was higher than the other applications (Figure 2). Similarly, it was determined in other studies that FA application increased shoot length and fresh and dry weight in wheat and barley (Braziene et al., 2021) and 80-160 mg/L fulvic acids increased the germination rate, growth vigor and root elongation of tomato seeds (Zhang et al., 2021).

In another study investigating the effects of foliar FA application on plant development, fruit quality and yield in tomatoes, it was determined that FA application caused a significant increase in plant height, fresh and dry weight, P and Ca contents increased, and the number of fruits and marketable yield increased. The researchers stated that foliar application of approximately 0.8 g/L FA could be used to stimulate plant growth and increase marketable yield in tomato production (Suh et al., 2014). It has been determined that the addition of 100-300 ppm fulvic acid to cucumber plants causes an increase in plant shoot and root growth and development and in the uptake of nutrients (Rauthan and Schnitzer, 1981). The mechanisms by which humic substances improve plant growth in this way are due to their increase in membrane permeability, ability to regulate intracellular signaling, root growth, chlorophyll content and photosynthetic activity (Blomster et al., 2011; Haghighi et al., 2012).

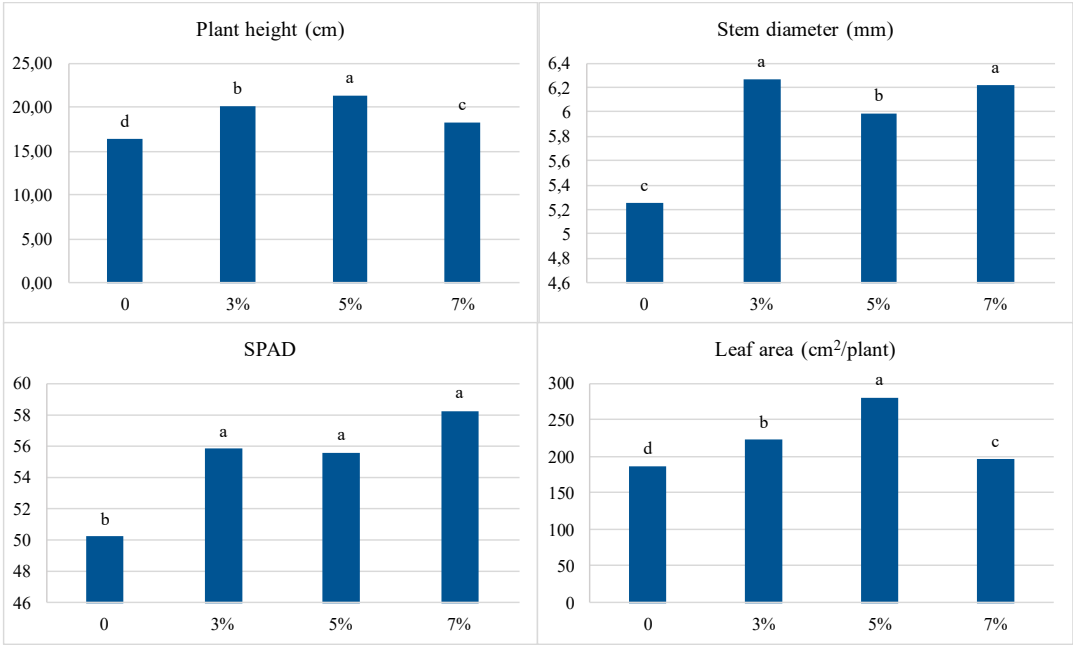


Figure 1. Effect of FA applications on plant height, stem diameter, SPAD and leaf area of tomato seedlings. The different lettered averages in each bar are significantly different according to Duncan's multiple range test ($p \leq 0.001$).

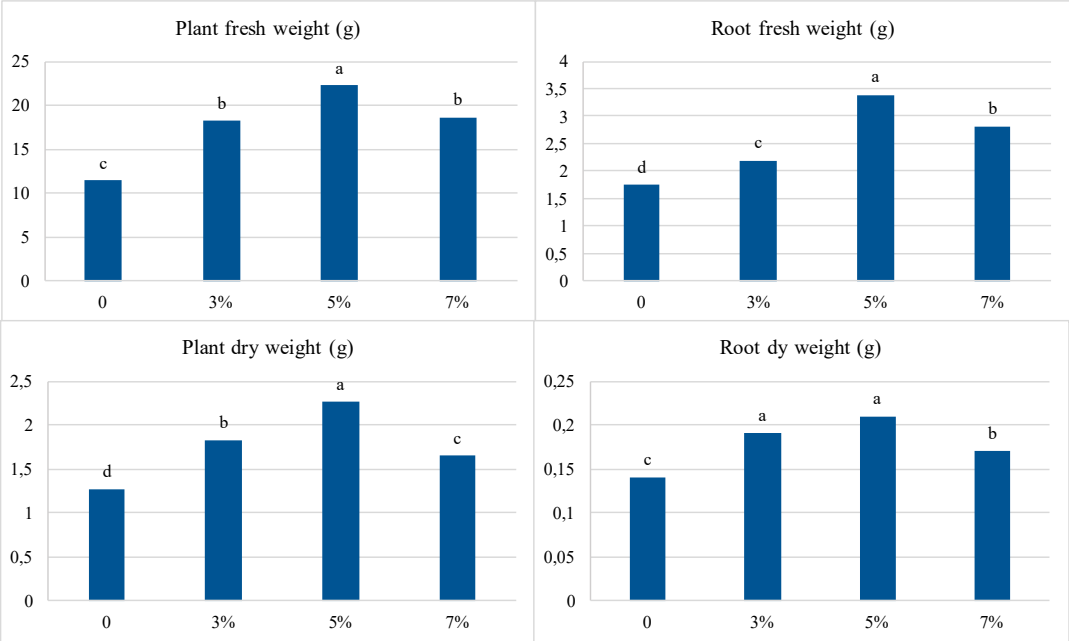


Figure 2. Effect of FA applications on plant fresh weight, plant dry weight, root fresh weight and root dry weight of tomato seedlings. The different lettered averages in each bar are significantly different according to Duncan's multiple range test ($p \leq 0.001$).

Applications also caused significant increases in leaf mineral content in tomato seedlings. Plant N, P and K contents increased with FA applications by 42-66%, 24-81% and 36-87%, respectively, compared to control. The dose that gave the best result in terms of these minerals was 7% (Figure 3).

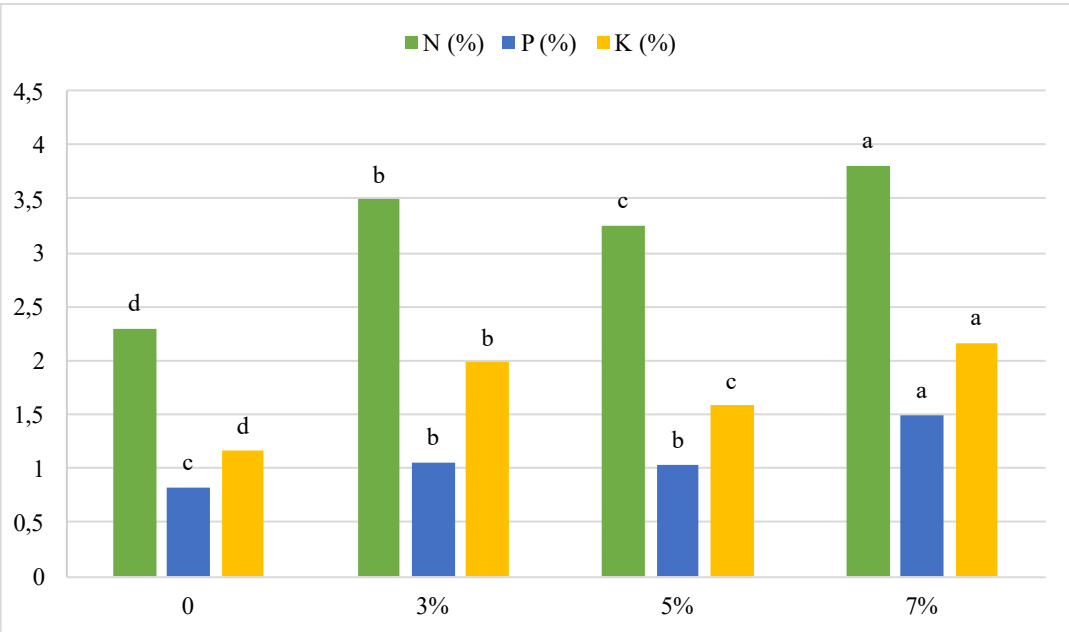


Figure 3. Effect of FA applications on N, P and K content of tomato seedlings. The different lettered averages in each different color bar are significantly different according to Duncan's multiple range test ($p \leq 0.001$).

Similarly, plant Ca, Mg, S, Mn, Fe, Zn, B and Cu content also increased with FA applications. These increases were between %66-81, %32-68, %13-48, %24-28, %47-97, %20-55, %20-65 and 23-64, respectively, compared to the control. While an increase occurred with all FA doses in terms of these mineral substances, the highest increases occurred with 7% FA (Table 1).

Table 1. Effect of FA applications on Ca, Mg, S, Mn, Fe, Zn, B and Cu content of tomato seedlings

FA	Ca (%)	Mg (%)	S (%)	Mn (mg/kg)
0	1,84 c	0,22 d	0,23 c	27,82 b
3%	3,05 b	0,33 b	0,27 b	35,56 a
5%	3,30 a	0,29 c	0,26 b	34,75 a
7%	3,33 a	0,37 a	0,34 a	34,60 a
FA	**Fe (mg/kg)**	**Zn (mg/kg)**	**B (mg/kg)**	**Cu (mg/kg)**
0	7,31 c	2,65 d	1,99 d	8,56 d
3%	10,79 b	3,18 c	2,39 c	10,54 c
5%	10,73 b	3,75 b	2,98 b	12,10 b
7%	14,37 a	4,10 a	3,27 a	14,04 a

The different lettered averages in each column are significantly different according to Duncan's multiple range test ($p \leq 0.001$).

Fulvic acids derived from biological sources increased the concentrations of minerals such as Ca, Fe and Zn in tomato fruits (Zhang et al., 2021). It has been stated that the increase in yield and quality provided by FA application in tomatoes is due to the improvement in root growth and therefore the increase in nutrient uptake (Zhang et al., 2021). Researchers state that fulvic acids facilitate root development and nutrient uptake, thus vegetable production and quality, and therefore may be an effective component in designing new biofertilizers for sustainable agricultural production (Zhang et al., 2021). Humic substances increase the nutrient uptake of the plant by promoting the growth of roots and chelate ions and regulate the activities of genes and enzymes involved in the translocation of nutrients from root to shoot (Mora et al., 2010; Calvo et al., 2014; Braziene et al., 2021). The better root growth that occurred with FA facilitated greater nutrient uptake (Zhang et al., 2021).
Applying humic and fulvic acids in liquid form directly to plant leaves, alone or as a fertilizer mixture, to the soil is considered an important part of fertilizer programs in agriculture and provides increased income (Osman et al., 2013).

CONCLUSION

In the study, the effects of FA application on growth and quality of tomato seedlings were examined, and as a result of the measurements, it was determined that the applications had positive effects on seedling growth and quality. This positive improvement in seedling quality can also show its benefits in the plant at the production stage in the future. In fact, similar practices in later stages of plant cultivation can provide benefits in terms of sustainability of yield and quality.

REFERENCES

Alvarez-Puebla, R. A., Valenzuela-Calahorro, C., & Garrido, J. J. (2006). Theoretical study on fulvic acid structure, conformation and aggregation: A molecular modelling approach. Science of the Total Environment, 358(1-3), 243-254.

Blomster, T., Salojärvi, J., Sipari, N., Brosché, M., Ahlfors, R., Keinänen, M., Overmyer, K., & Kangasjärvi, J. (2011). Apoplastic reactive oxygen species transiently decrease auxin signaling and cause stress-induced morphogenic response in Arabidopsis. Plant Physiology, 157(4), 1866-1883.

Braziene, Z., Paltanavicius, V., & Avizienytė, D. (2021). The influence of fulvic acid on spring cereals and sugar beets seed germination and plant productivity. Environmental Research, 195, 110824.

Bremner, J.M. (1996). Nitrogen-total. Methods of soil analysis. Part III. Chemical Methods (Bartels J. M. and Bigham, J. M. eds). 3nd Ed., ASA SSSA Publisher, Agronomy. No: 5 Madison, WI, USA, pp. 10851121.

Calvo, P., Nelson, L., & Kloepper, J. W. (2014). Agricultural uses of plant biostimulants. Plant and Soil, 383, 3-41.

Canellas, L. P., Olivares, F. L., Aguiar, N. O., Jones, D. L., Nebbioso, A., Mazzei, P., & Piccolo, A. (2015). Humic and fulvic acids as biostimulants in horticulture. Scientia Horticulturae, 196, 15-27.

Carmen, S., & Traian, C. (2019). Effects of fulvic acid on growth and productivity of tomato plants. International Multidisciplinary Scientific GeoConference: SGEM, 19(6.3), 89-96.

Gao, F., Li, H., Mu, X., Gao, H., Zhang, Y., Li, R., Cao, K., & Ye, L. (2023). Effects of organic fertilizer application on tomato yield and quality: a meta-analysis. Applied Sciences, 13(4), 2184.

Goenadi, D. H. (2021). Fulvic acid–a small but powerful natural substance for agricultural and medical applications. Menara Perkebunan, 89(1).

Haghighi, M., Kafi, M., & Fang, P. (2012). Photosynthetic activity and N metabolism of lettuce as affected by humic acid. International Journal of Vegetable Science, 18(2), 182-189.

Husein, M. E., El-Hassan, S. A., & Shahein, M. M. (2015). Effect of humic, fulvic acid and calcium foliar application on growth and yield of tomato plants. International Journal of Biosciences, 7(1): 132-140.

Mertens D (2005a). AOAC Official Method 922.02. Plants Preparation of Laboratory Sample. Official Methods of Analysis, 18th edn. Horwitz, W., and G.W. Latimer, (Eds). Chapter AOAC-International Suite 500, 481. North Frederick Avenue, Gaitherburg, Maryland 20877-2417, USA, 3: 1-2.

Mertens D (2005b). AOAC Official Method 975.03. Metal in Plants and Pet Foods. Official Methods of Analysis, 18th edn. Horwitz, W., and G.W. Latimer, (Eds). Chapter, AOAC-International Suite 500, 481. North Frederick Avenue, Gaitherburg, Maryland 20877-2417, USA, 3: 3-4,

Mora, V., Bacaicoa, E., Zamarreno, A. M., Aguirre, E., Garnica, M., Fuentes, M., & García-Mina, J. M. (2010). Action of humic acid on promotion of cucumber shoot growth involves nitrate-related changes associated with the root-to-shoot distribution of cytokinins, polyamines and mineral nutrients. Journal of plant physiology, 167(8), 633-642.

Osman, E. A. M., El-Masry, A. A., & Khatab, K. A. (2013). Effect of nitrogen fertilizer sources and foliar spray of humic and/or fulvic acids on yield and quality of rice plants. Advances in Applied Science Research, 4(4), 174-183.

Rauthan, B. S., & Schnitzer, M. (1981). Effects of a soil fulvic acid on the growth and nutrient content of cucumber (*Cucumis sativus*) plants. Plant and Soil, 63, 491-495.

Swat, M., Rybicka, I., & Gliszczyńska-Świgło, A. (2019). Characterization of fulvic acid beverages by mineral profile and antioxidant capacity. Foods, 8(12), 605.

Suh, H. Y., Yoo, K. S., & Suh, S. G. (2014). Effect of foliar application of fulvic acid on plant growth and fruit quality of tomato (*Lycopersicon esculentum* L.). Horticulture, Environment, and Biotechnology, 55, 455-461.

Zhang, P., Zhang, H., Wu, G., Chen, X., Gruda, N., Li, X., Dong, J., & Duan, Z. (2021). Dose-dependent application of straw-derived fulvic acid on yield and quality of tomato plants grown in a greenhouse. Frontiers in Plant Science, 12, 736613.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

CONTRIBUTIONS OF AN ENZYME-CONTAINING BIOSTIMULANT TO TOMATO SEEDLING GROWTH

Prof. Dr. Melek EKİNCİ
Atatürk University, Agriculture Faculty, Department of Horticulture
ORCID: 0000-0002-7604-3803

Prof. Dr. Ertan YILDIRIM
Atatürk University, Agriculture Faculty, Department of Horticulture
ORCID: 0000-0003-3369-0645

Prof. Dr. Metin TURAN
Yeditepe University, Faculty of Economy and Administrative Sciences, Department of Agricultural Trade and Management
ORCID: 000-0002-4849-7680

Prof. Dr. Selda ÖRS
Atatürk University, Agriculture Faculty, Department of Agricultural Structures and Irrigation
ORCID: 0000-0001-6789-8642

Assoc. Prof. Dr. Halil İbrahim ÖZTÜRK
Vocational School of Health Services, Erzincan Binali Yıldırım University
ORCID: 0000-0002-8977-0831

ABSTRACT
For plant growth and development, it is important that the nutrients and water needed by the plant are easily taken by the plant and transported to the necessary organs. Some substances are used effectively to ensure that the nutrients in the existing soil or supplied from outside are taken into the plant and made available to them. For this purpose, in this study, the preparation, which is a biostimulant containing enzymes was used in different doses (0 (control), 3%, 6% and 9%) and applied to tomato seedlings as a spray on the leaf (L) and as irrigation water to the soil (S). Applications were made three times at one-week intervals after the seedlings were transferred to pots. The effects of the applications were examined in terms of some plant growth parameters and mineral content. All treatments increased plant height, stem diameter, leaf area, plant fresh and dry weight, root fresh and dry weight and mineral content in tomato seedlings. The increase in seedling growth and development obtained with treatments used in the study can also have a significant effect on the future growth and fruit formation period of the plant.
Keywords: nutrient, seedling, growth, enzyme

INTRODUCTION
Enzymes are naturally occurring biocatalysts that have a wide range of applications and uses in daily life, and they can be classified into different categories and synthesized artificially (Kirana et al., 2016). Enzymes have the potential for many purposes and economic use in the food, feed, agriculture, paper, leather and textile industries (van Beilen and Li, 2002). Although enzymes occur naturally, they can also be synthesized artificially. The most common naturally occurring enzymes include amylase, cellulase, invertase, lactase and lipase.

Major important enzymes include alpha-glucosidase, amylase, diastase, invertase, glycoamylase, lactase, lipase, maltase, protease, peptidase, and sucrose, etc. enzymes are coming (Kirana et al., 2016). The effect of enzymes is important in terms of plant nutrition, and they break down various residues into forms that make them bioavailable for plants. Researchers have reported that the use of some basic enzymes can be important for soil improvement and plant nutrition (Turan et al., 2017). Lipase, cellulose and protease are some of them. Proteases, which are hydrolytic enzymes, are catalysts in the breakdown of proteins into polypeptides or free amino acids by hydrolyzing their peptide bonds, while lipases show activity on the carboxyl ester bonds of triacylglycerol and other substrates. These two enzymes also mediate numerous biological activities (Mehdi et al., 2018). The lipase enzyme that breaks down lipids has forms such as triacylglycerol lipases, carboxylesterase, arylesterase and phospholipase with similar activities. It is mostly produced by organisms such as fungi, bacteria, plant (Turan et al., 2017). Lipases isolated from microorganisms are used in the oil industry, paper industry, textile industry, food industry, cosmetic industry, as well as in environmental management, tea processing, biosensors, medicine, ester and organic synthesis, flavor development and quality improvement in cheese (Kirana et al., 2016). Cellulose, an important enzyme naturally produced by bacteria, fungi and protozoa, is responsible for hydrolyzing 1-4-beta-D glucosidic linkages. It is also a key enzyme in the breakdown of cellulose found in lichen and grain beta-D-glucans, the most abundant polymer in the world (Turan et al., 2017). Cellulases are a complex group of enzymes secreted by a wide variety of microorganisms such as fungi, bacteria, and actinomycetes; biofuel production, textile polishing, paper industry, agriculture, etc. are areas where cellulase enzyme has a wide potential for use (Jayasekara and Ratnayake, 2019).

Enzymes are replacing chemical reactions in industries because they are green and environmentally friendly, produce fewer by-products, consume less energy, reduce environmental pollution and add more value to products. Microorganisms are an important source of enzymes with numerous advantages, being good catalysts, increasing the reaction rate and working best under certain environmental conditions. Microbial enzymes are used in many industrial sectors such as food, medicine, detergent, leather, waste management, etc (Ramesh et al., 2020). Microorganisms are the main source of soil enzymes, they are produced intracellularly or extracellularly, and the amount and structure of organic matter and soil properties affect the enzyme levels and activities of organisms (Chettri et al., 2021). Enzymes provide an effect on nutrient supply by providing a relationship between plant-soil environments and promote the growth and production of agricultural products. It has many functions such as production of various phytohormones, uptake of nutrients, biological control of various pests and plant pathogens, etc (Chettri et al., 2021).

This study was aimed improved seedling growth and development of tomato with applications of a biostimulant containing enzymes and the effects of the applications were examined in terms of some plant growth parameters and mineral content.

MATERIALS AND METHODS

This study, in which tomato plants (*Solanum lycopersicum* L.) were used as plant material, was carried out in pots under greenhouse conditions of varying 25°C±2 temperature and 50%±5 humidity. Tomato seeds, which were planted in a medium containing peat: perlite (2:1, v:v) in multiple seedling pots, were transferred to pots when they emerged and had 2-3 true leaves.

The pots were filled with a mixture of soil: peat: sand (3: 1: 1, v: v: v). Biostimulant (contains lipase, cellulose and protease enzymes, fulvic acid and triloksan alchocsilat, Kiana Agriculture) solutions prepared in 0% (control), 3%, 6% and 9% doses and applied to tomato seedlings as a spray on the leaf and as irrigation water to the soil were examined. The applications were repeated three times with one-week intervals.

The study was conducted according to the random plot design with 3 replications and 6 plants in each replication and completed 40 days after planting the seedlings in pots. The effects of the treatments on plant height, stem diameter, leaf area, chlorophyll reading value (SPAD), plant fresh and dry weight, root fresh and dry weight and plant mineral content of plant were examined. Determination of the total N was achieved by the Kjeldahl method using a Vapodest 10 Rapid Kjeldahl Distillation Unit (Gerhardt, Konigswinter, Germany) (Brenmer, 1996). An inductively coupled plasma spectrophotometer (Optima 2100 DV, ICP/OES; Perkin-Elmer, Shelton, CT) was used to determine mineral content (Mertens, 2005a; Mertens 2005b).

Data obtained as a result of measurements and analyzes were subjected to variance analysis and the differences between the applications were determined by Duncan multiple comparison test.

RESULTS AND DISCUSSION

The results regarding the effect of the treatments on tomato seedlings are given in Figure 1, Figure 2 and Tables 1. Both leaf and soil treatments were effective in increasing seedling development and mineral content compared to the control.

Processes in plant metabolism are also effective in adapting plants to different environments and maintaining crop productivity. Various enzymes in the plant internal mechanism have important roles in the autotrophic behavior of higher plants. In this study, it was determined that the enzyme-containing biostimulant product applied exogenous, apart from the internal mechanism, caused significant morphological changes in the first stage of tomato development.

The highest increase in plant height, stem diameter and SPAD compared to the control was 36%, 15% and 9% respectively in the 9S treatment. Leaf area was obtained from the 3S treatment with a maximum increase of 50% (Figure 1). The highest increase in plant fresh, plant dry and root fresh weight was obtained from 3S with 38%, 55% and 67%. The increase in root dry weight with the treatments compared to the control ranged between 40% and 60% (Figure 2).

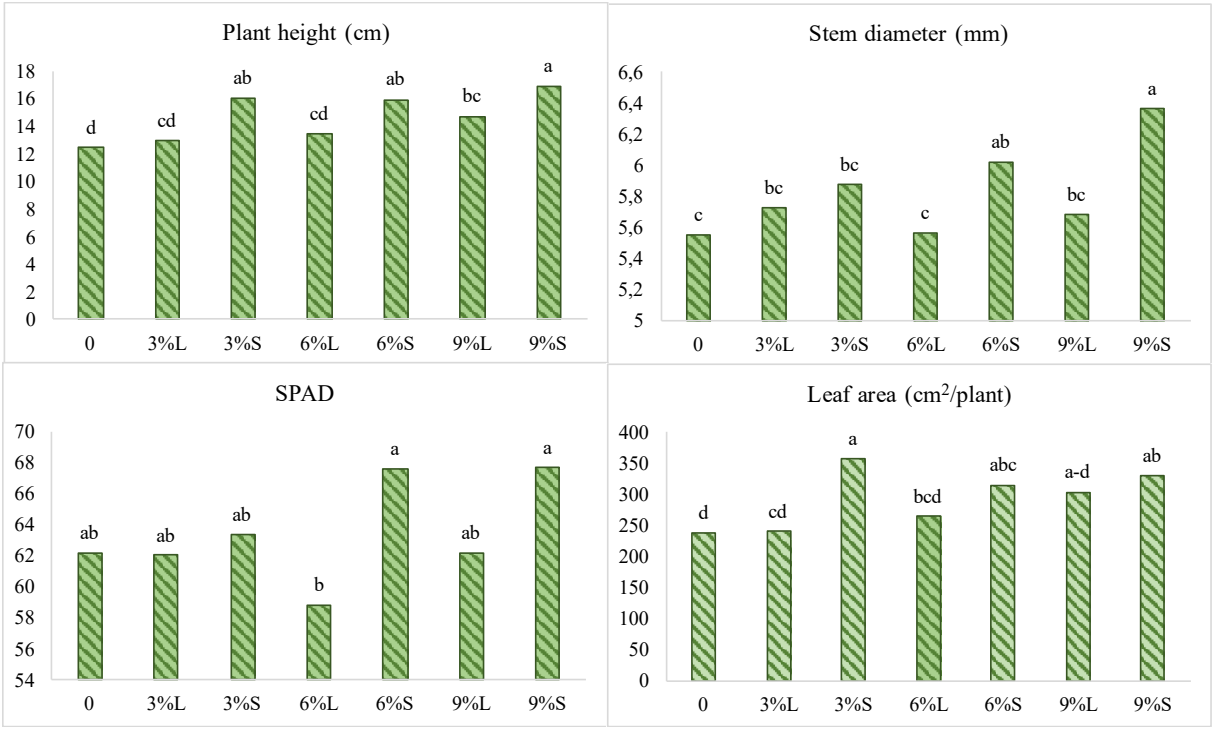


Figure 1. Contributions of enzyme-containing biostimulant on plant height, stem diameter, SPAD and leaf area of tomato seedlings. The different lettered averages in each bar are significantly different according to Duncan's multiple range test ($p \leq 0.001$).

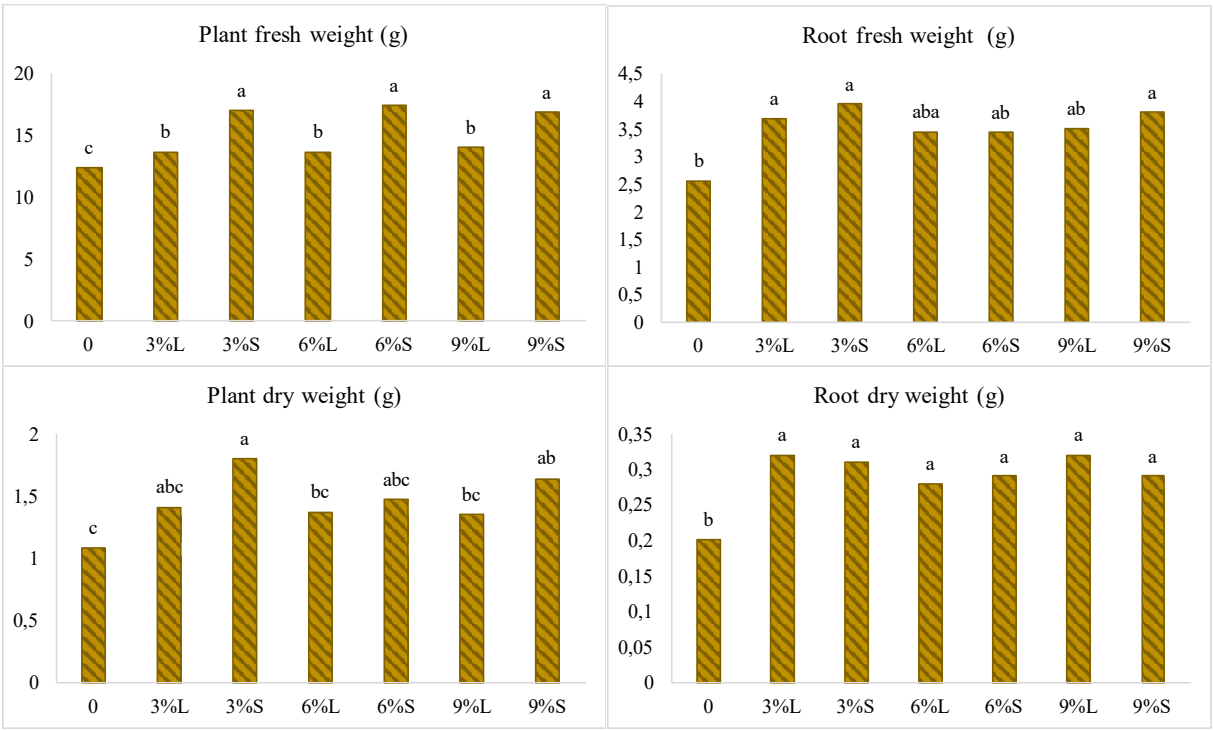


Figure 2. Contributions of enzyme-containing biostimulant on plant fresh weight, root fresh weight, plant dry weight and root dry weight of tomato seedlings. The different lettered averages in each bar are significantly different according to Duncan's multiple range test ($p \leq 0.001$).

There have been significant increases in mineral substance content with applications. The highest N, P, K, Ca, Mg and Fe were determined in the 6S treatment, and there was an increase of 90%, 160%, 137%, 106%, 125% and 135% compared to the control. Mn, Zn and B contents were highest in the 9L application with an increase of 106%, 85% and 153%, and S content was the highest in the 9S application with an increase of 290% (Table 1).

Table 1. Contributions of enzyme-containing biostimulant on mineral content of tomato seedlings.

Treatment	**N (%)**	**P (%)**	**K (%)**	**Ca (%)**	**Mg (%)**
0	1,75 e	0,10 e	0,45 d	0,49 d	0,28 c
3%L	1,88 d	0,13 d	0,46 d	0,53 d	0,31 c
3%S	1,93 d	0,16 c	0,57 c	0,54 d	0,31 c
6%L	2,86 c	0,20 b	0,80 b	0,86 c	0,53 b
6%S	3,32 a	0,26 a	1,07 a	1,01 a	0,63 a
9%L	3,31 a	0,25 a	1,02 a	0,94 b	0,53 b
9%S	3,16 b	0,24 a	1,07 a	0,91 bc	0,51 b
Treatment	**S (%)**	**Mn (mg/kg)**	**Fe (mg/kg)**	**Zn (mg/kg)**	**B (mg/kg)**
0	0,23 e	36,73 e	16,45 c	3,14 c	1,99 e
3%L	0,28 e	46,47 d	18,15 c	3,48 c	2,32 d
3%S	0,78 b	48,40 d	17,14 c	3,57 c	2,93 c
6%L	0,52 d	60,04 c	32,54 b	4,81 b	3,04 c
6%S	0,65 c	69,84 b	38,57 a	5,60 a	3,77 b
9%L	0,75 b	75,58 a	34,17 b	5,81 a	5,03 a
9%S	0,89 a	72,36 ab	33,25 b	5,55 a	3,75 b

The different lettered averages in each column are significantly different according to Duncan's multiple range test ($p \leq 0.001$).

In morphological determination of seedling quality, parameters such as seedling height, stem diameter, root length, root and shoot fresh and dry weight, shoot-root ratio and number of leaves are taken into account. Therefore, it is known that seedlings that are good in terms of morphological characteristics may be better in terms of development and quality at later stages (Ikiz et al., 2022).

It has been determined that *Trichoderma harzianum* application in tomato increases seedling quality by increasing seedling height, root dry matter, plant dry matter, total fresh weight, chlorophyll, P, Ca, Mn, Cu and Zn content and can be an alternative biostimulant in production (Ikiz et al., 2022).

Biostimulants with different active ingredients can sustainably improve mineral nutrient use efficiency and nutritional quality in the plant (Papa et al., 2022). Biostimulants obtained from different sources have positive effects on plant growth and development. In previous studies, it was determined that biostimulant applications of different sources in tomatoes increased plant growth and development. In tomato growth and development, plant and yeast extracts, rich in amino acids and that contains microelements (boron, zinc and manganese) based (Francesca et al., 2020), polysaccharide-enriched extracts derived from Moroccan seaweeds based (Mzibra et al., 2021), PGPR, humic and fulvic acid based (Turan et al., 2021), Trichoderma, seaweed extract and humic substance based (Sani et al., 2020), fulvic acid based (Zhang et al., 2021) biostimulants and biostimulants with many different properties provide significant effects has been determined.

Nowadays, when exogenous enzyme technology has become widespread in the development of natural plant resources, enzymes such as amylase, cellulase, protease, pectinase, glycosidase, tannase and polyphenol oxidase are widely used (Yuan et al., 2021). The use of biostimulants in plant cultivation is seen as a useful tool to achieve sustainability through their fertilizing effects and reduction of environmental pollution (Papa et al., 2022).
For this purpose, various enzymes are used in products used as biostimulants and the effectiveness of the product can be increased. Enzymes are replacing chemical reactions in industries because they are green and environmentally friendly, produce fewer by-products, consume less energy, reduce environmental pollution and add more value to products (Ramesh et al., 2020).

CONCLUSION

In this research, it was determined that the product containing various enzymes as biostimulants could provide significant effects during the seedling development period in tomatoes. The development of a healthy and high-quality seedling will also have a positive effect on subsequent plant development. For this reason, it is thought that these practices can give positive results in terms of fruit yield and quality in the future periods of tomato cultivation.

REFERENCES

Bremner, J.M. (1996). Nitrogen-total. Methods of soil analysis. Part III. Chemical Methods (Bartels J. M. and Bigham, J. M. eds). 3nd Ed., ASA SSSA Publisher, Agronomy. No: 5 Madison, WI, USA, pp. 10851121.

Chettri, D., Sharma, B., Verma, A. K., & Verma, A. K. (2021). Significance of microbial enzyme activities in agriculture. Microbiological Activity for Soil and Plant Health Management, 351-373.

Francesca, S., Arena, C., Hay Mele, B., Schettini, C., Ambrosino, P., Barone, A., & Rigano, M. M. (2020). The use of a plant-based biostimulant improves plant performances and fruit quality in tomato plants grown at elevated temperatures. Agronomy, 10(3), 363.

Jayasekara, S., & Ratnayake, R. (2019). Microbial cellulases: an overview and applications. Cellulose, 22(92), 10-5772.

Ikiz, O., Öztekin, G. B., Tüzel, Y., Karaçancı, Ş., & Tepecik, M. (2022). Trichoderma harzianum suşlarının domates fide kalitesine etkileri. Turkish Journal of Agriculture-Food Science and Technology, 10(1), 54-65.

Kirana, S., Arshada, Z., Nosheenb, S., Kamala, S., Gulzara, T., Majeeda, M. S., Jannat, M., & Rafiquec, M. A. (2016). Microbial lipases: production and applications: a review. J Biochem Biotechnol Biomater, 1(2), 7-20.

Mehdi, W. A., Mehde, A. A., Özacar, M., & Özacar, Z. (2018). Characterization and immobilization of protease and lipase on chitin-starch material as a novel matrix. International Journal of Biological Macromolecules, 117, 947-958.

Mertens, D. (2005a). AOAC Official Method 922.02. Plants Preparation of Laboratory Sample. Official Methods of Analysis, 18th edn. Horwitz, W., and G.W. Latimer, (Eds). Chapter AOAC-International Suite 500, 481. North Frederick Avenue, Gaitherburg, Maryland 20877-2417, USA, 3: 1-2.

Mertens, D. (2005b). AOAC Official Method 975.03. Metal in Plants and Pet Foods. Official Methods of Analysis, 18th edn. Horwitz, W., and G.W. Latimer, (Eds). Chapter, AOAC-International Suite 500, 481. North Frederick Avenue, Gaitherburg, Maryland 20877-2417, USA, 3: 3-4.

Mzibra, A., Aasfar, A., Khouloud, M., Farrie, Y., Boulif, R., Kadmiri, I. M., Bamouh, A., & Douira, A. (2021). Improving growth, yield, and quality of tomato plants (*Solanum lycopersicum* L) by the application of moroccan seaweed-based biostimulants under greenhouse conditions. Agronomy, 11(7), 1373.

Papa, S., Fusco, G. M., Ciriello, M., Formisano, L., Woo, S. L., De Pascale, S., Rouphael, Y., & Carillo, P. (2022). Microbial and non-microbial biostimulants as innovative tools to increase macro and trace element mineral composition of tomato and spinach. Horticulturae, 8(12), 1157.

Ramesh, A., Harani Devi, P., Chattopadhyay, S., & Kavitha, M. (2020). Commercial Applications of Microbial Enzymes. In: Arora, N., Mishra, J., Mishra, V. (eds) Microbial Enzymes: Roles and Applications in Industries. Microorganisms for Sustainability, vol 11. Springer, Singapore. https://doi.org/10.1007/978-981-15-1710-5_6

Turan, M., Nikerel, E., Kaya, K., Kitir, N., Gunes, A., Mokhtari, N. E. P., Tufenkci, S., Karaman, M.R., & Çimrin, K. M. (2017). Enzyme dynamic in plant nutrition uptake and plant nutrition. Enzyme Inhibitors and Activators, 225-242.

Turan, M., Yildirim, E., Ekinci, M., & Argin, S. (2021). Effect of biostimulants on yield and quality of cherry tomatoes grown in fertile and stressed soils. HortScience, 56(4), 414-423.

Sani, M. N. H., Islam, M. N., Uddain, J., Chowdhury, M. S. N., & Subramaniam, S. (2020). Synergistic effect of microbial and nonmicrobial biostimulants on growth, yield, and nutritional quality of organic tomato. Crop Science, 60(4), 2102-2114.

van Beilen, J. B., & Li, Z. (2002). Enzyme technology: an overview. Current Opinion in Biotechnology, 13(4), 338-344.

Yuan, B., Zhou, S., Liu, C., Zhang, S., Li, J., & Liu, A. (2021). Status of the application of exogenous enzyme technology for the development of natural plant resources. Bioprocess and Biosystems Engineering, 44, 429-442.

Zhang, P., Zhang, H., Wu, G., Chen, X., Gruda, N., Li, X., Dong, J., & Duan, Z. (2021). Dose-dependent application of straw-derived fulvic acid on yield and quality of tomato plants grown in a greenhouse. Frontiers in Plant Science, 12, 736613.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

BAZI HURMA ÇEŞİTLERİNİN ANTİOKSİDAN VE ENZİM İNHİBİSYON AKTİVİTELERİNİN BELİRLENMESİ

Doktor Abbas TARHAN
Dicle Üniversitesi, Bilim ve Teknoloji Uygulama ve Araştırma Merkezi
ORCID: 0000-0001-5191-3892

ÖZET

Çalışılan hurma türlerinin etanol ekstrelerinin toplam fenolik ve toplam flavonoid miktarları sırasıyla pirokatekol ve kersetine eşdeğer olarak belirlenmiştir. Ekstreler içerisinde Birem hurmasının çekirdek kısmı ekstresinin toplam fenolik miktarının (246,14±1,19 µg pirokatekole eşdeğer/mg ekstre) en yüksek olduğu belirlenirken, Tibarzal hurmasının etli kısmı ekstresinin toplam fenolik miktarının (1,78±0,87 µg pirokatekole eşdeğer/mg ekstre) en az olduğu belirlenmiştir. Toplam flavonoid miktarı bakımından ise, Maktum hurmasının çekirdek kısmı ekstresinin toplam flavonoid içeriğinin (23,31±1,24 µg kersetine eşdeğer/mg ekstre) en yüksek, Khadrawy hurmasının etli kısmı ekstresinin toplam flavonoid içeriğinin (0,17±1.73 µg kersetine eşdeğer/mg ekstre) ise en düşük olduğu görülmüştür. Tüm hurma ekstrelerinde çekirdek kısımlarının toplam fenolik ve toplam flavonoid içerikleri, etli kısımlarınkinden daha yüksek olduğu tespit edilmiştir. Ayrıca hurma çeşitlerinin etli kısımlarının ekstrelerinin toplam fenolik ve toplam flavonoid bakımından oldukça zayıf olduğu görülmüştür. Buna ek olarak, tüm ekstrelerde fenolik içeriğin flavonoid içeriğine oranla daha zengin olduğu belirlenmiştir.

Çalışılan hurma türlerinin etanol ekstrelerinin antioksidan aktiviteleri DPPH, ABTS ve CUPRAC yöntemleriyle belirlenmiştir. DPPH ve CUPRAC yöntemlerine göre, hurma örneklerinin çekirdek kısımlarının etanol ekstrelerinin yüksek aktivite gösterirlerken, numunelerin etli kısımlarının aktivite göstermedikleri görülmüştür. Ayrıca hem DPPH hem de CUPRAC yöntemlerine göre en yüksek aktiviteyi Maktum hurmasının çekirdek ekstresi göstermiştir (IC_{50} değerleri sırasıyla 8.22±1.13 ve 3,297±0,052). Buna ek olarak, Tiberzal hurmasının çekirdek kısmı da CUPRAC yöntemine güre yüksek aktivite göstermiştir. ABTS yöntemine göre en yüksek aktiviteyi yine Maktum hurmasının çekirdek ektresi (IC_{50}: 4,21±0,34) göstermiştir, Tüm hurmaların çekirdek kısımlarının ekstreleri daha iyi aktivite gösterirken, etli kısımlarının etanol ekstrelerinin çok düşük seviyede aktivite gösterdiği tespit edilmiştir.

Antikolinesteraz aktivite sonuçlarına göre çalışılan ekstreler arasında en yüksek aktiviteyi hem bütirilkolinesteraz hem de asetilkolinesteraz enzim inhibisyonunda Tiberzal hurmasının çekirdek kısmı ekstresi (% inhibisyon sırasıyla 65,83±0,31 ve 85,27±0,57) göstermiştir. Antiüreaz aktivite sonuçlarına bakıldığında sadece çekirdek kısımlarının düşük düzeyde enzim inhibisyon aktivitesi gösterdiği tespit edilmiştir.

Anahtar Kelimeler: Aktivite, antioksidan, CUPRAC, hurma, toplam fenolik.

DETERMINATION OF ANTIOXIDANT AND ENZYME INHIBITION ACTIVITIES OF SOME DATE VARIETIES

ABSTRACT

The total phenolic and total flavonoid amounts of the ethanol extracts of the studied date species were determined to be equivalent to pyrocatechol and quercetin, respectively. Among the extracts, it was determined that the total phenolic amount (equivalent to 246.14±1.19 µg pyrocatechol/mg extract) of the seed extract of Birem date was the highest, while the total

phenolic amount (equivalent to 1.78±0.87 µg pyrocatechol/mg extract) of the pulp extract of Tibarzal date was the lowest. In terms of total flavonoid amount, the total flavonoid content of Maktum date seed extract (equivalent to 23.31±1.24 µg quercetin/mg extract) was the highest, and the total flavonoid content of Khadrawy date pulp extract (equivalent to 0.17±1.73 µg quercetin/mg extract) was the lowest. In all date extracts, the total phenolic and total flavonoid contents of the kernel parts were found to be higher than those of the flesh parts. In addition, it was observed that the extracts of the fleshy parts of date varieties were quite poor in terms of total phenolics and total flavonoids. In addition, it was determined that the phenolic content was richer than the flavonoid content in all extracts.

Antioxidant activities of ethanol extracts of the studied date species were determined by DPPH, ABTS and CUPRAC methods. According to DPPH and CUPRAC methods, it was observed that the ethanol extracts of the kernel parts of date samples showed high activity, while the fleshy parts of the samples did not show activity. In addition, the kernel extract of Maktum date showed the highest activity according to both DPPH and CUPRAC methods (IC_{50} values 8.22±1.13 and 3.297±0.052, respectively). Furhermore, the seed of Tiberzal palm also showed high activity (IC_{50}: 3.149±0.058) according to the CUPRAC method. According to the ABTS method, the seed extract of Maktum date showed the highest activity (IC_{50}: 4.21±0.34). While the extracts of the kernel parts of all dates showed better activity, it was determined that the ethanol extracts of the flesh parts showed very low activity.

According to the anticholinesterase activity results, Tiberzal date seed extract showed the highest activity among the studied extracts in both butyrylcholinesterase and acetylcholinesterase enzyme inhibition (inhibition %: 65.83±0.31 and 85.27±0.57, respectively). When the antiurease activity results were examined, it was determined that only the seed parts showed low enzyme inhibitory activity.

Keywords: Bioactivity, antioxidant, enzyme inhibition, date, total phenolic, total flavonoid.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

İLKÖĞRETİM OKULLARINDAKİ I. KADEME (İLKOKUL) ÖĞRETMENLERİNİN ÖRGÜTSEL ADANMIŞLIK DÜZEYLERİNİN BELİRLENMESİ

Hasan KARAASLAN
Sakarya Üniversitesi
ORCID: 0009-0003-0783-7321

Doç. Dr. Mehmet Emin USTA
Sakarya Üniversitesi
ORCID: 0000-0003-2355-1203

Dr. Ümit DOĞAN
Milli Eğitim Bakanlığı
ORCID: 0000-0002-8144-9744

ÖZET
Eğitim-öğretim etkinliklerinde en önemli sorumluluk öğretmenlere düşmektedir. Öğretmenlerin adanmışlığı, öğretmenler arasındaki etkileşimler, öğrencilerle iletişim, yaptıkları işin doğası ve mesleki algıları gibi çeşitli faktörlerden etkilenir. Öğretmenler arasında yüksek düzeyde adanmışlık sağlamak çok önemlidir; çünkü düşük bağlılık, iş performansının azalmasına ve hatta yıpranmaya yol açarak sonuçta okulun genel verimliliğini etkileyebilir. Bağlılığı düşük olan öğretmenler yıkıcı davranışlar sergileyebilir ve okulun eğitim hedeflerine ulaşmasını engelleyebilir. Tersine, güçlü bir adanmışlık duygusu sergileyen öğretmenler yalnızca rollerinde başarılı olmakla kalmaz, aynı zamanda kendilerini okulun misyonuyla da uyumlu hale getirirler. Hizmet ederler, çalışma arkadaşlarıyla olumlu ilişkiler içindedirler. Öğretmenlerin mesleklerine, öğretim işlerine, çalıştıkları okula ve beraber çalıştıkları arkadaşlarına adanmaları öğretmenlerin başarısı için önemlidir. Bu araştırmanın amacı İlköğretim okullarındaki I. Kademe (ilkokul) öğretmenlerinin öğretmenlik mesleğine, eğitim öğretim süreçlerine, kuruma ve öğretmen ekibine dayalı olarak örgütsel adanmışlıklarını saptamaktır. Bu amaçla Sakarya ilindeki 20 ilkokulu örneklem grubuna dahil edilmiştir. Örneklem grubuna dahil edilen ilköğretim okullarından 321 ilkokulda görev yapan öğretmenlere anket uygulanmış, verilen anketlerin cevaplanmasından sonra 321 tanesi de geçerli sayılmıştır ve bilgisayar ortamında SPSS programına aktarılmıştır. Araştırma sonucunda sorulara verilen cevaplara göre yüzdelik ve aritmetik ortalamalara göre öğretmenlerin örgütsel adanmışlık düzeyleri yüksek çıkmıştır. Örgütsel adanmışlık boyutları arasında Öğretmenlik mesleğine, öğretmenlik işine, okula ve çalışma grubuna bağlılık arasındaki pozitif ve güçlü korelasyon, var olan çift yönlü ilişkiyi vurgulayarak ortaya çıkarmıştır. Örgütsel adanmışlık boyutlarının aritmetik ortalamasına bakıldığında; Öğretmenlerin yüksek düzeyde öğretmenlik mesleğine adandıkları, yine yüksek düzeyde öğretim işlerine adandıkları, diğer boyutlara göre daha düşük düzeyde okula adandıkları ve yüksek düzeyde çalışma grubuna adandıkları ortaya çıkmıştır. Öğretmenlerin cinsiyetlerine göre örgütsel adanmışlık boyutlarının aritmetik ortalamasına bakarak düzeylerini karşılaştırdığımızda kadın ve erkek öğretmenlerin karşılaştırılması yapıldığında yüksek düzeyde öğretmenlik mesleğine adandıkları, kadın ve erkek öğretmenlerin yapılan değerlendirmeler ışığında yüksek düzeyde öğretim işlerine adandıkları, kadın ve erkek öğretmenlerin diğer boyutlara göre daha düşük ve birbirine yakın düzeyde okula adandıkları ve kadın ve erkek öğretmenlerin elde edilen veriler yardımıyla değerlendirme sonucuna göre aynı düzeye ulaşan seviyede çalışma grubuna adandıkları ortaya çıkmıştır.
Anahtar Kelimeler: Öğretmen, Örgütsel Adanmışlık, Örgütsel Bağlılık.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

DETERMINATION OF ORGANIZATIONAL COMMITMENT LEVELS OF PRIMARY SCHOOL FIRST LEVEL (ELEMENTARY SCHOOL) TEACHERS (THE CASE OF SAKARYA PROVINCE)

ABSTRACT
Teachers have the most important responsibility in education and training activities. Teachers' commitment is influenced by various factors such as interactions between teachers, communication with students, the nature of their work and their professional perceptions. Maintaining a high level of commitment among teachers is very important because low commitment can lead to reduced job performance and even attrition, ultimately affecting the overall efficiency of the school. Teachers with low commitment can exhibit disruptive behaviors and hinder the school from achieving its educational goals. Conversely, teachers who exhibit a strong sense of commitment not only succeed in their roles, but also align themselves with the school's mission. They serve, they have positive relationships with their colleagues. Teachers' commitment to their profession, to their teaching, to the school they work in, and to the colleagues they work with is important for teachers' success. The purpose of this study is to determine the organizational commitment of Tier I (primary school) teachers in primary schools based on teaching profession, educational processes, institution and teacher team. For this purpose, 20 primary schools in Sakarya province were included in the sample group. A questionnaire was applied to 321 primary school teachers from the primary schools included in the sample group, and 321 of the questionnaires were deemed valid after the questionnaires were answered and transferred to the SPSS program in computer environment. As a result of the research, according to the answers given to the questions, the organizational commitment levels of the teachers were high according to the percentages and arithmetic averages. The positive and strong correlation between the dimensions of organizational commitment and commitment to teaching profession, teaching job, school and work group emphasized the existing bidirectional relationship. When the arithmetic mean of the dimensions of organizational commitment was examined, it was found that teachers were highly committed to the teaching profession, highly committed to teaching work, less committed to school and highly committed to the work group. When we compare the levels of teachers according to their gender by looking at the arithmetic mean of organizational commitment dimensions, it was found that female and male teachers were highly committed to the teaching profession, female and male teachers were highly committed to teaching jobs in the light of the evaluations made, female and male teachers were committed to school at a lower and close level compared to other dimensions, and female and male teachers were committed to the working group at the same level according to the evaluation result with the help of the data obtained.
Keywords: Teacher, Organizational Commitment, Organizational Commitment.

GİRİŞ
Bir toplumun çağdaş uygarlık seviyesine ulaşmasında temel hedef, eğitimdir. Türk Eğitim sisteminin belirlenen temel özellikleri ve gayesi, muasır medeniyetler seviyesine ulaşmanın ve çağın gereksinimlerine tam anlamı ile cevap verebilmektir. Fakat sisteminin yapısal özelliği ve amacının ideal seviyede gerçekleşmesi belirgin bir mana içermemektedir. Belirgin özellik eğitim sistemimizin yetiştirdiği kaliteli bireylerin üretkenliğidir. İnsan, mükemmel düzeyde kurulmuş sistemi işlemez duruma sokabileceği gibi, işlemez durumdaki bir sistemi de üretken bir duruma getirerek kaliteli ürünler üretebilir. Bu anlamda, eğitim sistemindeki eğitimci ve öğretmenlerin nitelikleri önem taşımaktadır.

Diğer taraftan, eğitim sisteminde amaç sapmasını anında saptamak olası değildir. Oysaki diğer örgütlerde amaç sapmasını anında belirleyerek gerekli önlemleri almak olanaklıdır. Bu bağlamda, eğitim örgütlerinde görev alan öğretmenlerin kendi amaçlarını veya özdeşleştikleri dışsal referans gruplarının amacını, eğitim sisteminin veya okulun amacı gibi göstermesi ve yorumlaması olasıdır. Bir okulun etkin ve verimli bir şekilde çalışabilmesi, öğretmenlerin ve okul yöneticilerinin okul ve eğitim sisteminin hedeflerini ve değerlerini ne kadar benimsediğine bağlıdır. Öğretmenlerin, kendilerine rehber olarak aldıkları amaçlar ve değerler, okulun genel hedeflerini etkileyebilir. Bir öğretmenin mesleğine, öğretim sürecine, öğrencilere, okula ve çalışma gruplarına yönelik tutumları ve bu konularla ilgili değerleri benimseme derecesi, iş performansında farklılıklar yaratabilir. Fakat öğretmenler okul dışındaki ekiplerin gaye ve kalitelerini kendi odak noktası haline getirdiklerinde, kurumun ve eğitim sisteminde yer alan hedeflerine ulaşamama durumu ortaya çıkabilir. Bu durum, ülkenin çağdaş gelecek amaçlarını sekteye uğratabilir. Eğitim kurumları, özellikle dışsal amaç ve değerlere açık olan yapılardır, bu yüzden dikkatli olunması gerekir. Eğitim kurumlarında da diğer örgütlerde olduğu gibi örgütsel adanmışlık konusundaki bilimsel araştırmalar, teori ile pratik arasındaki bağlantının güçlenmesine katkı sağlayarak eğitim sisteminin iyileştirilmesine yardımcı olabilir. Okullarda öğretmenlerin adanmışlığını artıran faktörlerin desteklenmesi ve adanmışlığı olumsuz etkileyen unsurların değiştirilmesi, okul başarısını yükseltebilir. Eğitim kurumları insan odaklıdır; öğretmenler ve yöneticiler insan üzerinde çalışmakta, öğrenciler ise toplumun beklentilerine uygun olarak geliştirilip yönlendirilmeye çalışılmaktadır (Özdemir,2000). Örgütlerin temel gayesi insan davranışlarını olumlu yönde değiştirmek olduğuna göre, öğretmenlerin kurumlarına hissettikleri güven ve adanmışlık seviyelerinin üst düzeyde gerçekleşmesi için, kurumların belirledikleri hedeflerinin gerçekleşmesi adına çok yararlı kazanımlar elde edilmesini sağlayacaktır.

Türkiye'de yürütülen organizasyonlarda "organizational commitment" söyleminin birden fazla manada tarif edildiği sonucuna varılmıştır. Bu bağlamda, Tuncer (1995) ve Varoğlu (1993) bu söylemi, örgütsel bağlılık; Balcı (2000) ve Celep (1996) ise, örgütsel adanmışlık türünde tanımlamıştır (Balay,2000, 13-14). Yaptıkları incelmede bağlılık ve adanmışlık söylemlerinin birliktelik oluşturarak ortaya çıktığını söyleyerek "organizational commitment" söylemine denk gelen "örgütsel adanmışlık" söylemini benimsemişlerdir. Mowday, Steers ve Porter'e göre örgütsel adanmışlık, kişinin kuruma ait olma güdüsü ve kuruma dahil olma azminin ortaya çıkardığı istekli durumdur. Örgütsel adanmışlığın üç ana temelini şöyle sıralayabiliriz: a) Kurumun gaye ve bünyesindeki barındırdığı kaliteye üst düzeyde sahip olmak, b) Kurum yararına katkıda bulunmak için önemli ölçüde gayret etmek, c) Kurumdaki yerini sağlamlaştırmak için üst düzeyde sıkı bir çaba gösterme sorumluluğu duymaktadır (Mowday, Steers, Porter, 1979, 226). Örgütsel adanmışlık, kuruma karşı gçlü bir aidiyet duygusu ihtiva etmektedir. Kurum ve kişi karşılıklı aktif iletişim durumundadırlar; çünkü kişiler, kurumun yenilenmesi ve işlevsel bir yeterliliğe kavuşması sürecine özverili ve adanmış olarak sürekli çalışmaya adapte olmuşlardır (Özkalp, Kırel, 2004, 26).

Adanmışlık, kişinin kurumun resmi ve düzgüsel isteklerinin farkında olarak, kurumun gaye ve kalitesine ilişkin kazanımları ortaya koymaktadır. Kurumlardaki adanmışlık, kurumsal gaye ve kalitesinin zenginleşmesine ve bu kaliteyi destekleyen ivmenin artarak devam etmesinin kaçınılmaz olduğunu savunmaktadır. Neticede, kişinin kurumdaki görevini tanımlayan iki seçenek oluşmaktadır: birincisi, kurumsal gaye ve kaliteye ulaşmayı kolaylaştıran bireysel faktörler (dışsal ödüller, eğitim durumu, mesleki kıdem, makam, eğitim, yaş, ücret, vb.), ikinci sıradaki ise kişinin görevinin kurumsal gaye ve kaliteye yararının hissedilme merhalesidir. Örgütsel adanmışlık, duygusal adanmışlık ve davranışsal adanmışlık olmak üzere iki aşamada tarif edilebilir (Celep, 2000, 15-16).

Duygusal adanmışlık olarak adanmışlık kişilerin kurum ile anılmalarını ifade etmektedir. Davranışsal olarak adanmışlık ise, kurumda var olma ile çalışanın tazminat ve aylık gibi dışsal ödülleri işaret eden farklı merhaledir (Shaw, Reyes, 1992, 297). Davranışsal yaklaşım, kişinin bağlılık ile ilgili kazanımlarını merkeze alarak değerlendirir. Kurumla ortaklaşa hareket edilmesi bağlamında ortaya çıkacak fayda ve kurumdan ayrılma halinde oluşacak zarar tespit edilerek, çalışanlar istendik davranışları sergiler ve diğer davranışlarını sergileme tutumundan vazgeçerler. Duygusal adanmışlık bireyin kendi gayesinin kurumsal hedeflerle tutarlı şekilde devam ettiği tespit edildiğinde ve çalışanın unvanının kurumsal kimlikle ilişkili bir yapıda olduğu tarif edilmektedir (Çetin, 2004, 61). Diğer taraftan davranışsal olarak adanmışlık bireyin davranışsal etkinlikler kapsamında ortaya koyduğu çabayla doğrudan ilişkilidir. Araştırmacılar her iki adanmışlık arasında dairesel bir ilişkinin olduğunu ileri sürmüşlerdir. Buna göre, adanmışlık tutumu, adanmışlık davranışına götürürken, bu davranışlar da dönüşte adanmışlık tutumlarını kuvvetlendirir (Balay,2000, 24).

Örgütsel adanmışlık kavramını tanımlama yaklaşımlarının oldukça farklılık göstermesine karşın, bu kavramlar belli eğilimler etrafında odaklaşmaktadır. Bu tanımların çoğu özellikle davranışla ilgili adanmışlık üzerinde yoğunlaşmaktadır. Örneğin, adanmışlık "birisinin eylemleri ile sınırlı olan veya resmi ve düzgüsel istekleri zorlayan davranışlar" olarak ifade edilmektedir (Balay,2000). Bu durumda adanmışlık; bir örgütün bireyden beklediği resmi ve düzgüsel isteklerinin de ilerisinde, kişinin gaye ve kaliteye ihtiyaç duyulan hal ve tutumlardır. Bir başka bakış açısı da tutumsal adanmışlığı ifade etmektedir. Bireyin, örgütsel amaçlarla özdeşleşmesi veya bu amaçlarla artan biçimde "bütünleşmiş ve uyumlu olma durumu " tutumsal adanmışlık oluşmaktadır. Tutumsal adanmışlık; iş görenin çalıştığı kurum ve kurumun hedefleri ile birleşme ve ulaşılmak istenen hedeflerin gerçekleştirilmesi için üstlenilen rolü devam ettirme isteğinin ortaya çıktığı zamandır. Bu adanmışlık, kurumdan elde edilen hakkediş ve yevmiyelerin karşılığı olarak kişilerin örgüte aidiyetle duymaları ile ilişkili oluşan takas ilişkisiyle sınırlandırılmıştır. Bu görüşlerden hareketle tutumsal açıdan örgütsel adanmışlık; kişilerin çalıştığı kurumla birleşme ve aktif çalışmalarının sonucu olarak gösterilmektedir.

YÖNTEM

Araştırma Modeli

Araştırma tarama modelindedir. Öğretmenlerin örgütsel adanmışlık tutumlarının, öğretim işlerine adanma ve öğretmenlik mesleğine adanma boyutlarında saptanması için, Sakarya ili ilköğretim okulları 1. Kademe öğretmenlerine anket uygulanmıştır. Tarama modeli, çok sayıda elemandan oluşan bir evrende, evren hakkında genel bir yargıya varmak amacı ile evrenin tümü ya da ondan alınacak bir grup, örnek ya da örneklem üzerinde yapılan tarama düzenlemeleridir (Karasar, 1999: 77). Araştırmada öğretmenlerin görüşlerine dayanarak, ilköğretim okullarındaki öğretmenlerin Öğretim işlerine, Öğretmenlik mesleğine adanma, Okula adanma ve Çalışma grubuna adanma boyutlarıyla örgütsel adanmışlık düzeylerini belirlemek istenmiştir.

Araştırmanın Evren ve Örneklemi

Araştırmanın evrenini, 2023-2024 Eğitim-Öğretim yılında Sakarya ilindeki 20 ilköğretim 1. kademe okulu (ilkokul) oluşturmaktadır. Araştırma örneklemini ise 20 ilköğretim okulundaki 321 öğretmen oluşturmaktadır. 321 Öğretmene anket uygulanmış gelen anketlerin 321 tanesi de değerlendirmeye alınmıştır. Araştırma örneklemini oluşturan ilköğretim I. Kademe (ilkokul) öğretmenlerinin %0,37 si 2 yıllık yüksekokul , %65,4 ü 4 yıllık fakülte, %28,03 ü yüksek lisans , % 6,2 si doktora mezunudur.

Araştırma örneklemini oluşturan ilköğretim I. Kademe ilkokul öğretmenlerinin %13,7'si 1-10 yıl %18,3'ü 11-15 yıl, %23,6'sı 16-20 yıl, %44,4' ü 21 ve daha fazla hizmet yılına sahiptir. Araştırma örneklemini oluşturan İlköğretim I. Kademe ilkokul öğretmenlerinin %58 `i kadın, %42' si erkektir.

Veri Toplama Aracı

Yapılan kaynak incelemeleri, ilgili tezler ve benzer araştırmaların anket formlarının incelenmesi sonucu daha önceki araştırmalarda Celep (2000) tarafından oluşturulmuş olan 28 soruluk "Örgütsel Adanmışlık Düzeyi Belirleme Anketi" oluşturulmuştur. "Örgütsel Adanmışlık Düzeyi Belirleme Anketi" araştırmada veri toplama aracı olarak kullanılacaktır. Ankette Örgütsel Adanmışlık; Öğretim İşlerine Adanma, Öğretmenlik Mesleğine Adanma, Okula Adanma ve Çalışma Grubuna Adanma olmak üzere dört boyutta ele alınmıştır. Eğitim Örgütlerinde Öğretmenlerin Örgütsel Adanmışlığı Ölçeği' nin (ÖAÖ) öncelikle tek boyutlu faktör analizi yapılmıştır. Eğitim örgütlerinin örgütsel adanmışlık ölçeğindeki toplam 28 maddenin güvenirlik Coranbach Alfa katsayısı .88'dir. Coranbach Alfa katsayısı Okula Adanma faktöründe .80; Öğretim işlerine Adanmada .75; Öğretmenlik Mesleğinde Adanmada .78; Çalışma grubuna Adanmada .81 olarak saptanmıştır.

Verilerin Toplanması

Veri toplama aracı olarak anket kullanılmıştır. Bu anketler, Sakarya il Milli Eğitim Müdürlüğü ve Sakarya Valiliğinden gerekli izin alındıktan sonra araştırma tarafından bizzat okullara gidilip dağıtılacak ve aynı yolla toplanacaktır. Araştırmanın kuramsal yapısını oluşturmak üzere alanla ilgili yazılar incelenmiştir. Araştırma konusunda yayınlanmış Türkçe ve yabancı kaynaklı yazılar kuramsal temeli oluşturmaktadır.

3.5. Verilerin Analizi

Anketle elde edilen kişisel veriler, yüzde değerlere göre yorumlanacaktır. Örgütsel adanmışlığa ilişkin 28 madde ise ilk önce frekans, yüzde, aritmetik ortalamaya göre ayrı ayrı yorumlanacaktır. Ayrıca, her boyut, o boyuttaki maddelerin aritmetik ortalamalarının toplamına göre açıklanacaktır. Anketteki madde seçenekleri; Beşli dereceleme ölçeğindeki (I) Hiçbir zaman, (2) Çok Az, (3) Ara sıra, (4) Çoğu Zaman, (5) Her Zaman şeklinde puanlandırılmıştır. İstatistiksel işlemler seçeneklerin sahip olduğu bu puanlamaya göre yapılacaktır. Ankette "okulun öğretmenlerle ilgili yönetsel uygulamasını onaylamıyorum, "okuldaki insanlar arası ilişkiyi onaylamıyorum maddeleri ters yönde (5,4,3,2,1) puanlandırılacaktır. Örgütsel adanmışlığı oluşturan boyutlar arasında ilişkiyi saptamak için Person' un Korelasyon Matrisi Analizi yapılacaktır. Kadın ve Erkek öğretmenlerin Örgütsel Adanmışlık düzeylerini karşılaştırmak için kadın ve erkeklerin verdikleri cevaplara göre boyutların aritmetik ortalamaları hesaplanacak ve karşılaştırma yapılacaktır.

BULGULAR

Öğretmenlik Mesleğine Adanma Boyutu ile İlgili Bulgular

Öğretmenlerin mesleki adanmışlığı; öğretmenlik mesleğini seçme kararını olumlu karar olarak değerlendirme, mesleği ile gurur duyma, öğretmenlik mesleğinin değerlerini diğer mesleki değerlerden üstün görme, öğretmenlik mesleğinin çalışma, hayati için ideal meslek olduğunu algılama, öğretmenlik mesleğinde tanınmış birisi olma, ekonomik açıdan çalışmaya gerek kalmasa da öğretmenlik mesleğini sürdürme sorularıyla belirlenmeye çalışılmıştır. Aşağıdaki Tabloda Öğretmenlik mesleğine adanma boyutundaki sorulara verilen cevaplarda kaç kişinin hangi soruya ne cevap verdiği ve bunların yüzdelik dilimi verilmiştir.

Ayrıca tabloda Öğretmenlik mesleğine adanma boyutundaki maddelerin aritmetik ortalamaları da verilmiştir.

Tablo 1. Öğretmenlerin öğretmenlik mesleğine adanma boyutundaki sorulara verdikleri cevaplar ve yüzdelikleri

	Hiçbir Zaman		Çok Az		Ara Sıra		Çoğu Zaman		Her Zaman	
	f	%	f	%	f	%	f	%	f	%
1.Öğretmenlik mesleğini seçme kararımı, yaşamımda en olumlu karar olarak değerlendiriyorum.	5	2,9	10	5,7	30	17,1	89	50,9	41	23,4
2.Öğretmenlikten gurur duyuyorum.	1	0,6	7	4,0	18	10,3	69	39,4	80	45,7
3.Öğretmenlik mesleğinin değerlerini diğer mesleki değerlerden üstün görüyorum.	2	1,1	4	2,3	36	20,6	69	39,4	64	36,6
4.Öğretmenlik mesleğinin çalışma hayatı için ideal meslek olduğunu düşünüyorum.	5	2,9	13	7,4	32	18,3	71	40,6	54	30,9
5.Öğretmenlik mesleğinde tanınmak istiyorum.	7	4,0	17	9,7	39	22,3	62	35,4	50	28,6
6.Ekonomik gereklilik olmasa da öğretmenliğe devam edeceğimi düşünüyorum.	10	5,7	20	11,4	17	9,7	78	44,6	50	28,6

Tablo 2. Öğretmenlerin öğretmenlik mesleğine adanma boyutundaki sorulara verdikleri cevaplara göre aritmetik ortalamalar

	Aritmetik Ortalama
1.Öğretmenlik mesleğini seçme kararımı yaşamımda en olumlu karar olarak değerlendiriyorum.	3,9
2.Öğretmenlikten gurur duyuyorum.	4,3
3.Öğretmenlik mesleğinin değerlerini diğer mesleki değerlerden üstün görüyorum.	4,08
4.Öğretmenlik mesleğinin çalışma hayatı için ideal meslek olduğunu düşünüyorum.	3,89
5. Öğretmenlik mesleğinde tanınmak istiyorum.	3,7
6. Ekonomik gereklilik olmasa da öğretmenliğe devam edeceğimi düşünüyorum.	3,8

Öğretmenlerin (% 74,3) 'ü öğretmenlik mesleğini seçme kararını yaşamlarındaki en olumlu kararlardan birisi olarak algılamakta (A0=3,9), (% 85,1) 'i mesleği ile gurur duymakta (A0=4,3), b (% 76)'sı öğretmenlik mesleğinin değerlerini diğer mesleki değerlerden üstün görmekte (A0=4,08), (%71,5)'i mesleğini çalışma yaşamı için ideal bir meslek olarak görmekte (A0=3,89) , (%64)'ü mesleğinde tanınmak istemekte (A0=3,7), (%73,2)'si ekonomik açıdan gerek kalmasa da öğretmenliğe devam etme eğilimini taşımaktadır. (A0=3,8). Öğretmenlik mesleğine adama boyutunda yüzdelik ve aritmetik ortalamalara bakıldığında öğretmenlerin öğretmenlik mesleğine yüksek düzeyde adandıkları görülmektedir. Maddelerin aritmetik ortalamalarına baktığımızda; beşli dereceleme ölçeğine göre "Öğretmenlikten gurur duyuyorum" maddesinin "Her zaman" seçeneğinde yoğunlaştığı ortaya çıkmıştır. Diğer maddelerin "Çoğu zaman" seçeneğinde yoğunlaştığı ortaya çıkmıştır.

Öğretim İşlerine Adanma Boyutu ile ilgili Bulgular

Öğretmenlerin öğretim işlerine adanmaları; Ders saatleri dışında da ders konusunda öğrenciye zaman ayırma, günlük ders zamanında yetiştirilemediğinde ek ders yapma fırsatını arama, derse zamanında girme sorumluluğunu taşıma, öğretim işlerine dört elle sarılma, öğrencilerin aile yaşantısı hakkında bilgi edinme, başarısız öğrencinin başarılı olması için fazla çaba gösterme, ders yapmaktan zevk alma olmak üzere toplam 7 soru ile saptanmaya çalışılmıştır. Aşağıdaki Tabloda Öğretim işlerine adanma boyutundaki sorulara verilen cevaplarda kaç kişinin hangi soruya ne cevap verdiği ve bunların yüzdelik dilimi verilmiştir. Ayrıca tabloda Öğretim işlerine adanma boyutundaki maddelerin aritmetik ortalamaları da verilmiştir.

Tablo 3. Öğretmenlerin öğretim işlerine adanma boyutundaki sorulara verdikleri cevaplar ve yüzdelikleri

	Hiçbir Zaman		Çok Az		Ara Sıra		Çoğu Zaman		Her Zaman	
	f	%	f	%	f	%	f	%	f	%
7.Ders dışında ders konusunda öğrencilere zaman ayırıyorum.	1	0,6	5	2,9	49	28,0	85	48,6	35	20,0
8.Ek ders yapma fırsatı arıyorum.	8	4,6	31	17,7	54	30,9	61	34,9	21	12,0
9.Derse zamanında girme sorumluluğumu yerine getiriyorum.	0	0	0	0	6	3,4	84	48,0	85	48,6
10. İşe dört elle sarılıyorum.	0	0	1	0,6	12	6,9	91	52,0	71	40,6
11.Öğrencinin aile yaşantısı hakkında bilgi ediniyorum.	1	0,6	16	9,1	35	20	86	49,1	37	21,1
12.Başarısız öğrenci için fazla çaba gösteriyorum.	1	0,6	7	4,0	42	24,0	89	50,9	36	20,6
13. Ders yapmaktan zevk alıyorum	1	0,6	3	1,7	15	8,6	93	53,1	63	36,0

Tablo 4. Öğretmenlerin Öğretim İşlerine Adanma Boyutundaki Sorulara Verdikleri Cevaplara Göre Aritmetik Ortalamalar

Öğretim İşlerine Adanma	Aritmetik Ortalama
7. Ders dışında ders konusunda öğrencilere zaman ayırıyorum.	3,8
8. Ek ders yapma fırsatı arıyorum.	3,3
9. Derse zamanında girme sorumluluğumu yerine getiriyorum.	4,45
10. İşe dört elle sarılıyorum.	4,3
11. Öğrencinin aile yaşantısı hakkında bilgi ediniyorum.	3,8
12. Başarısız öğrenci için fazla çaba gösteriyorum.	3,9
13. Ders yapmaktan zevk alıyorum.	4,2

Öğretmenlerin sorulara verdikleri yanıtların en yüksek yüzde ve aritmetik ortalamaları ele alındığında; yüksek derecede öğretim işlerine adandıkları ortaya çıkmaktadır. Öğretmenlerin, özellikle yüksek derecede öğretim işlerinden zevk aldığı ve okuldaki öğretim işlerini başarıyla yürütmek için fazla çaba gösterdikleri gözlenmektedir. Öğretmenlerin sorulara verdikleri yanıtlar dikkate alındığında; Öğretmenlerin (%68,6)'sının ders dışında ders konusunda öğrencilere zaman ayırdığı (A0=3,8) , (%46,9)'unun ek ders yapma fırsatı aradığı(A0=3,3), (%96,6)' sının derse zamanında girme sorumluluğunu yerine getirdiği ve öğretim işleri konusunda içsel denetime sahip olduklarını (A0=4,45), (%92,6)'sının işe dört elle sanıldığı (A0=4,3) , (%70,2)'sinin öğrencilerin aile yaşantısı hakkında bilgi edindiği (A0=3.8) , (%71,5)'inin başarısız öğrenci için çaba gösterdiği (A0=3,9) , (°/089,1)'inin ders yapmaktan zevk aldığı (A0=4,2) görülmektedir. En düşük yüzdelik ve aritmetik ortalama olarak ek ders yapma fırsatı aramada ortaya çıkmıştır. Bunun da sebebi okullarda ek ders yapmak için yeterli binanın olmayışı olabilir. Öğretmenler ek ders yapma fırsatı arasalar bile sınıf bulamamaları onların bu çabalarını söndürmüş olabilir. Maddelerin aritmetik ortalamalarına baktığımızda; beşli dereceleme ölçeğine göre "Ek ders yapma fırsatı arıyorum" maddesinin "Ara sıra" seçeneğinde yoğunlaştığı, "Derse zamanında girme sorumluluğumu yerine getiriyorum, İşe dört elle sarılıyorum" maddelerinin "Her zaman" seçeneğinde yoğunlaştığı ortaya çıkmıştır. Diğer seçeneklerin "Çoğu zaman" seçeneğinde yoğunlaştığı ortaya çıkmıştır.

Okula Adanma Boyutu ile ilgili Bulgular

Öğretmenlerin okula adanmaları; Okul için fazla çaba gösterme, Alanla ilgili ders olmasa da okulda kalmak için başka derse girmek isteme, Okuldan gurur duyma, Öğretmenlerle ilgili uygulamaları onaylamama, Okulun çalışma şevki uyandırması, başka okulda çalışma şansına sahip olduğum halde bu okulda çalışmaktan hoşlanma, Okuldaki insanlar arası ilişkileri onaylamama, Okulun geleceği ile ilgilenme, Okulun en iyi okul olduğunu düşünme olmak üzere toplam 9 soru ile saptanmaya çalışılmıştır. Aşağıdaki tabloda Okula adanma boyutundaki sorulara verilen cevaplarda kaç kişinin hangi soruya ne cevap verdiği ve bunların yüzdelik dilimi verilmiştir. Ayrıca tabloda Okula adanma boyutundaki maddelerin aritmetik ortalamaları da verilmiştir.

Tablo 5. Öğretmenlerin okula adanma boyutundaki sorulara verdikleri cevaplar ve yüzdelikleri

	Hiçbir Zaman		Çok Az		Ara Sıra		Çoğu Zaman		Her Zaman	
	f	%	f	%	f	%	f	%	f	%
14.Okul için fazla çaba gösteriyorum	0	0	16	9,1	65	37,1	84	48,0	10	5,7
15. Alanla ilgili ders olmasa da okulda kalmak için başka derse girmek isterim.	33	18,9	40	22,9	45	25,7	39	22,3	18	10,3
16. Okuldan gurur duyuyorum.	7	4,0	22	12,6	44	25,1	76	43,4	26	14,9
17. Öğretmenler ile ilgili yönetsel uygulamaları onaylamıyorum	1	0,6	5	2,9	28	16,0	72	41,1	69	39,4
18. Okulum çalışma şevki uyandırıyor.	10	5,7	30	17,1	46	26,3	71	40,6	18	10,3
19. Başka okulda çalışma şansına sahip olduğum halde, bu okulda çalışmaktan hoşlanıyorum.	10	5,7	25	14,3	35	20,0	89	50,9	16	9,1
20. Okuldaki insanlar arası ilişkileri onaylamıyorum.	5	2,9	20	11,4	26	14,9	68	38,9	56	32,0
21. Okulun geleceği ile ilgileniyorum	0	0	22	12,6	30	17,1	90	51,4	33	18,9
22. Okulun en iyi okul olduğunu düşünüyorum	33	18,9	36	20,6	46	26,3	43	24,6	17	9,7

Tablo 6. Öğretmenlerin okula adanma boyutundaki sorulara verdikleri cevaplara göre aritmetik ortalamalar

Okula Adanma	**Aritmetik Ortalama**
14. Okul için fazla çaba gösteriyorum.	3,5
15. Alanla ilgili ders olmasa da okulda kalmak için başka derse girmek isterim.	2,8
16. Okuldan gurur duyuyorum.	3,5
17. Öğretmenler ile ilgili yönetsel uygulamaları onaylamıyorum.	4,2
18. Okulum çalışma şevki uyandırıyor.	3,3
19. Başka okulda çalışma şansına sahip olduğum halde , bu okulda çalışmaktan hoşlanıyorum.	3,4
20. Okuldaki insanlar arası ilişkileri onaylamıyorum.	3,9
21. Okulun geleceği ile ilgileniyorum.	3,8
22. Okulun en iyi okul olduğunu düşünüyorum	2,9

Öğretmenlerin sorulara verdikleri yanıtlar dikkate alındığında; Öğretmenlerin (%53,7)'sinin okul için fazla çaba gösterdiği (AO=3,5), (%33,6)'sının alanla ilgili ders olmasa da okulda kalmak için başka derse girmek istediği (A0=2,8), (%58,3)'ünün okuldan gurur duydukları (AO=3,5), (%80,5)'inin öğretmenlerle ilgili yönetsel uygulamaları olumlu yönde onayladıkları (AO=4,2), (%50,9)'u okulun çalışma şevki uyandırdığım (A0=3,3), (%60)'ının başka okulda çalışma şansına sahip olduğu halde bu okulda çalışmaktan hoşlandığını (A0=3,4), (%70,9)'unun okuldaki insanlar arası ilişkileri olumlu yönde onayladıkları (A0=3,9), (%70,3)'ünün okulun geleceği ile ilgilendikleri (A0=3,8), (%34,3)'ü okulun en iyi okul olduğu düşündükleri (A0=2 9) görülmektedir. En düşük yüzdelik, ilk olarak "alanla ilgili ders olmasa da okulda kalmak için başka derse girmek" isteklerinde ortaya çıkmıştır. Bunun sebebi öğretmenlerin dersi bitince okuldan gitme isteklerinin fazla olması olabilir. 2. olarak okulun en iyi okul olduğunu düşünmelerinde en düşük yüzdelik oranı çıkmıştır. Bunun da sebebi öğretmenlerin okullarını her alanda (eğitim-öğretim, sosyal etkinlikler, spor vb.) başarılı görmediklerinden olabilir. Maddelerin aritmetik ortalamalarına baktığımızda; beşli dereceleme ölçeğine göre "Alanla ilgili ders olmasa da okulda kalmak için başka derse girmek isterim", "Okulum çalışma şevki uyandırıyor", "Okulun en iyi okul olduğunu düşünüyorum", "Başka okulda çalışma şansına sahip olduğum halde, bu okulda çalışmaktan hoşlanıyorum" maddelerinin "Ara sıra" seçeneğinde yoğunlaştığı ortaya çıkmıştır. Diğer seçeneklerin "Çoğu zaman" seçeneğinde yoğunlaştığı ortaya görülmektedir.

Çalışma Grubuna Adanma Boyutu ile ilgili Bulgular

Çalışma grubu üyeleri arasındaki uyum ve üyeler arası yakın, dostça bir ilişki, iş başarısı için güdüleyici bir ortam oluşturmaktadır. Bu ilişki, örgüt amacına yönlendirildiğinde, örgüt verimliliğini artırıcı rol oynayabilir. Öğretmenlerin çalışma grubuna adanması; öğretmenin ders aralarında diğer öğretmen arkadaşlarıyla birlikte olmaktan hoşlanması, öğretmen arkadaşlarından gurur duyması, öğretmenleri en iyi arkadaşları olarak görmesi, öğretmen arkadaşlarıyla okul dışında da ilişkisini sürdürmesi, öğretmen arkadaşlarının kendisini yakın dostu olarak gördüğü konusundaki algısı sorularıyla saptanmaya çalışılmıştır. Aşağıdaki tabloda Çalışma grubuna adanma boyutundaki sorulara verilen cevaplarda kaç kişinin hangi soruya ne cevap verdiği ve bunların yüzdelik dilimi verilmiştir. Ayrıca tabloda Çalışma grubuna adanma boyutundaki maddelerin aritmetik ortalamaları da verilmiştir.

Tablo 6. Öğretmenlerin çalışma grubuna adanma boyutundaki sorulara verdikleri cevaplar ve yüzdelikleri

	Hiçbir Zaman		Çok Az		Ara Sıra		Çoğu Zaman		Her Zaman	
	f	%	f	%	f	%	f	%	f	%
23.Ders aralarında okuldaki diğer öğretmenlerle birlikte olmaktan hoşlanıyorum.	1	0,6	4	2,3	16	9,1	95	54,3	59	33,7
24. Öğretmen arkadaşlarımdan gurur duyuyorum.	0	0	5	2,9	26	14,9	92	52,6	52	29,7
25. Okuldaki diğer öğretmenler tarafından yakın dost olarak görüldüğüme inanıyorum.	2	1,1	9	5,1	38	21,7	92	52,6	34	19,4
26. Yaşamımdaki en iyi arkadaşlar okuldaki diğer öğretmenlerdir.	12	6,9	22	12,6	48	27,4	70	40,0	23	13,1
27. Öğretmenlerle okul dışında da ilişkiyi sürdürürüm.	1	0,6	22	12,6	45	25,7	75	42,9	32	18,3
28. Kendimi okuldaki diğer öğretmenlerin yakın dostu olarak görüyorum.	1	0,6	19	10,9	46	26,3	67	38,3	41	23,4

Tablo 7. Öğretmenlerin çalışma grubuna adanma boyutundaki sorulara verdikleri cevaplara göre aritmetik ortalamalar

Çalışma Grubuna Adanma	**Aritmetik ortalama**
23.Ders aralarında okuldaki diğer öğretmenlerle birlikte olmaktan hoşlanıyorum.	4,2
24. Öğretmen arkadaşlarımdan gurur duyuyorum.	4,1
25. Okuldaki diğer öğretmenler tarafından yakın dost olarak görüldüğüme inanıyorum.	3,8
26. Yaşamımdaki en iyi arkadaşlar okuldaki diğer öğretmenlerdir.	3,4
27. Öğretmenlerle okul dışında da ilişkiyi sürdürürüm.	3,7
28. Kendimi okuldaki diğer öğretmenlerin yakın dostu olarak görüyorum.	3,7

Öğretmenlerin sorulara verdikleri yanıtların en yüksek yüzde ve aritmetik ortalamaları dikkate alındığında; Öğretmenlerin (%88)'inin ders aralarında okuldaki diğer öğretmenlerle birlikte olmaktan hoşlandıkları (AO=4,2), (%82,3)'ünün öğretmen arkadaşlarından gurur duydukları (A0=4,1), (%72)`sinin okuldaki diğer öğretmenler tarafından yakın dost olarak görüldüğüne inandıkları (A0=3,8), (%53,1)'inin yaşamındaki en iyi arkadaşlar olarak okuldaki diğer öğretmenleri gördükleri (A0=3,4), (%61,2)' sinin öğretmenlerle okul dışında da ilişkilerini sürdürdükleri (A0=3,7), (%61,7)'sinin kendini okuldaki diğer öğretmenlerin yakın dostu olarak düşündükleri (A0=3,7) görülmektedir. En yüksek yüzde ve aritmetik ortalamanın ders aralarında birlikte olmaktan hoşlanma sorusunda görülmektedir. Bu durumun, özellikle yakın, dostça bir ilişkinin geliştirilmesine ortam hazırladığı ileri sürülebilir. Çünkü öğretmenler, derslerinin olmadığı zamanlarda okulda kendilerine ait bir oda olmadığından genelde okuldan ayrılmak durumunda kalmaktadırlar. Bu nedenle, birlikte olabilecekleri süre, yalnızca ders aralarıdır. Ancak, ders aralarındaki bu birlikteliğin zorunluluğa değil, hoşlanmaya dayalı olduğu görülmektedir.
Maddelerin aritmetik ortalamalarına baktığımızda; beşli dereceleme ölçeğine göre "Yaşamımdaki en iyi arkadaşlar okuldaki diğer öğretmenlerdir" maddesinin "Ara sıra" seçeneğinde yoğunlaştığı ortaya çıkmıştır. Diğer maddelerin "Çoğu zaman" seçeneğinde yoğunlaştığı görülmektedir.

Örgütsel Adanmışlık Boyutları Arasındaki İlişki ile İlgili Bulgular

Tablo 8. Örgütsel adanmışlık boyutlarına ait betimsel istatistikler

Boyutlar	N	Aritmetik Ortalama (X)	Std. Hata	Std. Sapma	Varyans	Ranj
Mesleğe adanma	321	3,9381	,0531	,70290	,494	3,83
Öğretim işlerine adanma	321	3,9780	,0377	,49875	,249	2,71
Okula adanma	321	3,4724	,0489	,64673	,418	3,56
Çalışma grubuna adanma	321	3,8152	,0526	,69538	,484	3,67

Örgütsel adanmışlık boyutlarına ilişkin her boyutun aritmetik ortalamasına göre: öğretmenlerin en yüksek derecede kendilerini öğretim işlerine (A0=3,97),öğretmenlik mesleğine (AO=3,93) ve çalışma grubuna (A0=3,81) adadıkları ve beşli dereceleme ölçeğine göre aritmetik ortalamanın "Çoğu zaman" seçeneğinde yoğunlaştığı, en düşük derecede okula (A0=3,47) adandıkları buna rağmen beşli dereceleme ölçeğine göre okula adanmanın aritmetik ortalamasının "Çoğu zaman" seçeneğinde yoğunlaştığı gözlenmektedir. Ancak okula adanmayı düşüren en büyük etmenler; 1.Alanla ilgili ders olmasa da okulda kalmak için başka derse girmek isteklerinde ortaya çıkmıştır (%33,6)-(AO=2,8), 2.olarak Okulun en iyi okul olduğunu düşünmelerinde ortaya çıkmıştır (%34,3)-(AO=2,9).

Tablo 9. Örgütsel adanmışlık boyutları arasındaki ilişkinin korelasyon matrisi

Boyutlar	1	2	3	4
Mesleğe Adanma	1			
Öğretim İşlerine Adanma	,493(**)	1		
Okula Adanma	,391(**)	,390(**)	1	
Çalışma Grubuna Adanma	,370(**)	,359(**)	,563(**)	1

** Korelasyon 0.01 düzeyinde anlamlıdır. (2 yönlü)

Örgütsel adanmışlık boyutları arasındaki korelasyon matrisine göre: Öğretmenlik mesleğine adanma ile öğretim işlerine adanma (,493); Öğretmenlik mesleğine adanma ile okula adanma (,391) ; Öğretmenlik mesleğine adanma ile çalışma grubuna adanma (,371); Öğretim işlerine adanma ile okula adanma (,390); Öğretim işlerine adanma ile çalışma grubuna adanma (,359), okula adanma ile çalışma grubuna adanma (,563) arasında olumlu ve çift yönlü yüksek bir ilişkinin olduğu görülmektedir.

Cinsiyete Göre Örgütsel Adanmışlık Düzeylerinin Karşılaştırması ile İlgili Bulgular

Tablo 10. Öğretmenlerin cinsiyete göre örgütsel adanmışlık düzeyleri

Boyutlar	Cinsiyet	Aritmetik Ort.	Std. Sapma	t	sd	p
Mesleğe Adanma	Kadın Erkek	3,9095 3,9571	,71879 ,69493	,438	173	,66
Öğretim İşlerine Adanma	Kadın Erkek	3,9306 4,0095	,42108 ,54408	1,026	173	,30
Okula Adanma	Kadın Erkek	3,3683 3,5418	,62298 ,65584	1,0749	173	,082
Çalışma Grubuna Adanma	Kadın Erkek	3,7167 3,8810	,68827 ,69557	1,537	173	,126

Öğretmenlerin cinsiyetlerine göre örgütsel adanmışlık boyutlarının aritmetik ortalamasına baktığımızda Öğretmenlik mesleğine adanma boyutunda kadınlar (A0=3,9) ile erkeklerin (A0=3,95) aynı yüksek düzeyde öğretmenlik mesleğine adandıkları (beşli dereceleme ölçeğine göre bayan ve erkeklerin aritmetik ortalamalarının "Çoğu zaman" seçeneğinde yoğunlaştığı), Öğretim işlerine adanma boyutunda kadınlar (A0=3,93) ile erkeklerin (A0=4,0) aynı yüksek düzeyde öğretim işlerine adandıkları (beşli dereceleme ölçeğine göre bayan ve erkeklerin aritmetik ortalamalarının "Çoğu zaman" seçeneğinde yoğunlaştığı), Okula adanma boyutunda diğer boyutlara göre kadınlar (A0=3,36) (beşli dereceleme ölçeğine göre aritmetik ortalamanın "Ara sıra" seçeneğinde yoğunlaştığı) ile erkeklerin (A0=3,54) (beşli dereceleme ölçeğine göre aritmetik ortalamam "Çoğu zaman" seçeneğinde yoğunlaştığı) daha düşük düzeyde okula adandıkları hatta erkeklerin kadınlara göre daha yüksek düzeyde okula adandıkları, Çalışma grubuna adanma boyutunda kadınlar (A0=3,71) ile erkeklerin (A0=3,88) yüksek düzeyde çalışma grubuna adandıkları (beşli dereceleme ölçeğine göre bayan ve erkeklerin aritmetik ortalamalarının "Çoğu zaman" seçeneğinde yoğunlaştığı ortaya çıkmıştır.

Öğretmenlerin cinsiyetlerine göre örgütsel adanmışlıkları ile ilgili olarak Mesleğe adanma, Öğretim işlerin adanma, Okula adanma, Çalışma grubuna adanma boyutlarının puanlarına bakıldığında ($p>0.05$), cinsiyete göre anlamlı bir fark olmadığı görülmektedir.

SONUÇ VE ÖNERİLER

Bu araştırmada ilköğretim I.kademe (ilkokul) öğretmenlerinin örgütsel adanmışlığı 4 boyutta saptanmaya çalışılmıştır. Araştırmanın kuramsal dayanağını Mowda, Steers ve Porter (1979) in tutumsal yaklaşıma dayalı olan örgütsel adanmışlık oluşturmaktadır.

Araştırma bulgularına göre; öğretmenlik mesleğine adanan öğretmenlerin, öğretmenlik mesleğini seçme kararını yaşamlarının en olumlu kararı olarak değerlendirdikleri, öğretmenlikten gurur duydukları, öğretmenlik mesleğinin değerlerini diğer mesleki değerlerden üstün gördükleri, öğretmenlik mesleğini çalışma hayatı için ideal bir meslek olarak düşündükleri, öğretmenlik mesleğinde tanınmak istedikleri ve ekonomik gereklilik olmasa da devam etmeyi düşündükleri ortaya çıkmıştır. Ders saatleri dışında öğrencilere ders konusunda zaman ayıran, ek ders yapma fırsatı arayan, herhangi bir dış denetime gerek kalmaksızın derse zamanında girme sorumluluğunu taşıyan, işine dört elle sarılan, öğrencilerin aile yaşantısı hakkında bilgi edinen, başarısız öğrenci için fazla çaba gösteren, ders yapmaktan zevk alan öğretmenlerin kendilerini yüksek derecede öğretim işlerine adadıkları saptanmıştır. Öğretmenlerin özellikle ders dışında öğrencilere zaman ayırmaları, ders yapmaktan zevk almaları öğretim işlerine adanmanın odağını oluşturmaktadır. Kendisini okula adayan öğretmenlerin okul için fazla çaba gösterdiklerini, okuldan gurur duyduklarını, başka okulda çalışmak istemediklerini ortaya çıkarmıştır. Öğretmenler çalıştıkları okulun öğretmenlere ilişkin yönetsel uygulamalarını ve okuldaki insanlar arası ilişkileri olumlu ve kabul gören nitelikte olduğunu belirtmişlerdi. Çalıştıkları okula kendini adayan öğretmenlerin, okulun geleceği ve başarısı için sorumluluk yüklenmeye istekli oldukları görülmektedir. Kendisini çalışma grubuna adayan öğretmenlerin ders aralarında diğer öğretmenlerle birlikte olmaktan hoşlandığı, öğretmen arkadaşlarından gurur duyduğu, okuldaki diğer öğretmenler tarafından yakın dost olarak görüldüğüne inandığı, yaşamındaki en iyi arkadaşların okuldaki diğer öğretmenler olduğu, öğretmenlerle okul dışında da ilişkiyi sürdürdüğü, diğer öğretmenlerin yakın dostu olarak gördüğü ortaya çıkmıştır. Örgütsel adanmışlık boyutları arasındaki ilişki taramasında Öğretmenlik mesleğine adanma ile öğretim işlerine adanma, Öğretmenlik mesleğine adanma ile Okula Adanma, Öğretmenlik mesleğine adanma ile Çalışma Grubuna Adanma; Öğretim işlerine Adanma ile Okula Adanma, Öğretim İşlerine Adanma ile Çalışma Grubuna Adanma; Okula Adanma ile Çalışma Grubuna Adama arasında olumlu ve çift yönlü yüksek bir ilişkinin olduğu görülmektedir. Öğretmenlerin cinsiyetlerine göre örgütsel adanmışlık boyutlarının aritmetik ortalamalarına bakarak düzeylerini karşılaştırdığımızda, bayan ve erkek öğretmenlerin hemen hemen aynı yüksek düzeyde öğretmenlik mesleğine adandıkları, bayan ve erkek öğretmenlerin birbirine yakın yüksek düzeyde öğretim işlerine adandıkları, bayan ve erkek öğretmenlerin diğer boyutlara göre daha düşük ve birbirine yakın düzeyde okula adandıkları ve bayan ve erkek öğretmenlerin birbirine yakın seviyede çalışma grubuna adandıkları ortaya çıkmıştır.

Araştırma sonucunda elde edilen bulgulara dayanarak aşağıdaki öneriler geliştirilmiştir.

1. Okul yönetimi öğretmenlik mesleğine ters düşecek ve okuldaki öğretmenler arası ilişkileri olumsuz yönde etkileyecek uygulamalara önlem alması gerekmektedir.
2. Okul yönetimi öğretim işlerinde serbestliği, gelişim ve değişmeleri ortadan kaldıracak uygulamalardan kaçınmalıdır. Ancak bu serbestliğin, gelişim ve değişmelerin okulun amaçlarına hitap etmesine dikkat etmelidir.

3. Öğretmenlik mesleğinin toplumdaki saygınlığını arttırıcı iyileşmelere gidilmelidir. Bunun için öğretmenlerin ekonomik standartları iyileştirilmeli, ekonomik sıkıntıların sınıf ortamına taşınması engellenmelidir. Böylece saygınlığı artan öğretmenler mesleklerine de daha fazla adanacaklardır.
4. Öğretmenler tek bir kaynaktan yetiştirilmelidir. Öğretmen olabilme bilgi, beceri ve yeteneğine sahip olmayanlar öğretmen yetiştiren okullara alınmamalıdırlar.
5. Öğretmenlerin eğitim ve öğretim etkinliklerinde başarılı olabilmeleri için alınacak kararlara aktif katılımları sağlanmalıdır. Bu kararlar öğretmenlerin meslekleri ile ilgili veya sonucunda kişisel olarak etkilendikleri kararlar ile sınırlı olmalıdır.
6. Öğretmenlerin eğitim ve öğretim etkinliklerinde farklı becerilerini ortaya koyabilecek uygulamalara yer verilmelidir. Eğitim ve öğretim etkinliklerinde farklı becerilerin kullanılması hem işin anlamlılığını hem de öğretmen yaratıcılığını geliştirmektedir.
7. Okul yönetimi bir örgüt kültürü oluşturarak işlerin sistemli bir şekilde yapılmasını sağlamalıdır.
8. Okul yönetimi okulda olumlu bir örgüt iklimi oluşturmalı ve öğretmenlerin birbiriyle kaynaşarak iyi iletişim kurmalarını sağlamalıdır. Böylece okulun amaçlarını gerçekleştirmede bir takım ruhu ortaya çıkarabilir.

KAYNAKÇA

Açıkgöz, K. (1989). Liselerdeki sınıf atmosferi üzerine bir araştırma. *Eğitim Bilimleri Sempozyumu Bildiriler Kitabı*, *15*(17), 93-111.

Akyıldız, H. (1989). Öğretmen özelliklerinin öğretim sürecine etkisi. *Eğitim ve Bilim*, *13*(74).

Balay, R. (2000). *Yönetici ve öğretmenlerde: örgütsel bağlılık*. Nobel.

Balcı, A. (1993). *Etkili okul: Kuram, uygulama, ve araştırma*. Yavuz dağıtım.

Balcı, A. (1991). *Öğretmenin gelişmesinde okulun rolü, eğitimde arayışlar. 1.Sempozyumu-Bildiriler*-, İstanbul:13-14 Nisan 1991.

Bayraktar, E. (1991). Öğretmen Yetiştirmede Eğitim Ortamlarına İlişkin Öğretmen Adayı Görüşleri. *İzmir Birinci Eğitim Kongresi-Bildiriler, İzmir*.

Bursalıoğlu, Z. (1979). *Okul yönetiminde yeni yapı ve davranış*. Ankara Üniversitesi Eğitim Fakültesi Yayınları.

Celep, C. (1992), *İlköğretim okullarında yönetici-öğretmen iletişimi*, H.Ü Eğitim Fakültesi, 2.Eğitim Bilimleri Kongresi.

Celep, C. (1997). Aday öğretmenlerin öğrenci kontrol yönelimleri. *Eğitim ve Bilim*, *21*(106).

Celep, C. (1997). Öğretmenlik yeterlilik duygusu. *Yaşadıkça Eğitim Dergisi, İstanbul, Ocak/Şubat*.

Celep, C. (2000). Eğitimde Örgütsel Adanma ve Öğretmenler, Anı Yayıncılık, 2. *Baskı, Ankara*.

DeCotiis, T. A., & Summers, T. P. (1987). A path analysis of a model of the antecedents and consequences of organizational commitment. *Human Relations*, *40*(7), 445-470.

Durkheim, E. (2015). Sosyolojik Yöntemin Kuralları (2. Basım). *CB Akal, çev.). Dost Yayınları*.

Elliott, B., & Crosswell, L. (2001). Commitment to teaching: Australian perspectives on the interplays of the professional and the personal in teachers' lives. In *International Symposium on Teacher Commitment at the European Conference on Educational Research, Lille, France*.

Evans, P., & Bartolomé, F. (1984). The changing pictures of the relationship between career and family. *Journal of Organizational Behavior*, *5*(1), 9-21.

Karasar, N. (2007). *Bilimsel araştırma yöntemi: kavramlar, ilkeler, teknikler*. Nobel yayın dağıtım.

Marsh, R. M., & Mannari, H. (1977). Organizational commitment and turnover: A prediction study. *Administrative science quarterly*, 57-75.

Mowday, R. T., Steers, R. M., & Porter, L. W. (1979). The measurement of organizational commitment. *Journal of vocational behavior*, *14*(2), 224-247.

Onaran, O. (1987). Çalışma Yaşamında Güdülenme Kuramları, Ankara Üniversitesi. *Siyasal Bilgiler Fakültesi Yayınları*, (470), 138-166.

O'Reilly, C. A., & Chatman, J. (1986). Organizational commitment and psychological attachment: The effects of compliance, identification, and internalization on prosocial behavior. *Journal of applied psychology*, *71*(3), 492.

Özdemir, S. (2000). *Eğitimde örgütsel yenileşme*. Pegem A Yayıncılık.

Özkalp, E. ve Kırel, Ç. (2001). *Örgütsel Davranış*. Anadolu Üniversitesi.

Pfeffer, J., & Langton, N. (1993). The effect of wage dispersion on satisfaction, productivity, and working collaboratively: Evidence from college and university faculty. *Administrative Science Quarterly*, 382-407.

Salancik, G. R. (1977). Commitment and the control of organizational behavior and belief. *New Directions in Organizational Behavior*, *1*, 54.

Shaw, J., & Reyes, P. (1992). School cultures: Organizational value orientation and commitment. *The Journal of Educational Research*, *85*(5), 295-302.

Tuncer, A. (1995). *MEB bilgisayar eğitimi ve hizmetleri genel müdürlüğü personelinin iş doyumu ve örgüte bağlılık durumları*. Yayımlanmamış Yüksek Lisans Tezi. Türkiye Ortadoğu Amme İdaresi Enstitüsü, Ankara.

Varoğlu, D. (1993). *Kamu sektörü çalışanlarının işlerine ve kuruluşlarına karşı tutumları, bağlılıkları ve değerleri.* Yayımlanmamış Doktora Tezi. Ankara Üniversitesi Sosyal Bilimler Enstitüsü, Ankara.

Wiener, Y. (1982). Commitment in organizations: A normative view. *Academy of Management Review*, *7*(3), 418-428.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

2024 SOSYAL BİLGİLER ÖĞRETİM PROGRAMININ ANALİZİ

Cansel BURUÇ
Yüksek Lisans Öğrencisi, Fırat Üniversitesi, Eğitim Bilimleri Enstitüsü, Sosyal Bilgiler Eğitimi
ORCID: 0009-0000-8109-4317

ÖZET
Değişen ve dönüşen dünyada eğitimin yerinde saymayacağı aşikardır. Teknolojinin, eğitimin ve bilimin birbirinden etkilenmesi birbirlerine yol göstermesi gerekmektedir. Çağın gereksinimleriyle esnek yapıda değişip dönüşebilen eğitim programlarına ihtiyaç vardır. Bu çalışma yenilenen eğitim programımızın eğitim camiasına daha kolay aktarılması için yapılmış bir çalışmadır.Eski müfredat ve yerini bırakacağı yeni müfredat incelenip gerekli analizler yapılarak çalışma tamamlanmıştır. 2018 SBÖP' nda yer alan öğrenme alanlarının yenilenen 2024 SBÖP' nda isimlerinin tamamen değiştiği ve 7 adet olan öğrenme alanının 2024 SBÖP' nda 6' ya düştüğü görülmüştür. Birey ve Toplum öğrenme alanının Birlikte Yaşamak öğrenme alanına, Kültür ve Miras öğrenme alanının Ortak Mirasımız öğrenme alanına, Üretim, Dağıtım, Tüketim öğrenme alanının Hayatımızdaki Ekonomi öğrenme alanına, Bilim, Teknoloji ve Toplum öğrenme alanının Teknoloji ve Sosyal Bilimler öğrenme alanına, İnsanlar, Yerler ve Çevreler öğrenme alanının Evimiz Dünya öğrenme alanına, Etkin Vatandaşlık öğrenme alanının Yaşayan Demokrasimiz öğrenme alanına dönüştürülerek yeniden düzenlendiği görülmüştür.2024 SBÖP'da Küresel Bağlantılar öğrenme alanına ise yer verilmediği görülmüştür. Sosyal Bilgiler müfredatına siber zorbalık, teknoloji bağımlılığı, dijital vatandaşlık gibi önemli konular eklenmiştir. Türkçenin öğretimi ve geliştirilmesi 2024 eğitim politikasının temeli olmuştur. Bu nedenle Türkçenin etkili kullanılmasına yönelik becerilerin kazandırılması tüm derslerin ortak hedefi olarak gösterilmiştir. Öğrenme çıktısında tarihsel empati ifadesinin yerine bakış açısı geliştirme, sentezleme ifadesinin yerine özgün bir ürün oluşturma gibi benzer-yakın anlamlı ifadeler kullanılmış. "Türkiye Yüzyılı Maarif Modeli" başlığıyla yayınlanan 2024 yılı yeni öğretim programları büyük tartışmaları da beraberinde getirmiştir. Özellikle Osmanlı dönemi üsluplarına atıfta bulunan Maarif vurgusu kamuoyunda aldığı ilk eleştirilerden biridir. Sosyal Bilgiler öğretmenlerine ders dışı etkinlikleri vurgulayan öğrenim içeriklerinin arttığı bu anlamda da Sosyal Bilgiler dersinde müze eğitimi, geziler vb. açıdan birçok yaparak yaşayarak öğrenme ortamının önünü açmıştır diyebiliriz. 2024 programı beceri odaklı, sadeleştirilmiş, disiplinler üstü-ötesi yaklaşımı destekleyen program dışı etkinlikler, okul temelli planlama, sonuç yerine süreç odaklı ölçme değerlendirme yaklaşımı ve insanı önceleyen bütüncül maarif anlayış şeklinde tanıtılmıştır.
Anahtar Kelimeler: Sosyal Bilgiler, maarif, öğretim programı, müfredat, değer, beceri

2024 SOCIAL STUDIES CURRICULUM ANALYSIS

ABSTRACT
It is obvious that education will not remain stagnant in a changing and transforming world. Technology, education and science should influence each other and guide each other. There is a need for educational programs that can change and transform flexibly with the needs of the age. This study was conducted to more easily transfer our renewed education program to the education community. The old curriculum and the new curriculum that it will replace were examined and the necessary analyzes were made and the study was completed.

It was observed that the names of the learning areas in the 2018 SBÖP were completely changed in the renewed 2024 SBÖP, and the number of learning areas decreased from 7 to 6 in the 2024 SBÖP. Individual and Society learning area to Living Together learning area, Culture and Heritage learning area to Our Common Heritage learning area, Production, Distribution, Consumption learning area to Economy in Our Lives learning area, Science, Technology and Society learning area to Technology and Social Sciences learning area, People, Places and It has been observed that the Environments learning area has been reorganized into the Our Home is the World learning area, and the Active Citizenship learning area has been transformed into the Our Living Democracy learning area. It has been observed that the Global Connections learning area is not included in the 2024 SBÖP. Important topics such as cyberbullying, technology addiction, and digital citizenship have been added to the Social Studies curriculum. Teaching and developing Turkish has become the basis of the 2024 education policy. For this reason, gaining skills for the effective use of Turkish is shown as the common goal of all courses. In the learning outcome, expressions with similar meanings such as developing a perspective were used instead of the expression historical empathy, and creating an original product instead of the expression synthesis.The new curriculum for 2024, published under the title "Turkey Century Education Model", has brought about great debates. The emphasis on Education, which particularly refers to the styles of the Ottoman period, was one of the first criticisms it received from the public. In this sense, the learning content that emphasizes extracurricular activities for Social Studies teachers has increased, and in this sense, museum education, trips, etc. in the Social Studies course. In many respects, we can say that it has paved the way for a learning environment by doing and experiencing. The 2024 program has been introduced as skill-focused, simplified, extra-curricular activities supporting a transdisciplinary approach, school-based planning, a process-oriented measurement and evaluation approach instead of results, and a holistic educational approach that prioritizes people.

Keywords: Social Studies, education, curriculum, curriculum, value, skill

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

AHLAKİ DEĞERLERİN İNOVASYON BECERİLERİNE ETKİSİ

Aysel AŞIRLI
İktisat Enstitüsü, Bilim ve Eğitim Bakanlığı
ORCID: 0009-0000-6485-0774

ÖZET
Yenilik yapmak, yenilik için çabalamak insanın doğasında yaratılıştan beri vardır. İnsanlığın gelişiminin temeli yeniliklere olan eğilimdir. İnsanoğlu, modern çağın manzarasını yeni bilimsel keşiflerle şekillendirmiştir. Ancak bilim, bilimsel buluşlar, yenilikler ve inovasyon hiçbir zaman modern çağdaki kadar önemli olmamıştır. Çünkü modern bilgi ekonomisi çağında yenilik, ülke ekonomisinin rekabet gücünün ve istikrarının temel belirleyici faktörlerinden biridir. Böyle olunca inovasyon becerileri ülkeler için ayrı bir önem taşıyor. Ancak her ülke yeniliğe eşit derecede yatkın ve bu alanda eşit derecede başarılı değildir. Bunun arkasında elbette ekonomik faktörler de var, ancak bu çalışmanın amacı ülkelerin ve insanlarının sahip olduğu ahlaki değerlerin inovasyon becerilerini ne yönde etkilediğini araştırmaktır. Bunun için öncelikle inovasyonla ilgili teorik ve kavramsal konular üzerinde durulmuş, sürdürülebilir ve rekabetçi bir ekonominin inşasında inovasyon becerilerinin rolüne dikkat çekilmiştir. Veri tabanı olarak "Küresel İnovasyon Endeksi 2023" ve "Küresel Bilgi Endeksi 2023" kullanılarak seçilen ülkeler için yenilikçi alt endekslerin ve ilgili göstergelerin analizi yapılmıştır. Daha sonra yenilikçiliği, yenilikçi düşünceyi ve davranışı etkileyen faktörler arasında ulusal karakteri şekillendiren değerlerin yeri teorik olarak belirlenerek seçilen ülkeler için Dünya Değerler Araştırması'ndan alınan yanıtlarla karşılaştırılmıştır. Ülkelerin ekonomik gelişmişlik düzeyleri farklı olduğu gibi sahip oldukları değerlerin gelişmişlik düzeylerinin de farklı olduğu, ayrıca ekonomik gelişme ile ahlaki değerler arasında karşılıklı neden-sonuç ilişkisi olduğu için kalkınmanın her düzeyinde ülkelerin inovasyon becerilerini etkileyen değerlerin de farklılık gösterdiği tespit edilmiş, ahlaki değerlerin inovasyon becerilerine etkisine ilişkin genel yaklaşımların yanı sıra kültürel değerlerin bireysel yönlerinin de dikkate alınması gerektiği sonucuna varılmıştır.
Anahtar Kelimeler: ahlaki değerler, kültürel değerler, ekonomik kalkınma, inovasyon becerileri

INFLUENCE OF MORAL VALUES ON INNOVATION SKILLS

ABSTRACT
Human nature craves innovation since its existence. Being inclined to innovations has been the foundation of human development. A man has shaped the landscape of the modern era with new scientific discoveries. However, science, scientific discoveries, novelties, and innovation have never been as important as they are in the modern era. Innovation is one of the main determining factors of the competitiveness and stability of the economy of countries in the modern era of the knowledge economy. In such conditions, innovation skills are of particular importance for countries. However, not all countries are equally prone to innovation and successful in this field. Actually, economic factors act as the reason for this, but the purpose of this study is to investigate in which direction the moral values possessed by countries and their people affect their innovation abilities. First of all, theoretical and conceptual issues related to innovation are elaborated, attention is paid to the role of innovation skills in building a sustainable and competitive economy.

Analyzes on innovative sub-indexes and relevant indicators for selected countries are carried out using the Global Innovation Index 2023 (GII) and the Global Knowledge Index 2023 (GKI) as a database. Then, among the factors that influence innovation, innovative thoughts and behaviors, the place of the values that shape the national character was theoretically determined and compared with the responses from the World Values Survey for selected countries. It has been determined that development level of the countries is various, and the values they possess are also different, and since there is a mutual cause-and-effect relationship between economic development and moral values, the values that impact on the innovation skills possessed by the countries at each level of development are also diverse. In addition to this, it should be concluded that individual aspects of cultural values should be taken into account along with general approaches regarding the influence of moral values on innovation skills.

Keywords: moral values, cultural values, economic development, innovation skills

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

OTİZM SPEKTRUM BOZUKLUĞU OLAN ERGENLERE HİJYENİK KADIN PEDİ KULLANIMININ ÖĞRETİLMESİ

Aslıhan SEZİK
MEB, Özel Eğitim Öğretmeni
ORCID: 0000-0002-6504-8756

Dr. Öğr. Üyesi Pınar YAŞAR HAYAL
Trabzon Üniversitesi, Fatih Eğitim Fakültesi, Özel Eğitim Bölümü
ORCID: 0000-0002-6059-8206

ÖZET

Menstrüasyon dönemi kadınların çocukluktan ergenliğe geçiş dönemi olmakla birlikte yaşamlarının uzun bir bölümünü kapsamaktadır. Kadınların bu dönemde genital sağlıklarını ve hijyenlerini korumaları için bir takım becerileri edinmeleri gerekmektedir (Koyun vd., 2013). Genital sağlık ve hijyenin korunmasında hijyenik kadın pedi kullanımı becerisi menstrüel dönem için gerekli ve önemli olan becerilerdendir (Sinop-Gedik, 2016; Turan ve Ceylan, 2007). Kadınların menstrüasyon döneminde edinmesi gereken hijyenik kadın pedi kullanım becerisi tipik gelişim gösteren kadınlar tarafından gözlemleme ve inceleme becerilerine bağlı olarak gelişmesine rağmen OSB olan kadınlar bu beceriyi öğrenmeleri için desteğe ihtiyaç duymaktadır (Özdemir vd., 2012). Menstrüasyon döneminde meydana gelen fiziksel ve duygusal değişimler OSB olan kadınların bilişsel, duygusal ve sosyal gelişim özellikleri açısından bu süreci sorunsuz bir şekilde atlatmalarını güçleştirmektedir (Flavin vd., 2019). OSB olan kadınların menstrüasyon dönemlerinde yaşadıkları çeşitli sorunları atlatmaları ve hijyenlerini koruyabilmeleri için hijyenik kadın pedi kullanımı gibi uygulamaların öğretilmesi faydalı olacaktır (Altundağ ve Çalbayram, 2016). Bu nedenle yürütülen bu çalışmada OSB olan ergenlere kendini izleme stratejisi kullanılarak hijyenik kadın pedi kullanımının öğretilmesi amaçlanmıştır. Yürütülen çalışmada tek denekli araştırma desenlerinden yoklama evreli katılımcılar arası çoklu yoklama modeli kullanılmıştır. Çalışma kapsamına 11 ve 13 yaşında, hafif ve orta düzeyde OSB olan iki katılımcı dahil edilmiştir. Yürütülen çalışma öğretim öncesi ve öğretim sonrası toplu yoklama oturumları, öğretim oturumları, genelleme ve izleme oturumları olarak desenlenmiştir. Araştırmadan elde edilen veriler grafiksel analiz yöntemi ile analiz edilerek grafiğe işlenmiş ve çalışmanın sosyal geçerliğine ilişkin katılımcı öğrencilerin ailelerinin görüşleri alınmıştır. Araştırmadan elde edilen bulgulara göre; katılımcıların hijyenik kadın pedi kullanım becerisini edinmelerinde kendini izleme stratejisinin etkili olduğu ve çalışma sonlandırıldıktan iki hafta sonra uygulanan izleme ve genelleme oturumlarında katılımcıların beceriyi sergilemeye devam ettikleri gözlenmiştir. Araştırmanın sosyal geçerliğine ilişkin ailelerin yürütülen çalışmanın sonuçlarına yönelik olumlu görüş bildirdikleri gözlenmiştir. Araştırmadan elde edilen bulgular alanyazındaki çalışmalar ışığında değerlendirilmiş, uygulamaya ve gelecek araştırmalara yönelik önerilere yer verilmiştir.

Anahtar Kelimeler: Otizm Spektrum Bozukluğu, Menstrüasyon, Hijyenik Ped, Kendini İzleme Stratejisi, Kişisel Bakım.

TEACHING THE USE OF SANITARY NAPKINS TO ADOLESCENTS WITH AUTISM SPECTRUM DISORDER

ABSTRACT

Menstruation period is the transition period of women from childhood to adolescence and covers a long part of their lives. Women need to acquire a number of skills to protect their genital health and hygiene during this period (Koyun et al., 2013). The ability to use sanitary napkins in the protection of genital health and hygiene is one of the necessary and important skills for the menstrual period (Sinop-Gedik, 2016; Turan & Ceylan, 2007). Although the sanitary napkin use skill that women should acquire during menstruation is developed by women with typical development depending on their observation and examination skills, women with ASD need support to learn this skill (Özdemir et al., 2012). The physical and emotional changes that occur during menstruation make it difficult for women with ASD to go through this process smoothly in terms of cognitive, emotional and social developmental characteristics (Flavin et al., 2019). It would be beneficial to teach practices such as the use of sanitary napkins to help women with ASD overcome various problems they experience during menstruation and maintain their hygiene (Altundağ & Çalbayram, 2016). Therefore, in this study, it was aimed to teach adolescents with ASD to use sanitary napkins using self-monitoring strategy. In the current study, one of the single-subject research designs, the probe-phase multiple probe between participants model was used. Two participants aged 11 and 13 with mild and moderate ASD were included in the study. The study was designed as pre-instructional and post-instructional probe sessions, instructional sessions, generalization and follow-up sessions. The data obtained from the study were analyzed with the graphical analysis method and the opinions of the families of the participant students regarding the social validity of the study were obtained. According to the findings obtained from the study, it was observed that the self-monitoring strategy was effective in the participants' acquisition of the sanitary napkin use skill and that the participants continued to exhibit the skill in the follow-up and generalization sessions held two weeks after the study was terminated. Regarding the social validity of the study, it was observed that the families expressed positive opinions about the results of the study. The findings obtained from the study were evaluated in the light of the studies in the literature and recommendations for practice and future research were included.

Keywords: Autism Spectrum Disorder, Menstruation, Sanitary Pads, Self-Monitoring Strategy, Personal Care.

GİRİŞ

Menstrüasyon kadınların gelişimlerinde doğal ve fizyolojik bir evre olmasının yanı sıra menarş (ilk kanama) ile başlayıp menopoz (son kanama) ile sona eren ve yaşamın uzun bir döneminde kadınlara eşlik eden bir olgudur (Sinop-Gedik, 2016). Menstrüasyon döneminin başlangıcı genellikle 10-15 yaşları arasında değişkenlik göstermekte ve kadınların ergenliğe geçiş dönemi olarak kabul edilmektedir (Koyun vd.,2013). Ergenliğe geçiş döneminin başlangıcı olarak kabul edilen menstrüasyon dönemi kadınların yaşamında önemli bir yer tutmaktadır. Menstrüasyon döneminin kadınlar açısından önemli bir yere sahip olması bu dönemde sağlığın ve hijyenin korunmasının önemini de artırmaktadır (Turan ve Ceylan, 2007). Kadınların menstrüasyon dönemlerinde sağlık ve hijyenlerine dikkat etmeleri için menstrüasyon dönemine özgü menstrüel bakım becerilerini edinmeleri gerekir (Büyüksoy ve Ahi, 2023). Menstrüel bakım becerilerinin edinimi bu dönemde kadınların genital yolla bulaşan enfeksiyonlara karşı önlem alması açısından önemlidir (TÜİK, 2022).

Birleşmiş Milletler Uluslararası Çocuklara Acil Yardım Fonu (UNICEF)'e göre kız çocuklarının menstrüasyon dönemlerinde stressiz, kaygısız utanç duymadan, bilgi ve kaynaklara erişim sınırlığı yaşamadan okula devam etmelidirler. Ancak günümüz toplumlarında dahi kadınların/ kız çocuklarının menstrüasyon dönemi ile ilgili bilgiye ve gereken kaynaklara erişimlerinde sorun yaşadıkları görülmektedir (Büyüksoy ve Ahi, 2023).
Kadınların menstrüasyon dönemlerini sağlıklı bir şekilde yürütebilmeleri ve yaşadıkları çevresel sorunları en aza indirebilmek için erken yaşlardan itibaren menstrüasyon dönemi ile ilgili bakım becerilerini öğrenmeleri gerekmektedir (Sinop-Gedik, 2016). Menstürasyon dönemi becerileri genital bölge temizliğinin yanı sıra bu dönemde hijyenik kadın pedinin doğru kullanımını ve kullanım sonrasında pedlerin nasıl ortadan kaldırılacağı (çöpe atılması) gibi tüm aşamaların öğrenilmesi gereken karmaşık süreçlerden oluşur (Dündar ve Özsoy, 2017). Kadınlar açısından menstrüasyon dönemini anlamlandırmanın yanı sıra bu dönemde hijyenik kadın pedi kullanımı gibi edinilmesi gereken becerilerin karmaşık bir durum haline gelmesi onların sosyal yaşama katılımlarını da olumsuz yönde etkilemektedir (Kuhlmann vd., 2017). Menstrüasyon dönemi ile ilgili bahsedilen bu sorunlar tipik gelişimli kadınlar açısından zor olsa da otizm spektrum bozukluğu (OSB) olan kadınlar/kız çocuklarının bilişsel, duygusal ve sosyal gelişimlerindeki farklılıklardan dolayı bu dönemi anlamlandırma ve bu döneme uygun şekilde hareket edebilmelerini daha zorlayıcı ve anlaşılması güç bir durum haline getirebilmektedir (Tortumluoğlu, Tüfekçi-Özyazıoğlu ve Sezgin, 2004; Özdemir vd., 2012). Bu dönemde OSB olan kadınlar/kız çocukları bahsedilen gelişimsel farklılıklarından dolayı menstrüasyon döneminin beraberinde getirdiği fiziksel değişimleri anlama, bu dönemi kabullenme, bu dönemin başlangıç ve bitişini farketme ve bu dönemde hijyenik kadın pedi kullanımı gibi çeşitli durumlara karşı olumsuz tutum geliştirebilirler (Flavin, Shore, Miller ve Gray, 2019). Menstrüasyon döneminin doğru yönetimi üreme sağlığının korunması ve kadınların sosyal yaşama sorunsuz bir şekilde katılabilmeleri açısından önemlidir ve OSB olan kadınların da menstrüel hijyen konusunda eğitilmesi gerekir. Menstrüasyon dönemini sağlıklı bir şekilde yürütmek için en önemli beceriler menstrüasyonu fark etme ve hijyenik kadın pedi kullanım becerileridir (Kuloğlu-Aksaz ve Fırat, 1992). Bu nedenle menstrüasyon dönemi fark etme ve hijyenik kadın pedi kullanımı becerileri OSB olan kadınların/kız çocuklarının bu dönemi anlamlandırmalarına yardımcı olabilecek şekilde çeşitli yöntem ve teknikler kullanılarak öğretilmelidir.
OSB olan bireylere davranış ve beceri öğretimi için farklı yöntem ve stratejiler kullanılmaktadır. Bu yöntemlerden birisi de etkililiği farklı çalışmalarla kanıtlanmış olan kendini yönetme stratejileridir. Kendini yönetme bireylerin kendi davranışlarını başkalarının desteğini almadan kontrol edebilmesidir (Browder ve Shapiro, 1985). OSB olan bireylerin toplumsal hayata tam anlamıyla katılabilmek için kendilerini kontrol etmeyi öğrenmeleri gerekmektedir (Bigge, Stump, Spagna ve Silberman, 1999). Bu nedenle OSB olan bireylere kendini yönetme stratejilerinin öğretilmesi kişinin davranışlarını kontrol edebilmesi ve öğrenme sorumluluklarını almayı öğretmesi açısından faydalı olacaktır (Yücesoy-Özkan, 2007). Kendini yönetme stratejileri kendine ön uyaran verme, kendini izleme, kendine yönerge verme, kendini değerlendirme ve kendini pekiştirme stratejilerinden oluşmaktadır (Agran, King-Sears, Wehmeyer ve Copeland, 2003). Kendini yönetme stratejilerinden olan kendini izleme stratejisi genel eğitim ve özel eğitim ortamlarında sıklıkla kullanılan bir davranış kazandırma ya da davranış değiştirme tekniğidir (Rafferty, 2010). Alanyazında farklı özel gereksinimleri olan bireylere çeşitli becerilerin öğretiminde ve geliştirilmesinde kendini izleme stratejisinin etkililiğini kanıtlayan çalışmalara rastlanmaktadır.

Bu çalışmalar incelendiğinde; sınıf içi uyum davranışlarını geliştirme (Wood vd, 1998), alıcı dil becerilerini geliştirme (Amota-Zech, Haff ve Doepke, 2006), akademik başarıyı artırma (Romans, 2017; Rock ve Thead, 2007; Alussaif, 2020), kurallı oyun etkinlikleri ile ilgilenme (Sönmez-Kartal ve Yücesoy-Özkan, 2015) yemek pişirme (Gevşek, 2016) ve dışarı çıkarken uygun şekilde hazırlanma (Sönmez-Kartal ve Yücesoy-Özkan, 2012) gibi farklı alanlarda etkili olduğu görülmektedir

Alanyazında OSB olan bireylerin bağımsız bir yaşam sürdürmelerinde hijyenik kadın pedinin kullanımının önemli olduğu sıklıkla belirtilmekte ve kendini izleme stratejisinin özel gereksinimli bireylerin yeni bir davranışı uygulamayı öğrenmelerinde ve başkalarının yardımına ihtiyaç duymadan yaşamlarını sürdürmelerinde kendini izleme stratejisinin etkili olduğu vurgulanmaktadır (Kuloğlu-Aksaz ve Fırat, 1992; Gushanas ve Thompson, 2019). Ancak OSB olan bireylere yönelik kendini izleme stratejisi ile yürütülen çalışmaların sınırlı olduğu görülmekte ve OSB olan kadınların menstrüasyon becerilerinden olan hijyenik kadın pedi kullanımı becerilerinin üzerinde etkililiği kanıtlanmış herhangi bir çalışmayla karşılaşılmaması bu araştırmanın gereksinimini ortaya koymaktadır. OSB olan kadınların menstrüasyon dönemlerinde sağlıklarını olumsuz şekilde etkileyebilecek etmenlerden uzak durmaları ve bağımsız yaşamlarında önemli bir yer tutan hijyenik kadın pedi kullanımı becerisini edinmeleri OSB olan kadınlara faydalı olacağı gibi OSB olan kadınların/kız çocuklarının ailelerine, alanda çalışan tüm paydaşlara ve gelecekte yapılacak çalışmalara yol gösterici olması bakımından oldukça önemli olduğu düşünülmektedir. Bu önem ve gereksinim doğrultusunda mevcut araştırmada OSB olan kadınların hijyenik kadın pedi kullanım becerisini edinmelerinde kendini izleme stratejisinin etkisinin incelenmesi amaçlanmaktadır. Mevcut çalışma kapsamında aşağıdaki araştırma sorularına yanıt aranmıştır:

1. OSB olan kadınların/kız çocuklarının/ergenlerin hijyenik kadın pedi kullanım becerisini edinmelerinde kendini izleme stratejisi etkili midir?
2. OSB olan kadınlar/kız çocukları/ergenler hijyenik kadın pedi kullanımı becerisini öğretim sona erdikten en az iki hafta sonra sürdürebilmekte midir?
3. OSB olan kadınlar/kız çocukları/ergenler hijyenik kadın pedi kullanımı becerisini farklı ortamda sergileyebilmekte midir?
4. OSB olan kadınların/kız çocuklarının/ergenlerin ailelerinin çalışmanın sonuçlarına ilişkin görüşleri nelerdir?

YÖNTEM

Mevcut çalışmanın bu bölümünde araştırmanın modeline, katılımcılarına ve katılımcılarda aranan ön koşul özelliklerine, bağımlı ve bağımsız değişkene, uygulama sürecine, uygulama sürecinde kullanılan veri toplama araçlarına ve verilerin analizine ilişkin bilgilere yer verilmiştir.

1.Araştırma Modeli

Yürütülen çalışmada OSB olan ergenlere hijyenik kadın pedi kullanımının öğretiminde kendini izleme stratejisinin etkisinin incelenmesi amacıyla tek denekli araştırma desenlerinden yoklama evreli katılımcılar arası çoklu yoklama modeli kullanılmıştır. Yoklama evreli katılımcılar arası çoklu yoklama modeli; bir bağımsız değişkenin etkililiğinin farklı katılımcılar üzerinde incelenmesidir (Tekin-İftar, 2018). Katılımcılar arası çoklu yoklama modeli farklı durumlar içinde öğretimin etkiliğini sınamak için kullanılır ve birinci katılımcı ile öğretim yapılırken diğer katılımcılardan başlama düzeyi verisi alınarak veri toplamaya devam edilir (Tekin ve Kırcaali-İftar, 2001).

Mevcut araştırmada katılımcılar arası çoklu yoklama modelinin tercih edilmesinin nedeni; uygulamasının kolay olması, uygulamanın geri çekmeyi gerektirmemesi ve kullanan kişiler tarafından sıklıkla tercih edilmesi ve birden çok uygulama ile gerçekleştirilmesi ile öğretime benzer olmasıdır. Verilerin tekrar edilebilir olması da dış geçerlilik oranını artırmaktadır (Tekin-İftar, 2018).

2.Katılımcılar

Yürütülen çalışmanın katılımcıları Bursa ilinde yaşayan OSB olan iki ergen öğrencidir. Çalışma kapsamına dahil edilen katılımcıları, araştırmacı tarafından alanyazından elde edilen bilgiler doğrultusunda belirlenen dahil etme kriterleri kullanılarak seçilmiştir. Araştırmanın dahil etme şu şekildedir;

a.Çalışmaya gönüllü olma
b.Sözel yönergeleri takip edebilme
c.Görsel ve işitsel uyaranlara dikkatini yöneltebilme
d.Kendisini ve/veya ihtiyaçlarını sözel ve/veya sözel olmayan tepkiler ile ifade edebilme
e.Kaba motor becerilerini (giysi giyinme/çıkarma, tuvalet ihtiyacını bağımsız bir şekilde giderme gibi) ve ince motor becerilerini (el/yüz yıkama, giysilerinin düğmelerini açıp kapatabilme, fermuar açıp kapatabilme) yerine getirme
f.İç çamaşırlarını (külot), pantolon,/etek uygun şekilde yardımsız giyebilme
g."+,-, ☺,☹" sembollerinin anlamlarını bilme
h.Sunulan pekiştireçler arasından tercihin belirtebilme becerilerine sahip olma yürütülen çalışmanın dahil etme kriterleri olarak belirlenmiştir.

Mevcut çalışmada dahil etme kriterlerine uygun olduğu düşünülen iki katılımcı araştırma kapsamına dahil edilmiştir. Katılımcıların gerçek isimleri etik kurallara bağlı kalmak için araştırma sürecinde kullanılmayıp bunun yerine kod isimler tercih edilmiştir. Katılımcıların kod isimleri, özel gereksinim düzeyleri, yaş ve eğitim durumlarına ilişkin bilgiler Tablo 1'de görülmektedir.

Tablo 1.
Katılımcı Özellikleri

Katılımcı İsimleri	Kod	Tanı	Yaş	Eğitim Durumu
Esra		Hafif Düzey OSB	11	5.Sınıf
Derya		Orta Düzey OSB	13	5.Sınıf

Araştırmanın birinci katılımcısı Esra, 11 yaşında Bursa'da bir devlet okulunda tipik gelişimli akranları ile aynı sınıfa devam eden 5. Sınıf öğrencisidir. Esra'ya ilk OSB tanısı dört yaşında iken Bursa'daki bir devlet hastanesi tarafından konulmuştur. Esra, üç ve daha fazla sözcük içeren sözel yönergeleri takip edebilmekte ve kıyafetlerini giyinip çıkarma, tuvalet ihtiyacını giderme, diş fırçalama, saçını tarama, banyo yapabilme gibi kişisel bakım becerilerini uygulamaktadır. Görsel ve işitsel uyaranlara tepki göstermekte örneğin; ismi söylediğinde sesin geldiği yöne bakmak ve dikkatini vermek, rengi söylenen nesneyi göstermek ve nesnenin ismini ve rengini söylemek gibi becerileri yerine getirmektedir. Esra aynı zamanda sözel iletişim kurabilmekte, duygu, düşünce ve isteklerini sözel olarak ifade edebilmektedir. Kişisel bakım becerilerinde başkasının desteğine ihtiyaç duymayan Esra çalışmanın uygulandığı zaman diliminde menstrüasyon dönemine girmemiş olsa da hijyenik kadın pedi kullanımı için başkalarının yardımına ihtiyaç duymaktadır.

Esra günlük yaşamda edinmesi gereken becerilerin yanı sıra akademik becerilerden okuma-yazma, matematikte dört işlem becerilerini (toplama, çıkarma, çarpma ve bölme), gelişimine uygun hazırlanmış toplama ve çıkarma gerektiren problem çözme becerilerine de sahiptir. Ayrıca semboller tanıtıldığında anlamlarını ve işlevlerini bilmekte ve bunlara uygun çalışmalar yapabilmektedir. Örneğin; yürütülen çalışmada hijyenik kadın pedi kullanımına ilişkin etkinlik çizelgesinde yer alan basamaklardan uyguladıklarına "☺", uygulayamadıklarına "☹" etiketlerinin yapıştırması gerektiğini kısa zamanda kavramaktadır. Esra ayrıca doğum günü, bayramlar, tatile gittiği tarihleri ve bu tarihlerin hangi güne denk geldiğini bilmektedir. Örneğin; 19.07.2024 tarihinin Cuma günü olduğunu hatırlamak gibi özel bir yeteneği vardır.

Araştırmanın ikinci katılımcısı Derya, 13 yaşında ve Bursa'daki bir devlet ortaokulunun özel eğitim sınıfında 7. Sınıfa devam etmektedir. Derya'ya iki yaşında Bursa'da bir devlet hastanesi tarafından OSB tanısı konulmuştur. Derya, üç ve daha fazla sözel yönergeleri takip edebilmekte, tuvalet ihtiyacını gidermek, banyo yapabilmek, saçını taramak, el/yüz yıkamak gibi kişisel bakım becerilerini başkasının yardımı olmadan yerine getirebilmektedir. Kişisel bakım becerilerinde başkasının desteğine ihtiyaç duymayan Derya çalışmanın yürütüldüğü tarihte menstrüasyon dönemine girmemiş olsa da hijyenik kadın pedi kullanım becerisini yerine getirememekte, başkasının yardıma ihtiyaç duymaktadır. Derya görsel ve işitsel uyaranları takip edebilmekte (rengi söylenen nesneyi göstermek, istenen nesneyi getirmek gibi),selamlaşma, vedalaşma gibi sosyal iletişim becerilerini ve kendisine sorulan sorulara yanıt verme, istek ve ihtiyaçlarını belirtmek gibi becerileri sözel olmayan ifadeler kullanarak yerine getirmekte ancak iletişim başlatma, sürdürme ve sonlandırma becerilerini yerine getirmede sözlü ifadeler kullanamadığı için desteğe ihtiyaç duymaktadır. Derya görsel uyaranların anlamı ve işlevi ile ilgili bilgi verildiğinde bilgiyi kısa sürede çözümlemektedir. Örneğin; yürütülen çalışmada kullanılan "☺,☹" semboller arasından hijyenik kadın pedi kullanımı beceri basamaklarından uygulayabildiği basamaklara "☺" sembolünü, uygulayamadığı basamaklara "☹" sembolünü yapıştırması gerektiğini kısa sürede anlayabilmekte ve uygulayabilmektedir.

Derya günlük yaşam becerilerinin yanı sıra akademik becerilerden okuma-yazma becerilerini yerine getirememektedir. Matematik becerilerinde rakamları tanıma, rakam miktar eşlemeleri yapma, eşleme ve ayırt etme gibi becerileri yerine getirmektedir. Derya'nın kitaplara karşı çok ilgi duyması ve etkinlikleri görsellerden oluşan kitaplar üzerinden daha kolay öğrenmesi, eşleme beceriler ile ilgili etkinlikleri tek seferde görmesine rağmen eşleyebilmesi ve öğrendiği becerileri çok kısa sürede (hızlı hareket ederek) yerine getirmek gibi diğer bireylerden ayıran olumlu özelliklere sahiptir.

3.Bağımlı ve Bağımsız Değişken

Mevcut çalışmanın bağımlı değişkeni hijyenik kadın pedini bağımsız olarak kullanma becerisidir. Bağımlı değişken belirlenirken OSB olan ergenlerin aileleri ile görülmüş, yapılan görüşmeler sonucunda kendilerinin ve kızlarının başkalarının desteği olmadan yaşamlarını sürdürmeleri ve toplumsal hayata uyum sağlayabilmelerini kolaylaştırması açısından bu beceri ile ilgili çalışma yapılmasına karar verilmiştir.

Araştırmanın bağımsız değişkeni ise kendini yönetme stratejilerinden olan kendini izleme stratejisidir. Alanyazında özel gereksinimli bireylere günlük yaşam ve kişisel bakım becerilerinin öğretilmesinde ve becerilerin sürdürülmesinde kendini izleme stratejisinin etkili olması (Sönmez-Kartal ve Yücesoy-Özkan, 2012; Gevşek, 2016; Mann, 2018; Gushanas ve Thampson, 2019), yöntemin kolaylıkla uygulanabilir ve maliyetinin düşük olması (Aykut, 2013) gibi sebepler göz önünde bulundurulmuş ve bu çalışma için tercih edilmiştir.

4.Ortam

4.1. Kendini İzleme Stratejisinin Kullanıldığı Ortam

Kendini izleme stratejisinin kullanılarak OSB olan ergenlere hijyenik kadın pedi kullanım becerisinin öğretim oturumları katılımcıların kendi evleri yapılandırılmış ortam haline getirilerek gerçekleştirilmiştir. Katılımcıların evlerinin yapılandırılmış ortamlar haline dönüştürülmesinde öncelikle aileler ile görüşmeler yapılmış, katılımcıların evinde en rahat edebilecekleri ve mahremiyetlerini koruyabilecekleri ortamlarda çalışmaların gerçekleştirilmesi sağlanmıştır. Bunun sonuncunda birinci katılımcı Esra ile evinin kendi odasında, ikinci katılımcı Derya ile evindeki çalışma odasında ve banyosunda çalışma yapılmıştır. Kendini izleme strateji kullanılarak hijyenik kadın pedini kullanma becerisi yoklama oturumları için katılımcıların evlerindeki odalarında ve banyolarında gerçekleştirilmiştir.

4.2. Genelleme ve İzleme Ortamları

Yürütülen araştırmada katılımcıların kendini izleme stratejisi kullanarak hijyenik kadın pedi kullanım becerisinin, menstrüasyon dönemlerinde farklı ortamlarda ve farklı zamanlarda uygulaması beklenen davranış açsından önemli olabilecek ortamlarda gerçekleştirilmiştir. Yürütülen çalışmanın genelleme ve izleme oturumları katılımcıların yakınlarına ait ve rahat edebildikleri evlerde (babanne evi, komşu evi vb.) gerçekleştirilmiştir.

5.Pekiştireç ve Pekiştireç Tarifesi

Yürütülen araştırmada öğretim oturumları sırasında katılımcıların sergiledikleri uygun davranışlar sözel pekiştireçler (aferin, bravo vb.) ve daha önce araştırmacı tarafından hazırlanan pekiştireç belirleme formunda katılımcılara sunulan ve katılımcıların tercihleri doğrultusunda belirlenen pekiştireçler ödül olarak kullanılmıştır.

6.Araç Gereçler

Yürütülen çalışmada yoklama oturumları, öğretim oturumları ve izleme/genelleme oturumlarının kaydedilmesi için akıllı telefon kamerası, öğretim oturumlarında hijyenik kadın pedi kullanımına model olması için izletilen video kayıtlarının gösterimi için dizüstü bilgisayar, kirli ve temiz kadın pedi ayrımının yapılabilmesi için boyanmış hijyenik kadın pedi ve temiz hijyenik kadın pedi, katılımcıların kullanması için tayt, tayt üzerine giyinecekleri iç çamaşırı (külot), mutlu ve üzgün duygularını simgeleyen yapışkanlı etiketler, kullanılmış pedların atılması için çöp kutusu, ve katılımcıların malzemelere rahatlıkla ulaşabilmeleri için malzemelerin yerleştirildiği masa ve askı kullanılmıştır.

7.Öğretim Materyali

Mevcut araştırmada hijyenik kadın pedi kullanımının öğretilmesinde kendini izleme stratejisinin kullanılarak yapılan uygulamalarda kendini izleme stratejisinin kullanımına uygun etkinlik çizelgesi kullanılmıştır. Etkinlik çizelgesinde hijyenik kadın pedi kullanımı becerisinin 12 beceri basamağını gösteren fotoğraflar yer almıştır. Hijyenik kadın pedi kullanımı beceri basamakları araştırmacı tarafından alanyazın incelenerek (Ersoy, 2005) oluşturulmuştur. Hijyenik kadın pedi kullanımı beceri basamakları Tablo 2'de gösterilmiştir.

Tablo 2.
Hijyenik Kadın Pedi Kullanımı Beceri Basamakları

Beceri
1. Pantolonunu dizlerine kadar indirir
2.Külotunu dizlerine kadar indirir
3.Pedi alır
4.Ped paketinin bandını kaldırır
5.Pedin ucundan iki parmağıyla tutar
6.Ped paketini açar
7.Paketi çöpe atar
8.Pedin kısa bölümü öne, uzun bölümü arkaya gelecek biçimde tutar
9.Diğer eliyle külotunun ağını tutar
10.Pedi küloduna yerleştirir
11.Külodunu kaldırır
12.Pantolonunu kaldırır

Yürütülen çalışmada araştırmacı beceri basamaklarındaki her bir beceriyi sergilerken çekilmiş olan kendi fotoğraflarını etkinlik çizelgesinde kullanarak araştırmaya katılan öğrencilerin gelişimsel özellikleri göz önünde bulundurularak etkinlik çizelgesi katılımcıların dikkatini çekici şekilde hazırlanmıştır. Etkinlik çizelgesi resimleri siyah karton üzerine üç şerit şeklinde basamak sırasına göre yerleştirilmiştir. Etkinlik çizelgesi katılımcıların zarar vermesi ihtimaline karşılık yüzeyi şeffaf jelatin ile kaplanarak üzerinde birden fazla çalışma yapılmasına imkan verecek şekilde düzenlenmiştir. Uygulamalar sırasında katılımcıların materyale rahatlıkla erişim sağlayabilmeleri için duvara asılabilecek şekilde düzenlenmiş ve katılımcıların çizelgeyi takip edebilmeleri için görsellerin üzerine yapıştırmaları için etiketler kullanılmıştır.
Katılımcıların, öğretim oturumları sonunda kendini izleme stratejisi kullanarak hijyenik kadın pedi beceri basamaklarını doğru bir şekilde uyguladıklarında veya hedefe en yakın davranışı gerçekleştirdiklerinde (örneğin iç çamaşırını yukarı çekmek yerine tutup bırakmak gibi) pekiştirilmesi için daha önce araştırmacı tarafından hazırlanan pekiştireç formunda katılımcılar tarafından seçilen pekiştireçler kullanılmıştır. Birinci katılımcı Esra pekiştireç formundan çikolata yemeyi tercih ederken, ikinci katılımcı Derya ise kitaplar üzerinde etkinlik yapmayı tercih etmiştir.

8.Uygulama Süreci

Yürütülen araştırma sürecine ilk olarak katılımcıların belirlenmesi ile başlanmıştır. Katılımcıların belirlenmesi sürecinde öncelikle alanyazında menstrüel bakım becerileri ile ilgili çalışmalar incelenerek önceden yürütülmüş çalışmaların (Gölbaşı, Doğaner ve Erbaş, 2012; Öncül ve Yücesoy-Özkan, 2010; Kuloğlu-Aksaz ve Fırat, 1992) katılımcılarının özellikleri ile ilgili bilgiler elde edilerek özel eğitim alanında uzman kişilere danışılmış ve katılımcı özelliklerini belirleme konusunda fikirleri alınmıştır. Yapılan alanyazın incelemeleri ve uzman görüşleri doğrultusunda menstrüasyon döneminde olan veya menstrüasyon dönemine girmesi beklenen katılımcıların çalışma için uygun olduğuna karar verilmiştir. Mevcut araştırma kapsamına dahil edilen katılımcılar belirlendikten sonra hijyenik kadın pedi kullanımı becerisinin öğretilmesinde kendini izleme stratejisinin kullanım düzeyinin tüm katılımcılarda öğretim oturumları öncesinde yoklama oturumları ile belirlenerek kendini izleme stratejisi ve hijyenik kadın pedi kullanımı becerisi ile ilgili bilgilerinin olup olmadığı değerlendirilmiş ve katılımcıların her iki beceriye dair bilgilerinin olmadığı tespit edilmiştir.

Öğretim öncesi yoklama oturumları katılımcıların kendi evlerinde bahsedilen araç gereçler kullanılarak gerçekleştirilmiştir. Mevcut araştırmanın uygulama süreçlerinin tamamında güvenlik verilerinin etkili bir şekilde toplanabilmesi için akılı telefon kamerası ile kayıt altına alınmış, kayıt esnasında katılımcıların mahremiyetlerinin olumsuz etkilenmemesi ve etik kurallara bağlı kalınması için isimleri ile hitap edilmemiş ve yüzleri gösterilmemiştir.

Yoklama oturumları her oturumda dört denemeli beş oturumdan oluşmuş ve denemeler esnasında tek fırsat yöntemi kullanılmıştır. Her denemede öğrenciye beceriyi gerçekleştirmesi için verilen yönergeden sonra beş saniye bekleme süresi kullanılmıştır. Katılımcıların verdikleri tepkiler araştırmacı tarafından hazırlanan kendini izleme stratejisi ve hijyenik kadın pedi kullanımı becerisi gözlem formuna işlenmiştir. Katılımcılarla yapılan yoklama oturumları kararlı veriler elde edilinceye kadar devam edilmiş daha sonra öğretim oturumları uygulanmıştır.

Araştırmanın öğretim oturumları katılımcılarla birebir öğretim oturumlarının gerçekleştirilebileceği ev ortamlarında uygulanmıştır. Birinci katılımcı Esra ile evinde kendi odasında, ikinci katılımcı Derya ile evinin banyosunda oturumlar düzenlenmiştir. Öğretim oturumlarında model olma, rehberli uygulama ve bağımsız uygulama aşamalarına yer verilmiştir. Uygulamacı öncelikle katılımcılara menstrüsyon döneminin ne olduğu, başlangıcı ve bitişi, menstrüasyon döneminin nasıl gerçekleştiği ve bu dönemde ne kullanılması gerektiği konusunda kısa bilgiler vermiştir. Daha sonra araştırmacı katılımcılara kirli kadın pedini (kırmızı boya ile renklendirilmiş) göstererek menstrüasyon dönemlerinde kan akışı nedeniyle pedlerin bu şekilde görünebileceğini ifade etmiş sonrasında temiz kadın pedi gösterilerek kadın pedleri kirlendikten sonra temiz pedlerin kullanılması gerektiği belirtilmiştir. Katılımcılarla temiz ve kirli pedlerin ayrımını yapabilmeleri için öğretim uygulamaları yapıldıktan sonra değerlendirmeler yapılmış ve katılımcılardan kararlı veri elde edilinceye kadar öğretime devam edilmiştir. Katılımcıların menstrüasyon döneminde hangi zamanlarda kadın pedi kullanacakları ve ne zaman değiştirecekleri öğretildikten sonra hijyenik kadın pedi kullanımı beceri basamaklarının uygulanması ile ilgili araştırmacı tarafından hazırlanan video izletilmiştir. Video bitiminde katılımcı ve uygulamacı ayakta karşılıklı durmuş, katılımcı hijyenik kadın pedi kullanımı becerisi basamaklarının her birini uygulamış ve her uygulamasında duvarda asılı olan etkinlik çizelgesindeki beceri basamaklarının bulunduğu fotoğraflara yapışkanlı etiketi yapıştırarak model olmuştur. Araştırmacı uygulamaları gerçekleştirirken tayt üzerine iç çamaşırı giyinmiş ve katılımcının da aynı şekilde hazırlanmasını sağlamıştır. Bu uygulama katılımcının mahremiyet duygularını olumsuz etkilememesi ve etik kuralların ihlal edilmemesi için yapılmıştır. Araştırmacı, katılımcıların uygulamalarını beklediği davranış için model olduktan sonra rehberli uygulama ile beceri gerçekleştirmeleri için sözel ifadeler kullanarak (fotoğrafa bakmayı unutma!, bu durumda ne yapmak gerekir vb.) rehber olmuş ve katılımcıların beceriyi gerçekleştirmelerini beklemiştir. Katılımcılar doğru tepkiyi gösterdiklerinde pekiştirilmiş, yanlış tepki gösterdiklerinde düzeltme yapılarak beceri basamağını tekrar uygulamaları sağlanmıştır. Kararlı veri elde edilinceye kadar rehberli uygulama basamağına devam edilmiş daha sonra katılımcıların beceriyi bağımsız olarak gerçekleştirmeleri için çalışmalar yapılmıştır. Bağımsız uygulama basamağında katılımcılar yönlendirilmemiş, becerinin tüm basamaklarını kendilerinin gerçekleştirip kendini izleme stratejisine uygun olarak yanlış uygulamaları ve düzeltmeleri kendilerinin uygulaması beklenmiştir. Katılımcılar tüm basamakları doğru şekilde uyguladıklarında pekiştirilmiş, yanlış tepki verdiklerinde düzeltmeler yapılmıştır.

9.İzleme ve Genelleme Oturumları

Yürütülen çalışmada öğretim sonrası yoklama oturumlarından iki hafta sonra genelleme ve izleme oturumları düzenlenmiştir. Genelleme ve izleme oturumları, katılımcıların öğretim oturumlarından edindikleri beceriyi sürdürmelerine ilişkin verileri ve farklı bir ortamda menstrüasyon dönemine yakalanmaları durumunda hijyenik kadın pedi kullanımı becerisini gerçekleştirip gerçekleştiremeyeceklerini tespit etmek amacıyla düzenlenmiştir. Araştırmada genelleme ve izleme çalışmaları eş zamanlı olarak uygulanmış ve uygulama sürecinde katılımcıların isimlerinin kullanılmadığı ve yüzlerinin gösterilmediği kamera kayıtları ile kayıt altına alınmıştır. Çalışmanın etik ihlalleri sarsmaması için izleme ve genelleme oturumlarında da katılımcıların tayt üzerine iç çamaşırları giydirilerek uygulamalar gerçekleştirilmiştir. Elde edilen veriler araştırmacı tarafından hazırlanan kendini izleme stratejisi ve hijyenik kadın pedi kullanımı becerisi gözlem formunu işlenmiştir.

Mevcut araştırmanın izleme ve genelleme oturumları katılımcıların ikincil ev ortamında evin banyosunda (babaanne evi, komşu evi vb.) gerçekleştirilmiştir. İzleme ve genelleme oturumlarında hijyenik kadın pedleri, pedlerin imha edilmesi için çöp kutusu, katılımcıların rahat hareket etmeleri için masa ve sandalye bulundurulmuştur. İzleme ve genelleme oturumlarında katılımcı ve araştırmacı ikincil ev ortamının banyosuna geçerek ortamda önemli değişiklikler yapılmadan katılımcıya hijyenik kadın pedini ne zaman kullanmak gerektiği ve kirlenmesi durumunda nasıl davranmak gerektiği konusunda sorular sormuş daha sonra hijyenik kadın pedi kullanımı için yönerge vererek uyguladıkları beceri basamağına ilişkin verileri tepki vermeden kaydetmiştir.

10.Verilerin Toplanması

Yürütülen çalışmada OSB olan ergenlerin hijyenik kadın pedi kullanımı becerilerine ilişkin etkililik verileri, güvenirlik verileri, uygulama etkililiği verileri, gözlemciler arası güvenirlik verileri ve katılımcıların ailelerinin uygulamanın sonuçlarına ilişkin görüşlerini bildiren sosyal geçerlik verileri toplanmış ve analiz edilmiştir.

10.1. Hijyenik Kadın Pedi Kullanımına İlişkin Etkililik Verileri

Yürütülen araştırmada hijyenik kadın pedi kullanımına ilişkin veriler; toplu yoklama oturumları, öğretim oturumları, izleme ve genelleme oturumları araştırmacı tarafından geliştirilen hijyenik kadın pedi kullanımı becerisi kontrol listesi aracılığıyla toplanmıştır. Araştırmanın birinci katılımcısı Esra'dan beş, araştırmanın ikinci katılımcı Derya'dan beş oturum toplu yoklama oturumunda veri toplanmıştır. Çalışma sonlandırıldıktan iki hafta sonra katılımcıların davranışı sürdürme ve farklı ortamlara genelleme düzeylerini belirlemek amacıyla izleme ve genelleme oturumları düzenlenmiş ve veriler kamera ile kayıt altına alınarak kontrol listesine işlenmiştir.

10.2. Güvenirlik Verilerinin Toplanması

Yürütülen çalışmanın yoklama oturumları, öğretim oturumları, izleme ve genelleme oturumlarının %100'ünde uygulama güvenirliği veri toplanmıştır. Güvenirlik verileri, araştırmacının uygulamaları doğru bir şekilde yürütme derecesini belirlemek için çalışmayı yürüten araştırmacı tarafından toplanan veriler ile farklı bir gözlemci tarafından elde edilen verilerin karşılaştırılmasıyla elde edilmiştir. Güvenirlik verileri, araştırmanın tüm sürecinin kayıt altına alındığı video kayıtlar izlenerek elde edilmiştir.

10.3. Gözlemciler Arası Güvenirlik Verilerinin Toplanması

Mevcut araştırmada gözlemciler arası güvenirlik verileri; çalışmanın toplu yoklama oturumları, öğretim oturumları, izleme ve genelleme oturumlarında araştırmacı tarafından geliştirilen kendini izleme stratejisi ve hijyenik kadın pedi kullanımı becerisi kontrol listesi güvenirlik formuna işlenerek elde edilmiştir.

Gözlemciler arası güvenirlik; yürütülen çalışmada araştırmacı tarafından yürütülen uygulamaların iki bağımsız gözlemci tarafından aynı oturumların eş zamanlı ve bağımsız olarak değerlendirmeleridir (Tekin-İftar,2018). Gözlemciler arası güvenirlik verilerinin hesaplanmasında gözlemcilerin: görüş birliği/görüş ayrılığı + görüş ayrılığı x 100 formülü kullanılmaktadır (Şencan, 2005). Hesaplamalar sonucunda gözlemcilerin uyum indekslerinin %80 ve üzerinde olması yürütülen çalışmanın güvenilirliğine ilişkin yeterli bir ölçüt olarak kabul edilmektedir (Tekin-İftar, 2018).

Yürütülen çalışmada katılımcıların toplu yoklama oturumları, öğretim oturumları, izleme ve genelleme oturumlarına ilişkin gözlemciler arası güvenirlik verileri toplanmıştır. Araştırmanın birinci katılımcısı Esra ile uygulanan toplu yoklama oturumlarında kendini izleme stratejisine yönelik elde edilen gözlemciler arası güvenirlik verileri ortalama % 100 (ranj:%100-%100), hijyenik kadın pedi kullanımına ilişkin gözlemciler arası güvenirlik verisi ortalama %91 (ranj: %83-%100), kendini izleme stratejisine yönelik uygulama oturumlarından elde edilen gözlemciler arası güvenirlik verileri ortama %100 (ranj:%100-%100), kendini izleme stratejisine yönelik uygulama oturumlarında gözlemciler arası güvenirlik verisi ortalama %100 (ranj: %100-%100), hijyenik kadın pedi kullanımı becerisine yönelik uygulama oturumlarında ortalama %98 (ranj: %91-%100), izleme ve genelleme oturumlarında %100 oranında gözlemciler arası güvenirlik verisi elde edilmiştir.

Araştırmanın ikinci katılımcısı Derya ile kendini izleme stratejisinin uygulanmasına ilişkin güvenirlik verileri toplu yoklama oturumlarında ortalama %100 (ranj: %100-%100), hijyenik kadın pedi kullanımı becerisine ilişkin toplu yoklama oturumları gözlemciler arası güvenirlik verisi ortalama %93 (ranj: %89-%100), uygulama oturumlarında kendini izleme stratejisine yönelik güvenirlik verisi ortalama %100 (ranj:%100-%100), hijyenik kadın pedi kullanımı becerisine yönelik uygulama oturumları güvenirlik verisi ortalama %96 (ranj:%83-%100), izleme ve genelleme oturumlarına ilişkin güvenirlik verisi %100 oranında olduğu tespit edilmiştir.

10.4. Uygulama Güvenirliği Verilerinin Toplanması

Uygulama güvenirliği, araştırmacının uygulamayı öğretim planına uygun olarak gerçekleştirme düzeyinin yani bağımsız değişkeni ne derece uyguladığını belirlemek amacıyla yapılmaktadır (Alberto ve Toutman, 2009). Yürütülen çalışmada uygulama güvenirliği verileri araştırmacı tarafından hazırlanan "toplu yoklama oturumları uygulama güvenirliği araştırmacı gözlem formu" ile elde edilmiştir. Mevcut araştırmada uygulama güvenirliği verileri yoklama oturumları, öğretim oturumları ve genelleme oturumlarının tamamında (%100) toplanmış ve veri kayıt formuna kaydedilmiştir. Uygulama güvenirliğinin hesaplanmasında gözlenen uygulamacı davranışı/hedeflenen uygulamacı davranışı x 100 formülü kullanılmıştır (Erbaş, 2012). Araştırmanın uygulama güvenirliği verileri birinci katılımcı Esra'nın tüm toplu yoklama oturumlarında %100, ikinci katılımcı Derya'nın ise ortalama %96 (ranj: %80-%100) oranında olduğu belirlenmiştir.

10.5. Sosyal Geçerlik Verilerinin Toplanması

Yürütülen araştırmada OSB olan ergen katılımcıların ailelerinden uygulamanın önemine, etkililiğine ve uygunluğuna yönelik değerlendirmelerinin (Tekin-İftar, 2018) belirlenmesi amacıyla sosyal geçerlik verileri toplanmıştır. Araştırmada sosyal geçerlik verilerinin elde edilmesinde araştırmacı tarafından alanyazından elde edilen bilgiler doğrultusunda hazırlanan sosyal geçerlik formu kullanılmıştır. Hazırlanan formda ailelere a) bu çalışmadaki hijyenik kadın pedi kullanımının çocuğunuz açısından önemli olması hakkında düşünceleriniz nelerdir?, b) Çocuğunuzun bu çalışmada öğrendiği hijyenik kadın pedi kullanım becerisi sayesinde günlük yaşamındaki aktiviteleri aksatmadan bağımsız bir şekilde katılması konusunda düşünceleriniz nelerdir?, c)

Bu çalışmada öğretilen hijyenik kadın pedi kullanım becerisinin çocuğunuzun zamanını geçirdiği diğer ortamlara (alışveriş merkezi, okul, babaanne evi vb.) uyumunu kolaylaştırması bakımından düşünceleriniz nelerdir?, d) Çalışmaya katılan katılımcıların öğrendikleri hijyenik kadın pedi kullanım becerisinin bağımsız yaşamalarına ve yaşam kalitelerini artırmaya yardımcı olabildiğini düşünüyor musunuz? Soruları yöneltilmiştir. Görüşme yapılan ailelerin sorulara tarafsız ve doğru yanıt verdikleri varsayılmıştır.

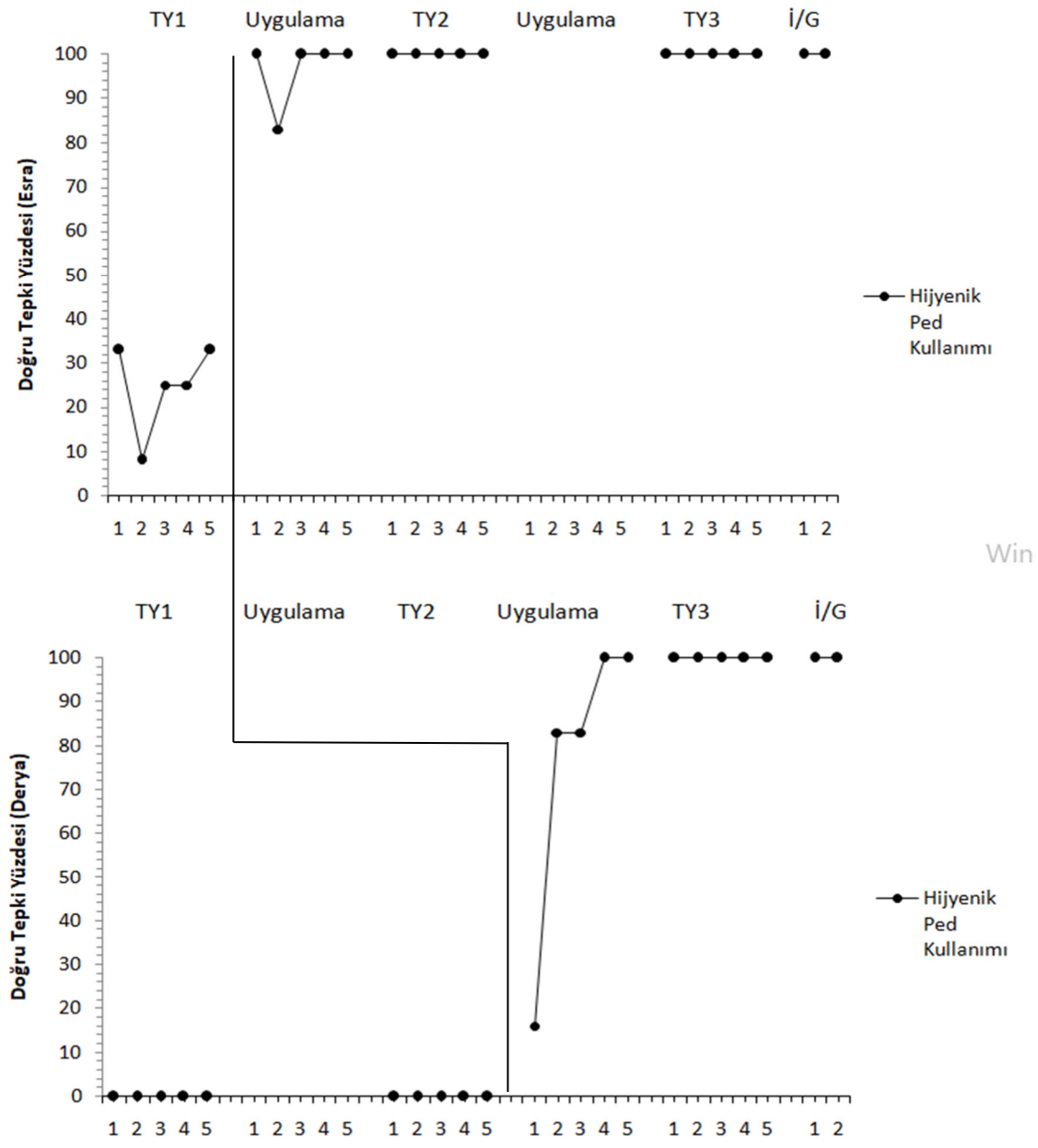
11.Verilerin Analizi

Yürütülen çalışmada OSB olan ergenlerin hijyenik kadın pedi kullanımı becerilerine ilişkin verilerin toplanmasında araştırmacı tarafından alanyazın incelemeleri doğrultusunda hazırlanan ölçüt bağımlı ölçü aracı kullanılmıştır. Ölçüt bağımlı ölçü aracındaki hedef davranış basamaklarını katılımcılar doğru şekilde gerçekleştirdiklerinde forma "+" sembolü, yanlış şekilde uyguladıklarında ise forma "-" sembolü işaretlenmiştir. Verilerin analizinde; katılımcıların doğru tepki yüzdesi=doğru sergilenen basamak sayısı/toplam basamak sayısı x 100 formülü kullanılmıştır. Araştırma ölçütünün değerlendirilmesi için öğretim uygulamalarının etki düzeyini belirlemek ve bu değerlendirmeyi görselleştirmek amacıyla grafiksel analiz yöntemi (Tekin-İftar, 2018) tercih edilmiştir.

BULGULAR

Kendini İzleme Stratejisinin hijyenik Kadın Pedi Kullanımı Becerisi Üzerindeki Etkililiğine İlişkin Bulgular

Esra ve Derya'nın hijyenik kadın pedi kullanımı becerisini edinimlerinde kendini izleme stratejisinin etkililik, izleme ve genelleme verileri Grafik 1'de gösterilmektedir.



Kısaltmalar; TY: Toplu Yoklama/ İ: İzleme/ G: Genelleme

Grafik 1.

Grafik 1'de incelenen Esra'ya ait bulgular incelendiğinde öğretim öncesi toplu yoklama oturumlarında ortalama %25 (ranj: %8-%33) performans sergilediği görülmektedir. Esra ile beş öğretim oturumu gerçekleştirilmiş ve öğretim oturumlarında ortalama %97 (ranj: %83-%100) oranında performans sergileyerek hijyenik kadın pedi kullanımı becerisine ait performans düzeyini öğretim öncesi yoklama oturumlarına göre artırdığı belirlenmiştir. Öğretim oturumlarından iki hafta sonra ikincil ev ortamında (babaanne evi, komşu vb.) uygulanan izleme ve genelleme oturumlarında da Esra'nın performans düzeyini koruduğu ve %100 oranında performans sergilediği görülmektedir.

Araştırma verileri izlendiğinde katılımcının öğretim öncesi toplu yoklama oturumlarında, öğretim oturumlarında ve öğretim oturumlarından iki hafta sonra gerçekleştirilen toplu yoklama oturumlarında performans düzeyinde olumlu yönde değişim olduğu ve başlangıç seviyesine göre performansını artırdığı ve edindiği beceriyi sürdürdüğü gözlenmektedir. Buna göre kendini izleme stratejisinin katılımcının hijyenik kadın pedi kullanımı becerisini edinmesinde etkili olduğu söylenebilir.

Yürütülen araştırmanın ikinci katılımcısı Derya'ya ait bulgular incelendiğinde öğretim öncesinde gerçekleştirilen toplu yoklama oturumlarının tamamında %0 oranında performans sergilediği görülmektedir. Derya ile gerçekleştirilen öğretim oturumlarında ise ortalama %77 (ranj: %16-%100) oranında performans düzeyine ulaştığı görülmektedir. Derya'nın son üç öğretim oturumunda performansının istenen seviyeye ulaşması nedeniyle öğretim oturumları sonlandırılarak edindiği hijyenik kadın pedi kullanımı becerisini farklı ortamlara genelleme ve beceriyi sürdürme düzeyinin belirlenmesi için öğretim sonrasında toplu yoklama oturumları gerçekleştirilmiştir. İzleme ve genelleme uygulamaları için gerçekleştirilen toplu yoklama oturumları Derya'nın ikincil yakının evinde (babaanne evi, komşu evi vb.) uygulanmıştır. Derya'nın izleme ve genelleme oturumlarına ilişkin performans düzeyi incelendiğinde; tüm toplu yoklama oturumlarında %100 ölçütünde performans sergilediği görülmektedir.

Derya'ya ilişkin araştırma verileri incelendiğinde öğretim öncesi toplu yoklama oturumları, öğretim oturumları ve hedeflenen davranışı genelleme ve sürdürme düzeyini incelemek amacıyla yapılan öğretim sonrası toplu yoklama oturumlarında Derya'nın başlangıç düzeyine göre performansının arttığı ve edindiği beceriyi istenen ölçütte sürdürdüğü ve farklı ortamlara genellediği görülmektedir. Buna göre Derya'nın hijyenik kadın pedi kullanımı becerisini ediniminde kendini izleme stratejisinin etkili olduğu söylenebilir.

Mevcut araştırmanın bulgularının daha genellenebilir olması yani dış geçerliliğinin sağlanabilmesi için çalışmaya üçüncü katılımcı dahil edilmek istenmiştir. Çalışma kapsamında aranan katılımcı ön koşul özelliklerine sahip olduğu düşünülen ileri düzeyde OSB tanısı olan katılımcı ile toplu yoklama uygulamaları için veriler toplanmaya başlanmıştır. Çalışmanın ilerleyen oturumlarında katılımcı çalışma yapmak için ön koşul özelliklere sahip olmasına rağmen uygulamalar sırasında verilen görevleri yerine getirmek istemediğinde öfke nöbetleri geçirerek kendisine ve araştırmacıya vurma ve ağlama gibi zarar verici uygun olmayan davranışlar sergilemiş ve bunu her toplu yoklama oturumlarında sürdürmüştür. Araştırmacı, katılımcının bilişsel gelişiminin diğer katılımcılara göre daha yavaş ilerlemesi bakımından hijyenik kadın pedi kullanımı becerisinin öğretiminden önce uygulama yapmayı engelleyen davranışların sıklığını ve süresini azaltıcı çalışmalar yapılması gerektiğini düşünmüş ancak bu çalışmaların yapılmasının mevcut araştırmayı sonlandırılması için hedeflenen zaman diliminden çok daha uzun bir süreye ihtiyaç duyulabileceğinden ve çalışmanın etik kurallarını ihlal edebileceği endişesi ile çalışmalara son vererek katılımcıdan öğretim öncesi toplu yoklama oturumları, öğretim oturumları ve öğretim sonrası toplu yoklama oturumlarına ilişkin yeterli düzeyde veri toplayamamıştır. Bahsedilen tüm sebeplerden dolayı mevcut araştırmaya iki katılımcı ile devam edilmiştir.

Sosyal Geçerlik Bulguları

Yürütülen araştırmada OSB olan ergenlerin annelerinden elde edilen sosyal geçerlik bulgularında katılımcıların ailelerinin kendini izleme stratejisi kullanmanın çocuklarına hijyenik kadın pedi kullanımı becerisini edinmelerinde etkili olduğu yönünde görüş bildirmişlerdir. Görüşme yapılan ailelere yöneltilen "Bu çalışmadaki hijyenik kadın pedi kullanımının çocuğunuz açısından önemli olması hakkında düşünceleriniz nelerdir?" sorusuna ikinci katılımcı: *Evet önemli olduğunu düşünüyorum. Özgüvenini kazandı, becerisini kazandı.*

Bilmeseydi onun için iyi olmazdı. Beceriyi şuan öğrendi, şuan hastalandı, daha rahat yapabiliyor her şeyi" yanıtını vermiştir. Katılımcıların öğrendikleri hijyenik kadın pedi kullanımı becerisinin günlük yaşamlarında etkisinin belirlenmesi amacıyla yöneltilen "Çocuğunuzun bu çalışmada öğrendiği hijyenik kadın pedi kullanım becerisi sayesinde günlük yaşamındaki aktiviteleri aksatmadan bağımsız bir şekilde katılması konusunda düşünceleriniz nelerdir?"sorusuna "*Tabiiki düşünüyorum kendine daha güveneceğini düşünüyorum böylece. Çünkü bu edinimi sağlarsak eğer dışarıda da daha rahat edecek diğer arkadaşlarından farklı olmadığını düşünecek. O yüzden yaşamını çok olumlu etkileyeceğini düşünüyorum"* yanıtını vermiştir.

Mevcut araştırmada elde edilen sosyal geçerlik bulgularına göre; OSB olan ergenlerin hijyenik kadın pedi kullanımı becerisini edinimleri, beceriyi sürdürmeleri ve farklı ortamlara genellemeleri üzerinde kendini izleme stratejisinin kullanımının etkili olduğu gözlemlenmiştir. Sosyal geçerlik bulgularında aileler yürütülen araştırma hakkında olumlu görüş bildirerek hijyenik kadın pedi kullanımı becerisi ediniminde kendini izleme stratejisinin etkili olduğu gözlemlenmiştir.

TARTIŞMA

Özel gereksinimli bireylerin menstrüasyon dönemi becerilerini edinmede ve ailelerinin ise yeterli desteklerden (öğretmen, sağlık hizmetleri vd.) yararlanamadıkları için bu dönemle ilgili becerileri çocuklarına kazandırmada güçlükler yaşamaktadır. Özel gereksinimli bireylerin ve ailelerinin bu konuda sorun yaşamaları özel gereksinimli bireyler açısından menstrüasyon dönemi ile ilgili becerilerin kazandırılmasının önemli bir gereksinim olduğunu göstermektedir. Çünkü menstrüasyon döneminde özel gereksinimli bireyler hijyenik kadın pedi kullanımı gibi gerekli hijyen becerilerine sahip olamadıklarından dolayı sosyal yaşamlarına devam etmek etmekte güçlük yaşamaktadır. Özellikle OSB olan bireyler gibi rutinlere bağlı özel gereksinimli bireyler açısından bu durum çeşitli problem davranışların da öncüsü olabilmektedir. Sosyal yaşamına devam edemeyen ve bununla ilgili olarak duygusal ve ruhsal problem yaşayan özel gereksinimli bireylerin ailelerini de olumsuz etkilemektedir. Çocuklarını okula gönderememe, sosyal faaliyetlere katılımını sınırlama gibi sorunlardan dolayı çocuklarının eğitimleri de aksamakta bu nedenle ilerlemelerini olumsuz etkilemektedir. Bunun gibi nedenlerden dolayı özel gereksinimli bireylerin aileleri özel gereksinimli çocuklarına menstrüasyon dönemi becerilerinin öğretilmesi gerektiğinin bilincinde olduklarını ancak bunu nasıl yapabilecekleri konusunda bilgilerinin yeterli olmadığını ifade etmektedirler (Öncü, Aktaş, Vayısoğlu ve Karakuş, 2019). Özel eğitim alanında çalışan uzmanlar ise mahremiyet ile ilgili sorunlarla karşılaşabilecekleri düşüncesi ile menstrüasyon dönemi ile ilgili çalışmalarını sınırlamak zorunda kalmaktadır (Aktaş, 2020). Alanyazından elde edilen bilgilere göre; özel gereksinimli bireylerin ve ailelerinin menstrüasyon dönemi ile ilgili yaşadıkları sorunların ve endişelerin giderilebilmesi için hijyenik kadın pedi kullanımı becerisini kazandırmak amacıyla müdahale içeren çalışmalara ihtiyaç duyulduğu gözlenmektedir.

Alanyazında menstrüasyon dönemi için gerekli hijyen becerilerinin ediniminde özel gereksinimli bireylerin sıklıkla hijyenik kadın pedi kullanımını gerçekleştirememe, pedi uygun şekilde çamaşıra yerleştirememe ve kirlenen pedi yenisiyle değiştirememe, toplum kullanımına açık alanlarda (okul tuvaleti, alış-veriş merkezi tuvaleti gibi) hijyenik kadın pedini kullanmak istememe gibi sorunlarla karşılaştıkları ve bu sorunların giderilmesinde uzmanlarca verilecek eğitimlere ihtiyaç duydukları bildirilmektedir (Aktaş, 2020; Flavin, Shore, Miler ve Gray, 2019; Nurkhairulnisa vd., 2018).

Bununla ilgili olarak Aktaş'ın (2020) yürüttüğü çalışmada zihinsel yetersizliği olan öğrencilere menstrüel bakım becerilerinin öğretilmesinde aile ve uzman eğitimlerinin karşılaştırılması amaçlanmıştır. Çalışma sonucunda uzmanlar tarafından verilen eğitimlerin aileler tarafından verilen eğitimlerden daha etkili olduğu gözlenmiştir. Alanyazında uzmanlar tarafından verilen eğitimin daha etkili olduğu bilgisi doğrultusunda yürütülen bu çalışmada çalışmayı yapan kişi tarafından verilen eğitimin katılımcılara hijyenik kadın pedi kullanımı becerisinin öğretilmesinde etkili olacağı öngörülerek uygulamalar gerçekleştirilmiştir.

Özel gereksinimli bireylerin menstrüasyon dönemlerinde bağımsız olarak hijyenik kadın pedi kullanamamaları nedeniyle bir takım sorunlar yaşamaktadır. Bunlardan birisi okula devam etme sorunlarıdır (Sakallı-Gümüş ve Altınsoy, 2015). Alanyazında özel gereksinimli bireylerin aileleri çocuklarının bu dönemde bağımsız hareket edemediklerinden dolayı okula göndermek istemediklerini bildirmektedir (Aktaş, 2020). Menstrüasyon dönemi uzun süren ve her ay tekrarlayan bir dönem olmasından dolayı özel gereksinimli bireylerin bu dönemde de okula gidememeleri okulda öğrenecekleri akademik ve sosyal becerilerinden mahrum kalmalarına neden olmaktadır (Kang ve Chang, 2019). Özel gereksinimli bireylerin hijyenik kadın pedi kullanımını edinememelerinde bir diğer sorun hijyenik kadın pedi kullanımı beceri basamaklarının uzun ve karmaşık olmasıdır. Özellikle pedin yapışkan özelliğinin olması nedeniyle yürütülen bu çalışmanın katılımcılarının yapışkanla oynama ya da yapışkan maddeyi çamaşıra yerleştirmekten kaçınma gibi olumsuz davranışları sergilemelerine neden olmuştur. Bu sorunun giderilmesi için özel gereksinimli bireylerin gelişimsel özellikleri dikkate alınarak beceri öğretiminin başlangıcında kullanılacak kadın pedinde düzenlemeler yapılması beceriyi öğrenmelerini kolaylaştıracağı düşüncesiyle çalışmanın başında kanatsız hijyenik kadın pedi kullanımı tercih edilmiştir. Böylece katılımcıların yapışkanlı maddeden rahatsız olmaları ve kanatlı ped kullanımı daha fazla beceri basamağı gerektirdiğinden dolayı beceri basamak sayısını en aza düşürülmesiyle katılımcıların beceriyi sorunsuz şekilde edinimlerini kolaylaştırmıştır.

Hijyenik kadın pedi kullanımı becerisinin ediniminde özel gereksinimli bireylerin bilişsel gelişim düzeyleri önemli bir faktördür (Akdoğan, 2019). Yürütülen araştırmada hafif, orta ve ileri düzeyde OSB olan ergenler çalışma kapsamına dahil edilmiştir. Çalışma sonucunda hafif ve orta düzeyde OSB olan ergenlerin hijyenik kadın pedi kullanımı becerisini kısa sürede edindikleri gözlenirken ileri düzeyde OSB olan ergenin öğretim için daha uzun öğretim sürecine ihtiyaç duyduğu gözlenmiştir. Hijyenik kadın pedi kullanımı becerisinin yapısı gereği karmaşık bir beceri olması belirli düzeyde bilişsel gelişim gerektirdiği alanyazında Cummins, Pellicano ve Crane (2020) yürüttükleri çalışmalarında da kanıtlanmıştır. Araştırmacıların yürüttükleri çalışmada hijyenik kadın pedi kullanımını içeren menstrüel bakım becerilerinin öğretilmesi için gereken sürenin zihinsel yetersizliği olan bireylerde de değişkenlik gösterdiğini, öğretim süresinin ileri düzeyde zihinsel yetersizliği olan bireyler için uzatılması gerektiği bildirilmektedir. Bu doğrultudan kendini izleme stratejisinin kullanıldığı mevcut çalışmada ileri düzeyde OSB olan ergenlerin hijyenik kadın pedi kullanımını öğrenmeleri için becerinin daha uzun sürede ve kişisel ihtiyaçları dikkate alınarak öğretilmesinin uygun olacağı söylenebilir.

Mevcut çalışmada OSB olan ergenlerin hijyenik kadın pedi kullanımı becerisini edinimlerinde, beceriyi edinme, genelleme ve kalıcılık süreçleri üzerinde durulmuştur. Beceriyi edinme; uygulanan müdahale öncesinde katılımcıların müdahale öncesi performanslarının müdahale sonrasında hedeflenen ölçüte yaklaşması, genelleme; öğretilmesi hedeflenen davranışın farklı ortam, araç gereç ve kişilere karşı sergilenmesi, kalıcılık; uygulanan müdahalenin sonucunda edinilen davranışın müdahale sonlandırıldıktan sonra üzerinden belli bir zaman geçmesine rağmen davranışın gerçekleştirilmesi olarak

tanımlanmaktadır (Aykut, 2007). Yürütülen çalışmada OSB olan ergenlerin kendini izleme stratejisi kullanılarak hijyenik kadın pedi kullanımı becerisini edindikleri, ikincil yakınlarının evinde (babaanne evi, komşu vb.) edindikleri beceriyi gerçekleştirebildikleri yani genelleyebildikleri ve müdahale sonlandırıldıktan iki hafta sonra edindikleri beceriyi sürdürdükleri yani becerinin katılımcılar üzerinde kalıcı olduğu gözlemlenmiştir.

Yürütülen çalışmada OSB olan ergenlere hijyenik kadın pedi kullanımı becerisinin öğretiminde katılımcıların kendi üzerinde uygulamalar gerçekleştirilmiştir. Alanyazında özel gereksinimli bireylere menstrüel bakım becerilerinin öğretilmesinde katılımcıların kendi üzerinde, oyuncak bebek modeli üzerinde ve video model yöntemi kullanılarak uygulamalar yapıldığı görülmektedir (Ersoy, Tekin-İftar ve Kırcaali-İftar, 2009; Gönenç, Çalbayram, Altundağ ve Aktaş, 2020; Öncül ve Yücesoy-Özkan, 2010). Menstrüel bakım becerilerinin katılımcıların kendi üzerinde öğretiminin yapılması toplumumuzda mahremiyete yönelik endişelere neden olsa da alanyazında menstrüel bakım becerilerinin katılımcılar üzerinde uygulamalar yapılarak öğretilmesinin daha etkili olduğu, aksi takdirde katılımcıların öğrendikleri becerileri daha sonra kendi üzerinde denemelerinde yani becerileri genellemelerinde sınırlılığa sebep olduğu bildirilmektedir (Aktaş, 2020). Bu nedenle OSB olan ergenlere hijyenik kadın pedi kullanımı becerisinin katılımcıların kendi üzerinde çalışma yapılmasının mevcut araştırmanın araştırmacısı tarafından daha etkili olacağı düşünülmüş ve çalışma bu kapsamda yürütülmüştür. Mevcut araştırmada katılımcılar üzerinde hijyenik kadın pedi kullanımı becerisinin öğretilmesinin etkili olduğuna dair bulgular alanyazındaki diğer araştırma bulguları ile desteklenmektedir (Epps, Stem ve Horner, 1990; Kuloğlu-Aksaz ve Fırat, 1992).

Menstrüasyon toplumumuzda konuşulmaması gereken bir konu olması gerektiği konusunda yanlış bir algıya sahiptir (Dewinter vd., 2015). Menstrüasyonla ile ilgili yanlış algılar özel gereksinimli bireylerin yaşamlarını olumsuz etkilemekte (Öncü, Aktaş, Vayısoğlu ve Karakuş, 2019), özel gereksinimli bireylerin ve ailelerinin menstrüel bakım becerileri ile ilgili destek sistemlerinden (öğretmen, sağlık uzmanları, sağlık kuruluşları vb.) faydalanamamaktadır (Sakallı-Gümüş ve Altınsoy, 2015; Uzun, 2015). Özel gereksinimli bireylerin ve ailelerinin menstrüasyon dönemlerinde gerekli bakım becerilerine sahip olamadıkları ve destek sistemlerinden faydalanamadıkları için yaşamlarının olumsuz etkilenmesi mevcut çalışmanın önemini ortaya koymakta ve bu yönüyle alanyazında özel gereksinimli bireylere menstrüel bakım becerilerinin öğretiminin önemi ile ilgili bulgularıyla uyuşmaktadır.

Çalışmanın bulguları OSB olan ergenlere hijyenik kadın pedi kullanımı becerisinin ediniminde, becerinin farklı ortamlara genellenmesinde ve müdahale sonlandırıldıktan sonra becerinin sürdürülmesinde kendini izleme stratejisinin etkililiğini ortaya koymaktadır. Bununla birlikte çalışmadan elde edilen bulgular okuyuculara ve ileride menstrüel bakım becerileri ile çalışma yapacak araştırmacılara yöntemsel bir çerçeve sunması bakımından önemli olduğu düşünülmektedir. Toplumun önyargılarının azalması ile birlikte menstrüasyon dönemi ile ilgili becerilerin ediniminde müdahaleye yönelik çalışmaların artacağı öngörülmektedir. Bu çalışmanın önemli olduğu düşünülen bulgularının yanı sıra bir takım sınırlıkları bulunmaktadır. Örneğin; özel gereksinim gruplardan sadece OSB olan ergenlerle çalışma yürütülmüş olması çalışma sonuçlarının tüm özel gereksinimli bireylere genellenebilirliği açısından mevcut çalışmanın sınırlılığını oluşturmaktadır. Başka bir sınırlılığı ise çalışmanın sonlandırılmasında hedeflenen süreyi aştığı için ileri düzeyde OSB olan ergenlerle çalışma yapılamamış ve yürütülen çalışma sonlandırılmıştır. Bu nedenle ileri düzeyde OSB olan ergenlerin hijyenik kadın pedi kullanımı becerisinin ediniminde kendini izleme stratejisinin etkililiğine ilişkin bulgular elde edilememiştir.

Bu nedenle ileri araştırmalarda ileri düzeyde OSB olan ergenlerin hijyenik kadın pedi kullanımı becerisinde kendini izleme stratejisinin etkililiği incelenebilir. Çalışma sonuçlarının daha genellenebilir olması açısından farklı özel gereksinim grupları arasında hijyenik kadın pedi kullanımı becerisi üzerinde kendini izleme stratejisinin etkililiği tekrarlanabilir. Ayrıca kendini izleme stratejisi kullanılarak mahremiyet kuralları ve toplumun kültürel yapısı göz ardı edilmeksizin anneler ve kızlarının birlikte uygulama yapması ve sonuçlarının değerlendirilmesine ilişkin bir aile eğitim programı geliştirilerek çalışmalar yapılması önerilebilir. Bu alanda çalışan uzmanlar, özel gereksinimli bireyler ve ailelerinin bağımsız şekilde hijyenik kadın pedi kullanımını gerçekleştiremeyeceklerine ilişkin endişelerinin giderilmesi için özel eğitim alanında uzman kişiler tarafından destek programları geliştirilerek evde kullanılabilir kaynaklar sağlanabilir. Bununla birlikte OSB olan ergenlerin menstrüasyon dönemini hazır olarak karşılamaları için menstrüasyon dönemine girmeden önce OSB olan ergenlere hijyenik kadın pedi kullanımı becerisi çalışmalarına başlanması ve düzenli aralıklarla değerlendirilmesi önerilebilir.

KAYNAKLAR

Agran, M., King-Sears, M., Wehmeyer, L. M., & Copeland, S. R. (2003). Student-directedlearning. Paul H. Brookes Publishing Co Inc.

Akdoğan R. E. (2019). Ergenlik dönemi öğrencilere kurumda gelişimsel destek. Eskişehir: Anadolu Üniversitesi.

Aktaş, G. (2020). Zihinsel yetersizliği olan ergenin menstrüasyon öz bakım becerisini geliştirmede hemşire ve ebeveyn eğitiminin karşılaştırmalı etkililiği. (Yayımlanmamış yüksek lisans tezi). Mersin Üniversitesi, Sağlık Bilimleri Enstitüsü, Mersin.

Alberto, P., & Troutman, A. C. (2013). Applied behavior analysis for teachers. Upper Saddle River, NJ: Pearson

Alussaif, E. A. A. (2020). Improving reading comprehension for students with intellectual disability: The effectiveness of the main ıdea and self-monitoring strategy. University of California, Riverside.

Amato-Zech, N. A., Hoff, K. E., & Doepke, K. J. (2006). Increasing on-task behavior in the classroom: Extension of self-monitoring strategies. Psychology in the Schools, 43(2), 211- 221.

Aykut Ç. (2007). Zincirleme becerilerin kazandırılmasında ipucunun sistematik olarak azaltılması işlem süreci ile yapılan beceri öğretiminin etkisi. GÜ, Gazi Eğitim Fakültesi Dergisi, 27(3), 221-238.

Bigge, J. L., Stump, C. S., Spagna, M. E., & Silberman, R. K. (1999). Curriculum, assessment and instruction for students with disabilities. Belmont, CA: Wadsworth Publishing.

Browder, D. M., & Shapiro, E. S. (1985). Applications of self-management to individuals with severe handicaps: A review. Journal of the Association for Persons with Severe Handicaps, 10(4), 200-208.

Büyüksoy GD, Ahi S. (2023). Adölesanların menstruasyon döneminde karşılanmamış sağlık hizmeti gereksinimleri ve ilişkili faktörler. Ordu Üniversitesi Hemşirelik Çalışmaları Dergisi, 6(3), 568-577. DOI:10.38108/ouhcd.1218288

Cummins, C., Pellicano, E., & Crane, L. (2020). Supporting minimally verbal autistic girls with ıntellectual disabilities through Puberty: Perspectives of parents and Educators. Journal of Autism and Developmental Disorders, 50(7), 2439-2448.

Dewinter, J., Vermeiren, R. Vanwesenbeeck, I., Lobbestaeil, J. &VanNieuwenhuizen, C. (2015). Sexuality İn AdolecentBoysWithAutismSpectrumDisorder: Self ReportesBehaviorsAndAttitudes. *Journal Of AutismAndDevelopmentalDisorders, 45(3),* 731-741. Doi: 10.1007/s10803-0142226-3

Dündar, T., & Özsoy, S. (2017). Menstrual Hijyen ve görme engelliler. Hemşirelikte Eğitim ve Araştırma Dergisi, 15(3), 192-194.

Epps, S., Prescott, A. L., & Horner, R. H. (1990). Social acceptability of menstrual-care training methods for young women with developmental disabilities. Education and Training in Mental Retardation, 25(1), 33-44.

Ersoy, G., Tekin-İftar, E., & Kırcaali-İftar, G. (2009). Effects of antecedent promptand test procedure on teaching simulated menstrual care skills to females with developmental disabilities. Educationand Training in Developmental Disabilities, 44(1), 54-66.

Flavin, M., Shore, B. J., Miller, P., & Gray, S. (2019). Hormonal contraceptive prescription in young women with cerebral palsy. Journal of Adolescent Health, 65(3), 405-409.

Gevşek, S. (2016). *Zihin yetersizliği olan öğrencilere yemek pişirme becerilerini kazandırmada kendini yönetme stratejilerinin etkisi* (Doctoral dissertation, Doktora tezi, Gazi Üniversitesi Eğitim Bilimleri Enstitüsü, Zihin Engellilerin Eğitimi Anabilim Dalı, Ankara.

Gölbaşı, Z., Doğaner, G., & Erbaş, N. (2012). 6-8. sınıf adolesan kızlara akran eğitimi yöntemiyle uygulanan menstruasyon sağlığı eğitiminin bilgi ve davranışlar üzerindeki etkisi. TAF Prev Med Bull, 11(2), 191-98.

Gönenç, M. İ., Çalbayram, Ç. N., Altundağ, S., & Aktaş, Ö. (2020). Determination of the efficiency of menstruation hygiene training given to trainable ıntellectual disability adolescent girls. Ankara Med J, 20(1), 57-68.

Gushanas, C. M., & Thompson, J. L. (2019). Effect of self-monitoring on personal hygiene among ındividuals with developmental disabilities attending postsecondary education. Career Development and Transition for Exceptional Individuals, 42(4), 203-213.

Gümüş, S. S., & Altınsoy, M. (2015). Hatay okullarında engellilerin cinsel eğitimi durum değerlendirmesi. *Adnan Menderes Üniversitesi Eğitim Fakültesi Eğitim Bilimleri Dergisi*, *6*(2), 63-72.

Kang, Y. S., & Chang, Y. J. (2019). Using a motion-controlled game to teach four elementary school children with intellectual disabilities to improve hand hygiene. Journal of Applied Research in Intellectual Disabilities, 32(4), 942-951.

Koyun, A., Özpulat, F., Bahar, & Özvarış, Ş. (2013). Bir eğitim programı geliştirme ve değerlendirme süreci: Ortaöğretim kız öğrencileri için "genital hijyen" eğitim programı. Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi, 2(4),443-459.

Kuhlmann AS, Bergquist EP, Danjoint D, Wall LL. (2019). Unmet menstrual hygiene needs among lowincome women. Obstetrics & Gynecology, 133, 238244.

Kuloğlu-Aksaz, N., & Fırat, A. (1992). Ergenlik çağındaki özürlü bireylere mensturasyon döneminde gerekli olan temizlik alışkanlıklarının kazandırılması. Özel Eğitim Dergisi, 1(2), 37-41.

Nurkhairulnisa, A. I., Chew, K. T., Zainudin, A. A., Lim, P. S., Shafiee, M. N., Kampan, N., ... & Azurah, A. G. N. (2018). Research article management of menstrual disorder in adolescent girls with ıntellectual disabilities: A blessing or a curse? Obstetrics and Gynecology International, 2018, 1-5.

Öncü, E., Aktaş, G., Vayısoğlu, S. K., & Karakuş, E. (2019). Zihinsel engelli ergenlerin cinsel gelişim özellikleri ve ailelerin yaşadığı güçlükler: Tanımlayıcı çalışma. Mersin Üniversitesi Sağlık Bilimleri Dergisi, 12(3), 413-425.

Öncül, N., & Yücesoy-Özkan, Ş. (2010). Orta ve ileri düzeyde zihin yetersizliği olan yetişkinlere videoyla model olma kullanılarak günlük yaşam becerilerinin öğretilmesi. Anadolu Üniversitesi Sosyal Bilimler Dergisi, 10(3), 143-156.

Özdemir, S., Ortabağ, T., Tosun, B., Özdemir, Ö., & Bebiş, H. (2012). Hemşirelik yüksek okulu öğrencilerinin genital hijyen hakkındaki bilgi düzeylerinin ve davranışlarının değerlendirilmesi. Gülhane Tıp Dergisi, 54(2), 120-128.

Rafferty, L.A. (2010) Step-by-step teaching students to self-monitoring. Teaching Exceptional Children, 43(2), 50-58.

Rock, M. L., & Thead, B. K. (2007). The effects of fading a strategic self-monitoring ıntervention on students' academic engagement, accuracy, and productivity. Behav Educ 16(4), 389-412.

Romans, S. K. (2017). The effect of web-based self-monitoring, ı-connect, to ıncrease on-task behavior of high school students with autism (Unpublished master's thesis). The Graduate College of Missouri State University, Missouri.

Sinop-Gedik, A. (2016). Adolesanlara verilen planlı eğitimin menstruasyon ve genital hijyen davranışına etkisinin belirlenmesi (Yayınlanmamış yüksek lisans tezi). Yıldırım Beyazıt Üniversitesi, Sağlık Bilimleri Enstitüsü, Ankara.

Sönmez-Kartal, M., & Yücesoy-Özkan, Ş. (2012). Gelişimsel yetersizliği olan öğrencilere dışarı çıkmak üzere uygun şekilde hazırlanma becerisinin öğretiminde kendini yönetme stratejilerinin etkileri. Anadolu Üniversitesi Sosyal Bilimler Dergisi, 12(1), 151-166.

Şencan, H. (2005). Sosyal ve davranışsal ölçümlerde güvenilirlik ve geçerlilik. Ankara: Seçkin Yayıncılık.

Tekin-İftar, E. (2018). Özel eğitimde bilimsel-dayanaklı uygulamalar: Tarihçe, tanım ve öneriler. Araştırmadan Uygulamaya Özel Eğitim Dergisi, 1(1), 15-20.

Tekin-İftar, E., & Kırcaali-İftar, G. (2001). Özel eğitimde yanlışsız öğretim yöntemleri. Ankara: Nobel Yayın Dağıtım Ltd. Şti.

Tortumluoğlu, G., Tüfekçi, F., Özyazıoğlu, N., & Sezgin, S. (2004). Kırsal alanda yaşayan kız çocuklarının menarşa yönelik emosyonel tepkilerinin saptanması. Atatürk Üniversitesi Hemşirelik Yüksekokulu Dergisi. 7(2), 77-78.

Turan, T., & Ceylan, S. S. (2007). 11-14 yaş grubu ilköğretim öğrencilerinin menstruasyona yönelik bilgileri ve uygulamaları. Fırat Sağlık Hizmetleri Dergisi, 2(6), 41-54.

Wood, S. J., Murdock, J. Y., Cronin, M. E., Dawson, N. M., & Kirby, P. C. (1998). Effects of selfmonitoring on on-task behaviors of at-risk middle school students. Journal of Behavioral Education, 8(2), 263-279.

Yücesoy-Özkan, Ş. (2007). Yetersizlik gösteren bireylere giyinme becerilerinin öğretimiyle, ilgili alan yazın taraması. Ankara Üniversitesi Eğitim Bilimleri Fakültesi Özel Eğitim Dergisi, 8(01), 61-80.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

İŞİTME KAYIPLI BİREYLER VE İLETİŞİM BOYUTUNDA YAPAY ZEKÂNIN ROLÜ

Dr. Öğr. Üyesi Şule YANIK
Trabzon Üniversitesi, Fatih Eğitim Fakültesi, Özel Eğitim Bölümü
ORCID: 0009-0000-5389-881X

ÖZET
İnsanlar için doğumdan itibaren en önemli unsur iletişimdir ve iletişim ihtiyacı sözlü dil yolu ile karşılanmaktadır. İşitme kayıplı bireyler söz konusu olduğunda ise işitme kaybının sözlü dilin edinilmesi sürecini bazı durumlarda zorlaştırdığı ve geciktirdiği bazı durumlarda ise tamamıyla engellediği görülmektedir. Şüphesiz bu durum üzerinde işitme kaybının türü, derecesi ve meydana geldiği yaş da etkili olmaktadır. Buradan hareketle işitme kayıplı bireylerin sözel, işaret dili, her iki yöntemin eş zamanlı olarak kullanılmasıyla oluşan karma (parmak alfabesi, işaret, dudak okuma ve sözlü dil) ve önce işaret dilinin ardından sözlü dilin öğetiminin temel alındığı çift dil yaklaşımı ile iletişim kurdukları bilinmektedir. Söz konusu iletişim olduğunda son yıllarda teknolojik gelişmeler ve yapay zekâ uygulamaları ile birlikte uluslararası ve ulusal alandaki yazılım mühendisliği, programcı ve bilgi teknolojileri alanındaki uzmanların işitme kayıplı bireylerin iletişim kurmaları yönündeki engelleri aşmak için yoğun çaba içerisinde oldukları görülmektedir. Bu bağlamda bu araştırma kapsamında Türkiye'de işitme kayıplı bireylerin iletişim ve dil alanında yaşadıkları zorlukların önüne geçmek amacıyla yapılan çalışmalar yapay zekâ çerçevesinde incelenmiş, alanyazın taraması yapılmış ve araştırma derleme çalışması olarak tasarlanmıştır. Bu kapsamda ülkemizde sadece 2005-2024 yılları arasında 6 yüksek lisans, 4 doktora ve 1 konferans çalışması olmak üzere toplam 11 çalışmanın yapıldığı görülmüştür. Ulaşılan çalışmalar araştırma türü, yayımlanma yılı, yayımlanılan üniversite, enstitü, ana bilim dalı ve konu alanları göz önünde bulundurularak özetlenmiş, sınıflandırılmış, karşılaştırılmış, analiz edilmiş ve sonuçlar yorumlanmıştır. İlgili alana ve çalışmalara 2021 yılından bu yana daha yoğun ilgili gösterildiği, en çok Fen Bilimleri Enstitüsü ve Bilgisayar Mühendisliği Anabilim Dalları'nda çalışmalar yapıldığı, yüksek lisans çalışmalarının daha çok yapıldığı, konu alanlarının ise sırasıyla "Yapay zekâ aracılığı ile işaret dilindeki harflerin, sayıların, kelimelerin tanınması", "Konuşma ya da metnin işaret diline çevrilmesi", "İşaret dilinin metne çevrilmesi, "Dudak okuma" ve "Bir robot aracılığı ile işaret dilinin öğretilmesi" şeklinde çeşitlendirildiği görülmüştür. Ulaşılan çalışmalar hem literatüre ve alana sağladığı katkı hem de işitme kayıplı bireyler üzerindeki etkililiği ve kullanılabilirliği boyutunda ele alınarak yorumlanmıştır.
Anahtar Kelimeler: işitme kayıplı bireyler, iletişim, yapay zekâ

HEARING LOSS INDIVIDUALS AND THE ROLE OF ARTIFICIAL INTELLIGENCE IN COMMUNICATION

ABSTRACT
The most important element for humans from birth is communication and the need for communication is met through oral language. When it comes to individuals with hearing loss, it is seen that hearing loss makes the process of acquiring spoken language difficult and delayed in some cases, and in some cases it prevents it completely. Undoubtedly, the type and degree of hearing loss and the age at which it occurs are also effective on this situation.

From this point of view, it is known that individuals with hearing loss communicate with verbal, sign language, mixed (finger alphabet, sign, lip reading and oral language) and bilingual language approaches based on the teaching of sign language first and then oral language. When it comes to communication, it is seen that in recent years, with technological developments and artificial intelligence applications, experts in the field of software engineering, programmers and information technologies in the international and national area have been making intense efforts to overcome the barriers to communication for individuals with hearing loss. In this context, within the scope of this research, the studies carried out in Turkey in order to prevent the difficulties experienced by individuals with hearing loss in the field of communication and language were examined within the framework of artificial intelligence, a literature review was conducted and the research was designed as a review study. In this context, it has been observed that a total of 11 studies, including 6 master's, 4 doctoral and 1 conference study, were conducted in Turkey between 2005 and 2024. The studies were summarized, classified, compared, analyzed and the results were interpreted by considering the type of research, year of publication, university, institute, main discipline and subject areas. It has been observed that there has been a more intense interest in the related field and studies since 2021, most of the studies have been conducted in the Graduate School of Natural and Applied Sciences and Computer Engineering Departments, master's studies have been conducted more, and the subject areas have been diversified as "Recognition of signs, numbers, words in sign language through artificial intelligence", "Translation of speech or text into sign language", "Translation of sign language into text, "Lip reading" and "Teaching sign language with a robot", respectively. The studies were discussed and interpreted in terms of their contribution to the literature and the field as well as their effectiveness and usability on individuals with hearing loss.
Keywords: individuals with hearing loss, communication, artificial intelligence

GİRİŞ

İşitme kaybı, işitme üzerinde en önemli organ olan kulağın ve dolayısıyla işitme yetisinin görevini yerine getirememesi, çevredeki sesleri algılayamaması olarak tanımlanmaktadır (Mucuk, 2022). Bu nedenle işitme kayıplı bireylerin çevrelerindeki işitmeye ilişkin olayları anlamaya ve kendilerini ifade etmeye ilişkin farklı iletişim yöntemlerinden yararlandıkları belirtilmektedir (Gürboğa ve Kargın, 2003). İşitme kayıplı bireylerin çevrelerindeki kişileri anlamaya yönelik kullandıkları iletişim yöntemleri işaret, dinleme, yazma, tercüman kullanma, dudak okuma şeklinde gerçekleşirken, kendilerini ifade etmeye yönelik kullandıkları iletişim yöntemlerinin ise işaret, konuşma, hem işaret hem konuşma, yazma, tercüman kullanma şeklinde gerçekleştiği belirtilmektedir (Gürboğa ve Kargın, 2003; Polat, 1995; Yavuz, 2007). Bu bakış açısıyla işitme kayıplı bireylerin kullandıkları temel iletişim yaklaşımlarına izleyen başlıkta yer verilmiştir.

İşitme Kayıplı Bireylerin Kullandıkları İletişim Yaklaşımları

Bu başlık altında işitme kayıplı bireylerin iletişim kurmak amacıyla kullandıkları üç temel yaklaşım olan sözlü dil, dudak okuma ve işaret dili ele alınmıştır.

Sözlü Dil

Sözlü dil yaklaşımında, işitme kayıplı bireylerin var olan işitme kalıntılarından maksimum düzeyde yararlanmaları, uygun işitme cihazını erken yaşlarda kullanmaya başlamaları ve erken eğitime başlamaları benimsenmektedir (Shivaprakash ve Castro, 2019).

Burada önemli olan nokta işitme kayıplı bireylerin belirtilen koşullar sağlandıktan sonra zengin bir dil yaşantısı ile donatılmasıdır (Hogan, Stokes, White, Tyszkiewicz ve Woolgar, 2008). Bu yaklaşım doğal işitsel sözel yaklaşım olarak adlandırılmaktadır (Clark, 1989).

Dudak Okuma

Dudak okuma, işitme desteği (dinleme) ile birlikte dudağın hareketleri, yüz hareketleri ve jestler ile konuşulanların anlaşılmaya çalışılmasıdır (Akçamete, 2003).

İşaret Dili

İşaret dili, sözlü dilin kullanılamadığı durumlarda işitme kayıplı bireylerin duygu, düşünce ve iletişim ihtiyaçlarını karşılamak amacıyla el ve yüz hareketleri ile aynı zamanda vücut hareketlerini de kullanarak gerçekleştirdikleri bir iletişim yaklaşımıdır (Akalın, 2014; Bakr, 2022).

Türk İşaret Dili bağlamında beş temel özellikten söz edilmektedir (Napoli, 2019). Bunlar; elin şekli, konumu, hareketi, yönelimi ve el dışı işaretler şeklindedir. Elin şekli, işaret yapılırken elin hangi şekilde (düz, v şekli, pençe vb.) olduğunu; elin konumu işaret yapılırken elin nerede (omuz, kol, baş, gövde vb.) olduğunu; elin hareketi işaret yapılırken elin hareket şeklinin (yukarıdan aşağıya, aşağıdan yukarıya, iki yana vb.) ne olduğu; el yönelimi işaret yapılırken elin vücuda göre aldığı konumu (avuç içi yukarı, aşağı vb.); el dışı işaretler el dışındaki (yüz, baş, gövde, göz vb.) kullanılan işaret bileşenlerini ifade etmektedir (Napoli, 2019).

İşitme kayıplı bireylerin yukarıda özetlenen iletişim yaklaşımları ile iletişim kurabildikleri görülürken yine de toplumsal hayatta birtakım iletişim zorlukları ile karşı karşıya kaldıkları görülmektedir (Alsancak, 2022; Bulgan ve Ergençiçeği, 2021; Göktaş ve Bulgan, 2016). İzleyen başlıkta bu sorunlar genel anlamıyla özetlenmiştir.

İşitme Kayıplı Bireylerin Yaşadıkları İletişim Zorlukları

İşitme kayıplı bireyler de işitenler gibi toplumsal hayatta aktif yer almakta, okul, hastane, devlet dairesi, banka, restoran ve kafelerde bulunmakta ve aynı zamanda telefon yolu ile de iletişim kurmaktadır (Alsancak, 2018; Haksız ve Nuri, 2023). Dolayısıyla her işitme kayıplı bireyin sözlü dil yolu ile iletişim kurmasının mümkün olmaması, sözlü dil ile birlikte dudak okuma ya da işaret dilini de kullanması, ancak bu tür iletişim yaklaşımlarını kullandıklarında hem kendilerini işiten ve sadece sözlü dili kullanan bireylere ifade etmekte hem de onlar tarafından yöneltilen sözlü dili anlamakta zorlandıkları vurgulanmaktadır (Alsancak, 2022; Bulgan ve Ergençiçeği, 2021; Göktaş ve Bulgan, 2016; Haksız ve Nuri, 2023).

İşitme kayıplı bireylerin iletişim bağlamında yukarıda bahsedilen toplumsal hayatta yaşadıkları zorluklar göz önünde bulundurulduğunda son yıllarda teknolojik gelişmeler ve yapay zekâ uygulamaları ile birlikte uluslararası ve ulusal alandaki yazılım mühendisliği, programlama ve bilgi teknolojileri alanındaki uzmanların işitme kayıplı bireylerin iletişim kurmaları yönündeki engelleri aşmak için yoğun çaba içerisinde oldukları görülmektedir (Kumdereli, 2024; Pourmousa, 2022; Tombaloğlu, 2021). İzleyen başlıkta iletişim başta olmak üzere işitme kayıplı bireylere yönelik olarak gerçekleştirilen yapay zekâ çalışmalarına yer verilmiştir.

İşitme Kayıplı Bireyler ve Yapay Zekâ Uygulamaları

Yapay zekâ, düşünme ve insan gibi davranabilme özelliklerine sahip, insanlar tarafından üretilen, öğrenme, akıl yürütme, dili anlama ve karmaşık problemleri çözme becerilerine sahip olan akıllı bir yapı olarak tanımlanmaktadır (Arslan, 2020).

Birçok alanda olduğu gibi son zamanlarda ülkemizde işitme kayıplı bireyler bağlamında yapay zekâ çalışmalarının yaygınlaşmaya başladığı görülmektedir (Bağlayıcı, 2021; Baştürk, 2023; Çankaya, 2022; Çetinkaya, 2023; Dişçi, 2021; Er, 2020; Gök, 2021; Gürpınar, 2023; Uludağ, 2020; Verim, 2023). Gerçekleştirilen çalışmalardaki konu alanlarının odyometri uzmanına gerek kalmadan okul, aile sağlığı ve halk sağlığı merkezlerinde ön teşhis koyma amacıyla yapay zekâ destekli odyometri ölçüm sistemi tasarlamak (Er, 2020); bilgisayar desteği ile odyogramların otomatik olarak okunması, değerlendirilmesi ve dijitalleştirilmesini sağlamak (Baştürk, 2023), odyoloji terapisi için işitsel duygusal oyun tasarlamak (Verim, 2023); derin öğrenme yöntemi kullanarak işitme kaybı tür ve derecelerini ayırt etmek (Dişçi, 2021); işitme kayıplı bireylerin doğru işitme cihazından yararlanmalarını sağlamak (Çetinkaya, 2023); yapay zekâ tabanlı işitme cihazı geliştirmek (Çankaya, 2022); koklear implant kullanan bireylerin derin öğrenme aracılığı ile ses duygu analizi yapmak (Bağlayıcı, 2021; Gök, 2021; Gürpınar, 2023; Uludağ, 2020), yardımcı robotlar aracılığı ile sosyal davranış öğrenimi sağlamak (Uluer, 2023) şeklinde sıralandığı görülmektedir. Görülebileceği gibi belirtilen çalışmalar; tanı ve değerlendirme, cihazlandırma, tanı ve cihazlandırma sonrasında işitme kayıplı bireye destek sağlama ve duyguları tanıma ile sosyal etkileşim ortamı sağlama şeklinde farklılaşmaktadır. Bu çalışmalarla birlikte son zamanlarda araştırmacıların eğilimlerinin işitme kayıplı bireylerin iletişim ve dil alanında yaşadıkları zorlukların önüne geçmeye yönelik olduğu ve bu alana yoğunlaştıkları görülmektedir (Akalın, 2014; Bakr, 2022; Bankur, 2021; Çelik, 2019; Kumdereli, 2024; Pourmousa, 2022; Tombaloğlu, 2021).

Araştırmanın Amacı

Bu araştırma kapsamında Türkiye'de işitme kayıplı bireylerin iletişim ve dil alanında yaşadıkları zorlukların önüne geçmek amacıyla yapılan çalışmalar yapay zekâ çerçevesinde incelenmiş ve alanyazın taraması yapılmıştır. Bu amaç doğrultusunda alanyazında şu ana kadar yapay zekâ yolu ile işitme kayıplı bireylerin iletişim alanında yaşadıkları zorlukların önlenmesine ilişkin yapılan çalışmaların ileriki araştırmalar için bir yol haritası oluşturması ve geliştirilen sistemlerin bir ileri seviyeye ulaştırılarak aşama kaydedileceği düşünülmüştür. Bu amaç doğrultusunda Türkiye'de 2005-2024 yılları arasında yayımlanan 6 yüksek lisans tezi, 4 doktora tezi ve 1 konferans çalışmasına ulaşılmıştır. Ulaşılan çalışmalar hem literatüre ve alana sağladığı katkı hem de işitme kayıplı bireyler üzerindeki etkililiği ve kullanılabilirliği boyutunda ele alınarak yorumlanmıştır.

YÖNTEM

Araştırma Modeli

Türkiye'de işitme kayıplı bireylerin iletişim ve dil alanında yaşadıkları zorlukların önüne geçmek amacıyla yapılan çalışmaların yapay zekâ çerçevesinde incelenmesinin amaçlandığı bu çalışma derleme çalışması olarak tasarlanmıştır. Derleme çalışmaları, odaklanılan konu alanı ile ilgili literatürün taranması ile birlikte elde edilen bilgilerin bir araya getirilmesi, özetlenmesi, sınıflandırılması, karşılaştırılması, analiz edilemsi ve yorumlanması süreçlerini kapsamaktadır (Karaçam, 2013; Millar, 2004). Bu kapsamda, "YÖK Tez" ve "Google Akademik" veri tabanlarında "işitme kayıplı bireyler, yapay zekâ, iletişim" anahtar kelimeleri kullanılarak tarama yapılmıştır. Yapılan tarama sonucunda 11 çalışmaya ulaşılmıştır.

BULGULAR

Bu derleme çalışması kapsamında Türkiye'de işitme kayıplı bireylerin iletişim ve dil alanında yaşadıkları zorlukların önüne geçmek amacıyla yapay zekânın kullanıldığı toplam 11 çalışmaya ulaşılmıştır. İlgili araştırmalara Tablo 1'de yer verilmiştir.

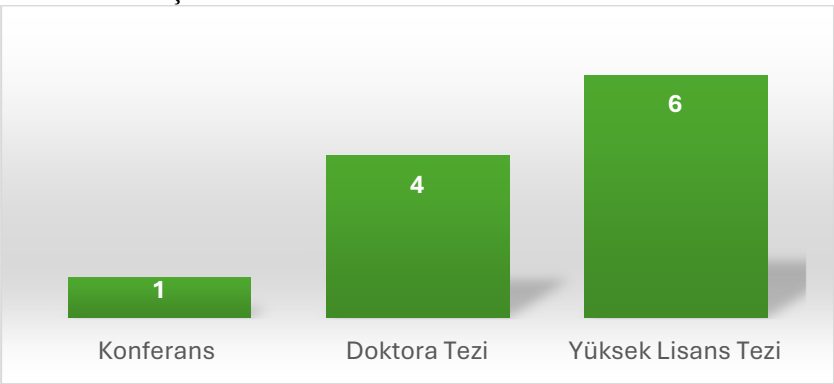
Tablo 1. Ulaşılan Araştırmalara İlişkin Genel Bilgiler

Sayı	Tür	Üniversite	Enstitü/Anabilim Dalı	Yazar	Başlık
1	Doktora Tezi	Trakya Üniversitesi	Fen Bilimleri/ Bilgisayar Mühendisliği	Kumdereli, 2024	İşitme Engelli Bireylerle İletişimde Imu ve Semg Sensör Verilerini Kullanacak Bir Sistem Geliştirilmesi
2	Konferans	Kırıkkale Üniversitesi	-	Demir, Peker ve Savaş, 2024	İşaret Dilinin Dijital Sesi: Mediapipe ve LSTM Uygulaması
3	Yüksek Lisans Tezi	İstanbul Üniversitesi	Cerrahpaşa Lisansüstü Eğitim Enstitüsü, Elektrik-Elektronik Mühendisliği	Bakr, 2022	Python PyAudio Modülü Kullanarak Konuşma Dilinden İşaret Diline Makine Öğrenmesi Tabanlı Tercüme Sistemi
4	Doktora Tezi	Eskişehir Osmangazi Üniversitesi	Fen Bilimleri/ Matematik Bilgisayar	Çelik, 2019	Yapay Zekâ Tekniğiyle İşitme Engelliler İçin Uzaktan İletişim Sistemi
5	Yüksek Lisans Tezi	Fırat Üniversitesi	Fen Bilimleri/ Adli Bilişim Mühendisliği	Bankur, 2021	Derin Öğrenme Temelli Türk İşaret Dili Harflerinin Tanınması
6	Yüksek Lisans Tezi	Yıldız Teknik Üniversitesi	Fen Bilimleri/ Bilgisayar Mühendisliği	Haberdar, 2005	Saklı Markov Model Kullanılarak Görüntüden Gerçek Zamanlı Türk İşaret Dili Tanıma Sistemi
7	Yüksek Lisans Tezi	Ankara Üniversitesi	Fen Bilimleri/ Elektrik Elektronik Mühendisliği	Güler, 2021	Derin Öğrenme Kullanarak İşaret Dili Rakam Tanıma
8	Doktora Tezi	Başkent Üniversitesi	Fen Bilimleri/ Elektrik Elektronik Mühendisliği	Tombaloğlu, 2021	Türkçe Otomatik Konuşma Tanıma ve İşaret Diline Çevirme
9	Yüksek Lisans Tezi	İstanbul Teknik Üniversitesi	Fen Bilimleri/ Bilgisayar Mühendisliği	Akalın, 2014	İnsansı Robot Destekli İşaret Dili Öğretimi
10	Doktora Tezi	Atatürk Üniversitesi	Sosyal Bilimler/Yönetim Bilişim Sistemleri	Pourmousa, 2022	Türk Dilinde Derin Öğrenme ile Dudak Okuma
11	Yüksek Lisans Tezi	Karadeniz Teknik Üniversitesi	Fen Bilimleri/ Bilgisayar Mühendisliği	Yavuz, 2007	Bilgisayarlı Dudak Okuma

Araştırmaların Türleri

Araştırma kapsamında 6 yüksek lisans tezi, 4 doktora tezi ve 1 konferans çalışmasına ulaşılmıştır. Bu noktada 1 tane de konferans çalışması bulunmaktadır. Araştırma türlerine ilişkin bulgulara Tablo 2'de yer verilmiştir.

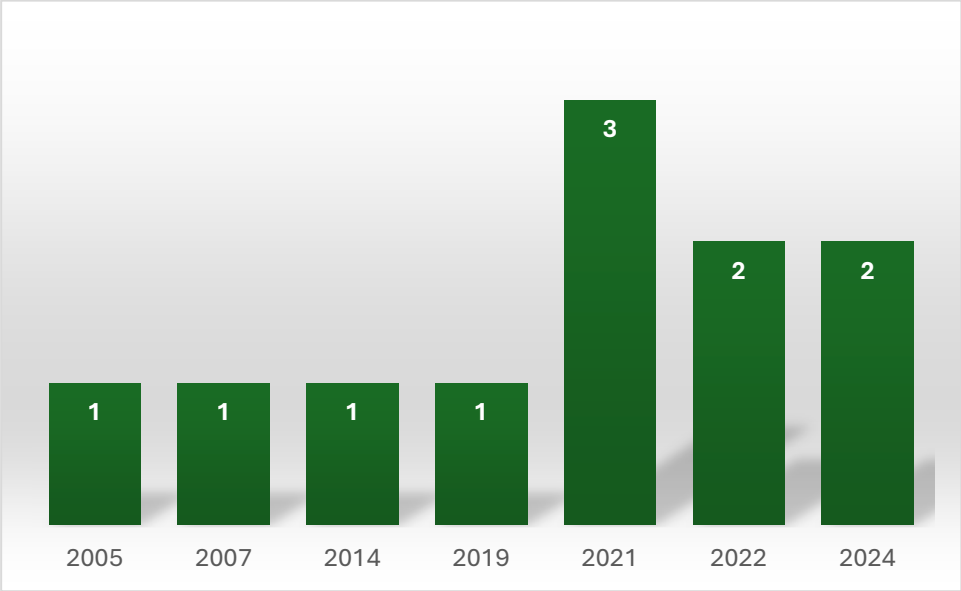
Tablo 2: Araştırma Türleri



Araştırmaların Yayımlanma Yılları

Google Akademik ve YÖK Tez üzerinden herhangi bir yıl aralığı belirlenmeden yapılan taramalar sonucunda ulaşılan çalışmaların 2005-2024 yılları arasında yapıldığı görülmüştür. Bununla birlikte bu yıllar arasında hiç çalışma yapılmayan yılların olduğu da görülmektedir. Bu bağlamda yapılan en eski çalışmanın 2005 yılında; en güncel çalışmanın 2024 yılında yayımlandığı görülmektedir. Çalışmaların en çok sırasıyla 2021 (3), 2022 (2) ve 2024 (2) yılları arasında yapıldığı sonucuna ulaşılmıştır. Araştırmaların yayımlanma yıllarına ilişkin bulgulara Tablo 3'de yer verilmiştir.

Tablo 3: Araştırmaların Yayımlanma Yılları

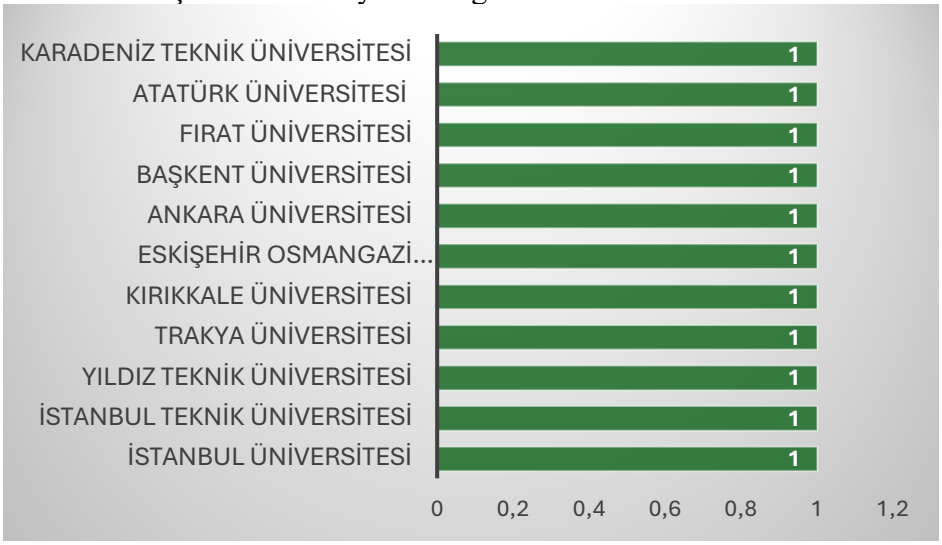


Araştırmaların Yayımlandığı Üniversiteler

Araştırmaların birbirinden farklı üniversitelerde gerçekleştirildiği görülmüştür. Bu üniversitelerin; İstanbul Üniversitesi, İstanbul Teknik Üniversitesi, Yıldız Teknik Üniversitesi, Trakya Üniversitesi, Kırıkkale Üniversitesi, Eskişehir Osmangazi Üniversitesi,

Ankara Üniversitesi, Başkent Üniversitesi, Fırat Üniversitesi, Atatürk Üniversitesi ve Karadeniz Teknik Üniversitesi olduğu görülmüştür. Araştırmaların yayımlandığı üniversitelere ilişkin bulgular Tablo 4'de yer almaktadır.

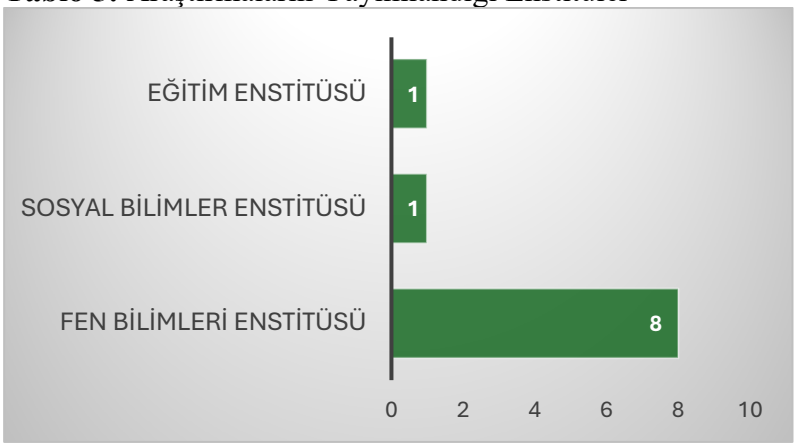
Tablo 4: Araştırmaların Yayımlandığı Üniversiteler



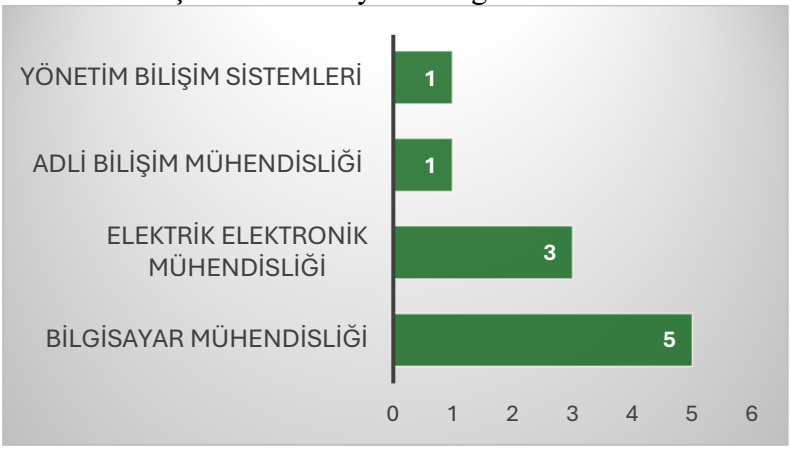
Araştırmaların Yayımlandığı Enstitü ve Anabilim Dalları

Araştırmaların yayımlandıkları enstitülere bakıldığında en sık üniversitelerin Fen Bilimleri Enstitülerinin (8) araştırma yapıldığı görülmüştür. Bu enstitüyü Sosyal Bilimler (1) ve Eğitim Enstitülerinin (1) takip ettiği görülmüştür. Anabilim Dallarında ise sırasıyla Bilgisayar Mühendisliği (5), Elektrik Elektronik Mühendisliği (3), Adli Bilişim Mühendisliği (1) ve Yönetim Bilişim Sistemleri (1) takip etmiştir. Araştırmaların yayımlandığı enstitü ve anabilim dallarına ilişkin bulgular Tablo 5 ve Tablo 6'da yer almaktadır.

Tablo 5: Araştırmaların Yayımlandığı Enstitüler



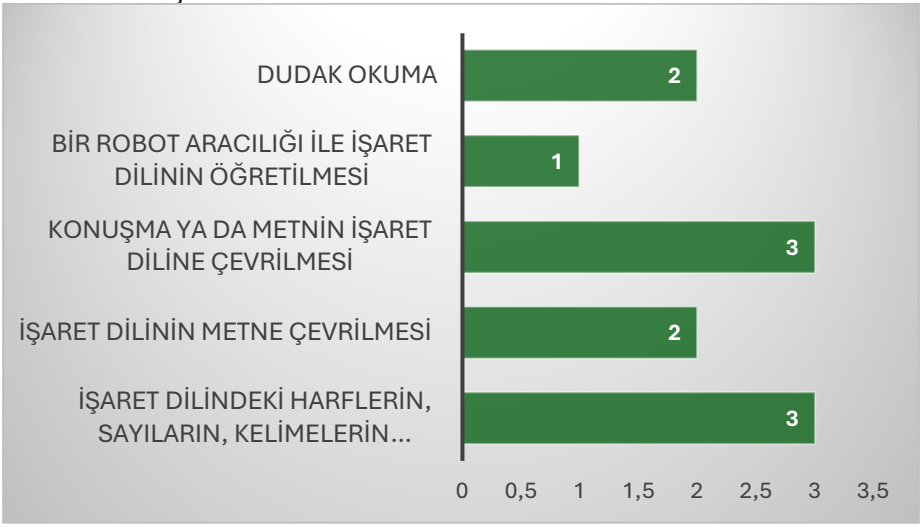
Tablo 6: Araştırmaların Yayımlandığı Anabilim Dalları



Araştırma Konuları

Çalışmadaki araştırmaların konu alanları incelendiğinde sırasıyla yapay zekâ aracılığı ile işaret dilindeki harflerin, sayıların, kelimelerin tanınması (3), konuşma ya da metnin işaret diline çevrilmesi (3), işaret dilinin metne çevrilmesi (2), dudak okuma (2) ve bir robot aracılığı ile işaret dilinin öğretilmesi (1) konularında gerçekleştirildiği görülmüştür. Araştırma konularına ilişkin bulgulara Tablo 7'de yer verilmiştir.

Tablo 7: Araştırma Konuları



Araştırma Sonuçları

Bu araştırmada işitme kayıplı bireylerin iletişim ve dil alanında yaşadıkları zorlukların önüne geçmek amacıyla yapılan çalışmaların yapay zekâ çerçevesinde incelenmesi amaçlanmıştır. Bu amaç doğrultusunda 2005-2024 yılları arasında toplam 11 çalışmaya ulaşılmıştır. Ulaşılan araştırmaların türü, yayımlanma yılı, yayımlandıkları üniversite, enstitü, anabilim dalı ve konu alanları incelenmiş, özetlenmiş, birbirleriyle karşılaştırılmış, analiz edilmiş ve yorumlanmıştır.

Buna göre ulaşılan araştırmaların en eski 2005 en güncel 2024 yılına ait çalışmalar olduğu görülmüştür. Ancak bu zaman aralığında 2005, 2007, 2014, 2019, 2021, 2022, 2024 yılları dışında herhangi bir çalışma yapılmadığı görülmüştür. En sık yapılan çalışmalar ise 2021 (3), 2022 (2) ve 2024 (2) yıllarına aittir.

Dolayısıyla bu alanda daha sık ve daha çok çalışma yapılma gereksinimi olduğu söylenebilir. Sonuçlara göre yüksek lisans başta olmak üzere en çok yüksek lisans (6) ve doktora tez (4) çalışmalarının olduğu görülmüştür. Ayrıca sadece 1 konferans çalışması ile karşılaşılmıştır. Bu bağlamda ileriki araştırmalarda konferans, kongre gibi çeşitli bilimsel toplantılar ve makale gibi akademik yayınların yapılmasına gereksinim olduğu söylenebilir. Çalışmaların belirli bölge ve şehirlerdeki üniversitelerle sınırlı kalmadığı Türkiye'nin kuzey, batı, iç ve doğu bölgelerindeki birbirinden farklı üniversitelerde gerçekleştirildiği görülmüştür. Ancak bu çalışmaların da en çok üniversitelerin Fen Bilimleri Enstitüleri ve Bilgisayar Mühendisliği Anabilim Dallarında gerçekleştirildiği görülmüştür. Bunu Elektrik Elektronik Mühendisliği takip etmiştir. Eğitim Bilimleri Enstitüsü ve eğitim alanında ise bu konuya ilişkin henüz herhangi bir çalışma yapılmamış olması dikkat çekici bir bulgudur. Bu bulgu henüz işitme kayıplı bireyler için eğitim ortamlarında öğretmen ve öğrenciler için dil ve iletişim sorunlarının önüne geçebilecek yapay zekâ aracılığı ile kapsamlı bir dil ve iletişim sistemin geliştirilememiş olması ile açıklanabilir (Bankur, 2021; Demir, Peker ve Savaş, 2024; Çelik, 2019; Haberdar, 2005; Güler, 2021; Kumdereli, 2024, Pourmousa, 2022; Yavuz, 2007). Bu düşünceyi destekler nitelikte yapay zekâ kullanılarak yapılan çalışmaların; işaret, harf, rakam, kelime tanıma; metnin işaret diline- işaret dilinin metne çevrilmesi; yapay zekâ destekli dudak okuma sisteminin geliştirilmesi; işaret dilinin öğretimi için robot kullanımı konuları ile sınırlı kalması ve az olması; şu ana kadar sadece belirli ve sınırlı veri setleri üzerinde çalışılmış olması; ülkemizde standartlaştırılmış bir işaret dili sözlüğü olmasına karşın işaret diline ilişkin kullanılan işaretlerin bölgesel ve yöresel kullanım olarak net bir standartının olmaması; bilgisayar ortamındaki uygulamalarda işaret hareketleri dışındaki ışık, arka plan gibi değişkenlerin gündelik hayattaki farklı kombinasyonlardaki çeşitliliği yansıtmaması; dudak okumaya ilişkin çalışmalarda duygusal ifadeler ve mimiklerin yapay zekâ ile henüz işlenememesi; bazı harf, ses ve rakamların dudak hareketlerinin olmaması nedeniyle daha fazla ve geniş veri setleri üzerinde farklı algoritmalarla daha fazla araştırma yapılmasına ihtiyaç duyulduğu söylenebilmektedir. Sonuç olarak yapay zekâ kullanılarak dil ve iletişime yönelik daha geniş kapsamlı yapılacak ve belirli bir standarta oturtulan çalışmaların; eğitim, sağlık ve kamuya açık diğer sosyal alanlarda işitme kayıplı bireyler ve onlarla iletişim kuran işiten bireylerin etkileşimleri üzerinde ne tür etkiler göstereceğinin ileriki süreçlerde görülmesi beklenmektedir (Bankur; 2021; Demir, Peker ve Savaş, 2024; Çelik, 2019; Haberdar, 2005; Güler, 2021; Kumdereli, 2024, Pourmousa, 2022; Yavuz, 2007).

KAYNAKLAR

Derleme çalışmalarına dâhil edilen çalışmalar * işareti ile birlikte sunulmuşur.

*Akalın, N. (2014). *İnsansı robot destekli işaret dili öğretimi* (Yayımlanmamış Doktora Tezi), İstanbul Üniversitsi, Fen Bilimleri Enstitüsü, İstanbul.

Akçamete, G. (2003). *İşitme yetersizliği olan çocuklar, özel gereksinimli çocuklar ve özel eğitime giriş*. Ankara: Gündüz Eğitim Yayıncılık.

Alsancak, F. (2018). Sağır toplumunun sosyal dışlanma sorunları. *Journal of International Social Research*, *11*(58), 423-430.

Alsancak, F. (2022). İşitme engelli bireylerin çeşitli kamu alanlarında yaşadıkları sorunlar. *Socıal Scıences Studıes Journal (Sssjournal)*, *3*(12), 1966-1981.

Arslan, K. (2020). Eğitimde yapay zekâ ve uygulamaları. *Batı Anadolu Eğitim Bilimleri Dergisi*, *11*(1), 71-88.

Bağlayıcı, S. E. (2021). *Transfer öğrenme tabanlı yüz ifadesinden duygu tanıma ve eylem birimi tespiti* (Yayımlanmamış Yüksek Lisans Tezi). İstanbul Teknik Üniversitesi, Lisanüstü Eğitim Enstitüsü, İstanbul.

*Bakır, A., O., A. (2022). *Python pyaudio modülü kullanarak konuşma dilinden işaret diline makine öğrenmesi tabanlı tercüme sistemi* (Yayımlanmamış Yüksek Lisans Tezi). İstanbul Üniversitesi, Cerrahpaşa Lisansüstü Eğitim Enstitüsü, İstanbul.

*Bankur, F. (2021). *Derin öğrenme temelli Türk işaret dili harflerinin tanınması* (Yayımlanmamış Yüksek Lisans Tezi). Fırat Üniversitesi, Fen Bilimleri Enstitüsü, Elazığ.

Baştürk, B. N. (2023). *Odyogramların otomatik olarak okunması ve değerlendirilmesi için bir görsel yazılımı geliştirilmesi ve test edilmesi* (Yayımlanmamış Yüksek Lisans Tezi). İstanbul Aydın Üniversitesi, Lisanüstü Eğitim Enstitüsü, İstanbul.

Bulgan, G. ve Ergençiçeği, A. (2021). Engelli bireylerin restoranlarda yaşadıkları erişim sorunları: Isparta ili örneği. *Süleyman Demirel Üniversitesi Vizyoner Dergisi*, *12*(29), 46-64.

Clark, M. (1989). *Language through living: for hearing - impaired children*. London Hodder and Stoughton.

Çankaya, E. (2022). *İşitme cihazlarındaki derin sinir ağları teknolojisinin zamansal işlemleme testleri ile değerlendirilmesi* (Yayımlanmamış Yüksek Lisans Tezi). İstanbul Medipol Üniversitesi, Sağlık Bilimleri Enstitüsü, İstanbul.

*Çelik, Ö. (2019). *Yapay zekâ tekniğiyle işitme engelliler için uzaktan iletişim sistemi* (Yayımlanmamış Doktora Tezi). Osman Gazi Üniversitesi, Fen Bilimleri Enstitüsü, Eskişehir.
Çelik, Ö. ve Odabaş, A. (2020). Sign2Text: Konvolüsyonel sinir ağları kullanarak Türk İşaret Dili tanıma. *Avrupa Bilim ve Teknoloji Dergisi*, 19, 923-934.

Çetinkaya, Ü. C. (2023*). İşitme kayıplı hastalar için makine öğrenmesi ile işitme cihazı seçim sisteminin geliştirilmesi* (Yayımlanmamış Doktora Tezi). İstanbul Aydın Üniversitesi, Lisanüstü Eğitim Enstitüsü, İstanbul.

*Demir, İ., Peker, İ. ve Savaş, S. (2024). İşaret dilinin dijital sesi: Medıapıpe ve lstm uygulaması. *EU 4th Internatıonal Conference On Health, Engıneerıng And Applıed Scıences Aprıl 12 - 14, Paris*, 290-306.

Dişçi, A. Y. (2021). *İşitme kaybı türü ve dercesi belirlenmesinde iki metot karşılaştırması: Yapay sinir ağları ve koşullu yapılarla kodlanan mobil uygulama* (Yayımlanmamış Yüksek Lisans Tezi). İstanbul Aydın Üniversitesi, Lisanüstü Eğitim Enstitüsü, İstanbul.

Er, B. (2020). *Yapay zekâ destekli odyometri ölçüm sisteminin tasarımı ve* gerçekleştirilmesi (Yayımlanmamış Yüksek Lisans Tezi). Afyon Kocatepe Üniversitesi, Fen Bilimleri Enstitüsü, Afyon.

Gök, M. (2021). *Drama liderlerinde, işitme engelli bireylerde, normal işiten bireylerde ve otizm spektrum bozukluğunda derin öğrenme ile ses duygu analizi* (Yayımlanmamış Yüksek Lisans Tezi). İstanbul Aydın Üniversitesi, Lisansüstü Eğitim Enstitüsü, İstanbul.

Göktaş, P. ve Bulgan, G. (2016). Turizm sektöründe engelliler ile iletişimin geliştirilmesine yönelik bir çalışma. *Erciyes İletişim Dergisi*, *4*(3), 36-56.

*Güler, H. (2021). *Derin öğrenme kullanarak işaret dili rakam tanıma* (Yayımlanmamış Yüksek Lisans Tezi). Ankara Üniversitesi, Fen Bilimleri Enstitüsü, Ankara.

Gürboğa, C. ve Kargın, T. (2003). İşitme engelli yetişkinlerin farklı ortamlarda kullandıkları iletişim yöntemlerinin/becerilerinin incelenmesi. *Ankara University Journal of Faculty of Educational Sciences (JFES)*, *36*(1), 51-64.

Gürpınar, C. (2023). *İşitme engelli çocuklar için duyuşsal sistemlerde yüzdeki duyguların tanınması maksadıyla geliştirilen derin öğrenme modeli* (Yayımlanmamış Doktora Tezi). İstanbul Teknik Üniversitesi, Lisanüstü Eğitim Enstitüsü, İstanbul.

*Haberdar, H. (2005). *Saklı Markov model kullanılarak görüntüden gerçek zamanlı Türk işaret dili tanıma sistemi* (Yayımlanmamış Yüksek Lisans Tezi). *Yıldız Technical University,* Fen Bilimleri Enstitüsü, *İstanbul*.

Haksız, M. ve Nuri, C. İşitme yetersizliği olan bireylerin toplumsal alanda yaşadıkları iletişim sorunları: KKTC örneği. *Turkish Special Education Journal: International*, *5*(1), 93-108.

Hogan, S., Stokes, J., White, C., Tyszkiewicz, E., & Woolgar, A. (2008). An evaluation of auditory verbal therapy using the rate of early language development as an outcome measure. *Deafness & Education İnternational*, *10*(3), 143-167.

Karaca, M. F. ve Bayır, Ş. (2018). Türk İşaret Dili incelemesi: İletişim ve dil bilgisi. *Ulusal Eğitim Akademisi Dergisi, 2*(2), 35-58.

Karaçam, Z. (2013). Sistematik derleme metodolojisi: Sistematik derleme hazırlamak için bir rehber. *Dokuz Eylül Üniversitesi Hemşirelik Fakültesi Elektronik Dergisi*, *6*(1), 26-33.

Ketenci S., Kayıkçıoğlu T. ve Gangal A., (2015, May). *Recognition of sign language numbers via electromyography signals, In Signal Processing and Communications Applications Conference (SIU), 2015 23th (pp. 2593-2596), IEEE.*

*Kumdereli, C. Ü. (2024). *İşitme engelli bireylerle iletişimde IMU ve sEMG sensör verilerini kullanacak bir sistem geliştirilmesi* (Yayımlanmamış Doktora Tezi). Trakya Üniversitesi, Fen Bilimleri Enstitüsü, Edirne.

Kuroda, T., Tabata, Y., Goto, A., Ikuta, H., & Murakami, M. (2004). *Consumer price data-glove for sign language recognition*. Virtual Reality & Assoc. Tech.

Millar, J. (2004). 'Systematic Reviews for Policy Analysis', S. Becker ve A. Byrman (ed.), *Understanding Research for Social Policy and Practice: Themes, Methods and Approaches* içinde, Bristol: Policy Press.

Mucuk, S. (2022). *Koklear implant kullanan okul öncesi dönem çocukların fonksiyonel işitme davranışları ile yönetici işlev becerileri arasındaki ilişkinin incelenmesi* (Yayımlanmamış Yüksek Lisans Tezi). Gazi Üniversitesi, Sağlık Bilimleri Enstitüsü, Eskişehir.

Napoli, D. J. (2019). Morphological theory and sign languages. In: *The Oxford handbook of morphological theory* (pp. 594-614).

Polat, F. (1995). İşitme engellilerin eğitiminde kullanılan yöntemler. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Özel Eğitim Dergisi*, *2*(01), 24-32.

*Pourmousa, H. (2022). *Türk Dili'nde derin öğrenme ile dudak okuma* (Yayımlanmamış Doktora Tezi). Atatürk Üniversitesi, Yönetim Bilişim Enstitüsü, Erzurum.

Rybach, D., Ney, I. H., Borchers, J., & Deselaers, D. I. T. (2006). *Appearance-based features for automatic continuous sign language recognition* (Unpublished Master's Thesis). RWTH Aachen University, Germany.

Savur, C. ve Şahin, F. (2016). American Sign Language recognition system by using surface EMG signal. In *2016 IEEE International Conference on Systems, Man, and Cybernetics (SMC)* (pp. 002872-002877). IEEE.

Shivaprakash, S., & Castro, N. O. (2019). Performance of hearing-impaired children with hearing aid and cochlear implant in auditory verbal therapy. *Scholarly Journal of Otolaryngology*, *2*(3), 10-32474.

*Tombaloğlu, B. (2021). *Türkçe otomatik konuşma tanıma ve işaret diline çevirme* (Yayımlanmamış Doktora Tezi). Başkent Üniversitesi, Fen Bilimleri Enstitüsü, Ankara.

Uludağ, B. (2020). *İşitme kayıplı bireylerin derin öğrenme tabanlı ses duygu analizi* (Yayımlanmamış Yüksek Lisans Tezi). İstanbul Aydın Üniversitesi, Lisanüstü Eğitim Enstitüsü, İstanbul.

Uluer, P. (2023). *Yardımcı robotlar için sosyal davranış öğrenimi* (Yayımlanmamış Doktora Tezi). İstanbul Teknik Üniversitesi, Lisansüstü Eğitim Enstitüsü, İstanbul.

*Yavuz, Z. (2007). *Bilgisayarlı dudak okuma* (Yayımlanmamış Yüksek Lisans Tezi). Karadeniz Teknik Üniversitesi, Fen Bilimleri Enstitüsü, Trabzon.

Verim, E. (2023). *Odyoloji terapisi için işitsel-duygusal ciddi oyunlar tasarlama ve geliştirme* (Yayımlanmamış Yüksek Lisans Tezi). İstanbul Teknik Üniversitesi, Lisansüstü Eğitim Enstitüsü, İstanbul.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

ÖZEL GEREKSİNİMLİ BİREYLERE YÖNELİK HAZIRLANAN EBEVEYN ARACILI UYGULAMALARA İLİŞKİN ARAŞTIRMALARIN İNCELENMESİ

Dr. Öğretim Üyesi Pınar YAŞAR HAYAL
Trabzon Üniversitesi, Fatih Eğitim Fakültesi, Fatih Eğitim Fakültesi
ORCID: 0000-0002-6059-8206

Selçuk BAYRAM
Trabzon Üniversitesi, Lisansüstü Eğitim Fakültesi
ORCID: 0009-0005-7938-5883

ÖZET
Bu araştırmada, Türkiye'de Özel gereksinimli çocuklara yönelik uygulanan ebeveyn aracılı müdahaleleri içeren ve 1998-2024 Yılları arasında gerçekleştirilen çalışmaların incelenmesi hedeflenmiştir. Ebeveynlere yönelik hazırlanan çalışmalar farklı terimler ile ifade edilebilmektedir. Bu çalışmada ''ebeveyn aracılı uygulamalar'' ifadesinin kullanımı benimsenmiştir. Eğitim, çocuğun içinde yaşadığı ailede başlamaktadır. Çocuğun öğrenme ve gelişim sürecinin başladığı bu ortamda ebeveynler çocuğa yol göstericidir. (Akosmanoğlu, Bedel, 2021). Ebeveynler çoğunlukla çocuklarının birincil bakıcılarıdır ve sistematik şekilde ebeveynlerin bilgi becerileri geliştirilirse, çocukları için bir koç veya terapist görevi görebilirler (Prata vd., 2018:2). Yapılandırılmış bir eğitim programı aracılığıyla aileler bu tür uygulamaları evlerinde veya okullarda uygulamayı öğrenirler. (Hendricks, 2009).
Araştırmada sistematik tarama modeli kullanılmıştır. Sistematik inceleme, belirli bir alanda hazırlanmış araştırma sorusuna cevap aramak için belirlenmiş kriterlere uygun olarak o alanda yayınlamış çalışmaların sistemli ve yansız şekilde taranması, seçilen çalışmaların değerlendirilip incelenerek bir araya getirildiği modeldir. Yükseköğretim Kurulu Başkanlığı (YÖK) Ulusal Tez Merkezi'nde yapılan tarama sonucunda toplam 70 çalışma, araştırmaya dahil edilmiştir. Tarama Sonucunda; literatürde bulunan ebeveyn aracılı çalışmaların ağırlıklı olarak nörogelişimsel bozukluk olan otizm spektrum bozukluğu ve zihinsel yetersizlik (Diagnostic and Statistical Manual of Mental Disorders-5 [DSM-5], 2013:31-33) türlerinden etkilenen bireylere yönelik olduğu görülmüştür. Ebeveyn aracılı uygulamalar ile ilgili araştırmalar incelendiğinde, yapılan çalışmaların kurum, ev ve web tabanlı platformlar merkezli gerçekleştirildiği gözlemlenmiştir. Ele alınan değişkenler açısından incelenen veriler bulgular başlığı altında detaylı olarak açıklanmıştır. Araştırma sonunda incelenen çalışmaların büyük çoğunluğu ebeveyn aracılı uygulamalarının özel gereksinimli bireylerde kullanımının etkili olduğunu ortaya koymaktadır. Araştırma sonuçlarının Türkiye'de özel gereksinimli bireylerle ebeveyn aracılı uygulamalarıyla ilgili çalışma yapmayı planlayan araştırmacılara yol göstermesi beklenmektedir.
Anahtar Kelimeler: Özel Eğitim, Ebeveyn Aracılı Müdahaleler, Aile Koçluğu.

INVESTIGATION OF RESEARCH ON PARENT MEDIATED PRACTICES PREPARED FOR INDIVIDUALS WITH SPECIAL NEEDS

ABSTRACT
In this study, it was aimed to analyse the parent-mediated interventions applied to children with special needs studies. This study is examined 70 studies carried out between 1998-2024 in Turkey. Studies prepared interventions for parents can be expressed with different terms. In this study, the term 'parent-mediated interventions' was adopted.

Education basically starts in the family environment in which the child lives. In this period while the child's learning and development process begins, parents are the guide for the child (Akosmanoğlu, Bedel, 2021). Parents are often the primary care-givers of their children and if their knowledge and skills are systematically developed, they can act as a coach or therapist for their own children (Prata et al., 2018:2). Through a structured training program, families can learn to implement such practices in their homes or schools (Hendricks, 2009).
Systematic review model was used in the study. Systematic review is a model in which the studies published in that field are systematically and unbiasedly scanned in accordance with the criteria determined to answer the research question prepared in a certain field, and the selected studies are evaluated and examined and brought together. As a result of the search in the National Thesis Centre of the Council of Higher Education (YÖK), a total of 70 studies were included in the research. As a result of the review, it was seen that the parent-mediated studies in the literature were mainly aimed at individuals affected by autism spectrum disorder which is a neurodevelopmental disorder and intellectual disabilities (Diagnostic and Statistical Manual of Mental Disorders-5 [DSM-5], 2013:31-33). When the studies on parent-mediated interventions were examined, it was observed that the studies were carried out in institution-based, home-based and online platforms. The data analysed in terms of the variables examined are explained in detail under the title of findings. At the end of the research most of the studies examined reveal that the use of parent-mediated practices in individuals with special needs is effective. The results of the research are expected to guide researchers who plan to conduct studies on parent-mediated practices with individuals with special needs in Turkey.
Keywords: Special Education, Parent Mediated interventions, family coaching.

1.GİRİŞ

Eğitim, çocuğun yaşadığı aile ortamında başlar ve bu süreçte ebeveynler, çocuğun öğrenme ve gelişim sürecinde yol göstericidir (Akosmanoğlu & Bedel, 2021). Ebeveynler, çocuklarının eğitimine aktif olarak katıldıklarında, çocuklarının akademik başarılarını, sosyal ve duygusal gelişimlerini, olumlu davranış alışkanlıklarını güçlendirebilirler (Cavkaytar, 1999) Ayrıca, çocuğun gelişimine uygun ve destekleyici bir ortam ile koşulları oluşturmakta ailenin kritik bir rolü vardır (Varol, 2015).

Özel gereksinimli bireylerin, erken çocukluk döneminden itibaren çeşitli becerilerin kazandırılması için sistematik bir öğretime ihtiyaçları vardır (Ataman, 2003). Anne babaların çocuklarının ilk eğitimcileri olduğu göz önüne alındığında, ebeveynlerin eğitiminin toplumun genel yararına olduğu inkâr edilemez bir gerçektir. Bu bağlamda, aile üyelerinin özel eğitim sürecinin her aşamasına aktif olarak katılması beklenmektedir (MEB, 2018). Özel gereksinimli çocukların ailelerine, çocuklarına yeni kavramlar ve beceriler kazandırma yöntemlerini öğretmek gereklidir. Yapılandırılmış eğitim programları, ailelerin bu tür uygulamaları evde veya okulda nasıl gerçekleştireceklerini öğrenmelerini sağlar (Hendricks, 2009). Araştırmalar hem tipik gelişim gösteren hem de özel gereksinimli çocuklara sahip ailelerin, çocuklarına yeni beceriler öğretmelerinin, bu becerilerin evde devam ettirilmesini sağlamalarının ve uygun olmayan davranışları kontrol etmelerinin, aileye, çocuğa ve eğitim sürecine olumlu katkılar sunduğunu göstermektedir (Varol, 1996; Vuran, 1997; Cavkaytar, 1999). İngersol ve Gergans (2007), ebeveynlerin çocuklarının eğitim sürecine katılımının aile ve çocuk için sağladığı yararları sıralamıştır. Bunlar:

1. Ebeveynler tarafından uygulanan müdahalelerde, uzmanlar tarafından uygulanan müdahalelere kıyasla daha yüksek düzeyde genelleme ve kalıcılık sağlandığı, dolayısıyla çocukların daha fazla kazanım elde ettiği görülmektedir.

2. Ebeveyn eğitimi, ebeveynlik stresini azaltarak ailenin yaşam kalitesini artırır.
3. Ebeveyn eğitimi, ebeveynlerin çocuklarının eğitimine katıldıklarında kendi yeteneklerini görmelerini ve çocukları için çaba göstermeye devam etmelerini sağlar.
4. Ebeveynlerin eğitime dahil olması ve çocuklarının eğitiminde aktif rol alması, uzmanlar tarafından yetersizliği olan bireylere sunulacak olan hizmet süresini azaltabilir; dolayısıyla, uzun dönemde maliyet açısından verimli olduğu söylenebilir.

Ebeveyn aracılı çalışmalar, ebeveynlerin çocuklarının eğitimine aktif ve bilinçli bir şekilde katılmalarını sağlayan uygulamalardır. Bu çalışmalarda, ebeveynlerin çocuklarına yeni beceriler kazandırma, uygun olmayan davranışları kontrol etme ve çocuklarının eğitim süreçlerine katkıda bulunma becerileri geliştirilir (Cavkaytar, 1999). Ebeveyn koçluğu da bu kapsamda ele alınabilecek bir kavramdır. Rush ve Shelden (2005), ebeveyn koçluğunu, ebeveynlerin yeteneklerini geliştiren, eğitim süreçlerini planlamalarına ve değerlendirmelerine yardımcı olan bir yetişkin öğrenme stratejisi olarak tanımlar. Ebeveynlere yönelik hazırlanan çalışmalar farklı terimler ile ifade edilebilmektedir. Bu çalışmada ‘’ebeveyn aracılı uygulamalar’’ ifadesinin kullanımı benimsenmiştir. Türk Dil Kurumu'na (TDK) göre "aracı" kelimesinin anlamı, İki şey arasında bağlantı kuran kimse; vasıta, şeklindedir (Sozluk, 2024)

Cavkaytar'ın 1999 tarihli çalışmasına göre, aile eğitim ortamları, ebeveynlerin çocuklarının eğitimine aktif olarak katıldığı ve onlara çeşitli öğrenme fırsatları sunduğu alanlardır. Bu eğitim ortamları üç ana başlık altında toplanabilir: ev ortamı ebeveynlerin çocuklarıyla vakit geçirdiği, onlara rehberlik ettiği ve evdeki eğitimlerini desteklediği alandır. Ailelerin çocuklarıyla birlikte kitap okuma, oyun oynama ve problem çözme gibi etkinlikler gerçekleştirmesi bu ortamın bir parçasıdır. Topluluk ve sosyal çevre, ailelerin çocuklarını toplum içindeki diğer bireylerle ve akranlarıyla etkileşime sokarak sosyal becerilerini geliştirdikleri ortamlardır. Parklar, oyun alanları ve kültürel etkinlikler bu kategoriye girer. Eğitim kurumları ile ilişki, ailelerin çocuklarının eğitim aldığı kurumlarla kurdukları iş birliği ve iletişimi ifade eder. Ebeveynlerin okullarla iş birliği yapmaları ve öğretmenlerle sürekli iletişimde olmaları, çocuğun eğitimine önemli katkılar sağlar. Son yıllarda, özellikle COVID-19 pandemisi gibi olağan dışı durumlar nedeniyle, yüz yüze eğitimin sürdürülememesi, ebeveynleri eğitmek için kullanılan web-tabanlı uygulamaların önemini artırmıştır (Yekta, 2023; Uçar Rasmussen, 2021; Kaymak, 2024). Uzaktan ebeveyn koçluğu ile sunulan eğitim programlarının birçok avantajı bulunmaktadır. Çevrimiçi platformlar aracılığıyla uzmanlar ve ebeveynler farklı yerlerde olsalar bile etkileşim kurabilirler, eğitimlere zaman ve mekân fark etmeksizin katılım sağlanabilir ve ebeveynler, eğitim içeriklerine istedikleri zaman erişebilirler (Barkaia vd., 2017; Simacek vd., 2021).

Özel gereksinimli bireylerin eğitiminde ebeveynlerin rolü kritik öneme sahiptir. Ebeveyn aracılı çalışmalar ve aile temelli eğitim programları, bu bireylerin gelişiminde ve eğitim süreçlerinde önemli katkılar sunmaktadır. Ebeveyn aracılı uygulamalar sayesinde aileler, özel gereksinimli çocuklarının eğitim sürecinin bir parçası olabilmektedir. Uzmanların ve ailelerin özel gereksinimli çocuklar için güncel müdahale yöntemleri ile ilgili bilgi sahibi olmaları gerekmektedir. Ancak, literatürde bu konuda daha fazla araştırmaya ihtiyaç vardır. Araştırma sonuçlarının Türkiye’de özel gereksinimli bireylerle ebeveyn aracılı uygulamalarıyla ilgili çalışma yapmayı planlayan araştırmacılara yol göstermesi beklenmektedir.

2. YÖNTEM

Türkiye’de özel gereksinimli bireylere yönelik ebeveyn aracılı uygulamaları konu alan araştırmaların incelendiği bu araştırmada sistematik tarama modelinden faydalanılmıştır.

İzleyen bölümde araştırmanın plan, tarama süreci, dahil etme ve dışlama kriterleri, veri analizi ve incelenen araştırmaların yer aldığı tablolara ilişkin açıklamalar bulunmaktadır.

2.1 Tarama Süreci

Sistematik alanyazın taraması, belirli bir konu hakkında yapılan ilgili çalışmaların sentezini içeren ve araştırma tekniğine öncelik verilerek yanlılığın azaltılmasını amaçlayan kapsamlı ve detaylı bir plan ve araştırma olarak tanımlanmaktadır (Uman, 2011). Alanyazın taraması yaparak mevcut araştırmaları incelemek, kanıta dayalı değerli bilgilere ulaşmamızı sağlar ve bu bilgilerin uygulayıcılar tarafından erişilebilir olmasını mümkün kılar. Sistematik derlemelerin hazırlanması ve raporlanması, okuyucuların bu çalışmaları, tıpkı bireysel araştırmalar gibi, güvenilir bir şekilde değerlendirmelerine olanak tanır. Sistematik derlemeler, tüm araştırma soruları ve yöntemleri için kullanılabilir (Gough ve diğerleri, 2013). Tarama sürecinde incelenen araştırmalar ile Türkiye'de özel gereksinimli bireylere yönelik hazırlanan ebeveyn aracılı uygulamaların konu, yöntem, katılımcı bilgileri, ortam ve etkililik, güvenirlik verileri incelenerek alanyazında ebeveyn aracılı uygulamalara ilişkin boşlukları tespit etmek hedeflenmektedir.

2.2 Tarama / Derleme Süreci

Bu çalışmada alanyazı taranarak bulunan araştırmalar belirli özellikleri dikkate alınarak incelenmiştir. Öncelikle dahil edilecek araştırmaların belirlenmesi için anahtar sözcükler belirlenmiştir. Anahtar sözcük olarak '' ebeveyn koçluğu, aile eğitimi, ebeveyn eğitimi, anne eğitimi, baba eğitimi'' belirlenmiş ve farklı kombinasyonları oluşturularak arama yapılmıştır. Araştırmalar Yükseköğretim Kurulu Başkanlığı (YÖK) Ulusal Tez Merkezi'nde anahtar sözcükler kullanılarak taranıp incelenmiştir.

2.2.1 Dahil Etme / Dışlama Kriterleri

Araştırmacılar tarafından araştırmaların belirlenmesi için dahil etme ve dışlama kriterleri belirlenmiş ve tarama sonucunda bulunan araştırmalar bu kriterlere göre çalışmaya dahil edilmiştir.

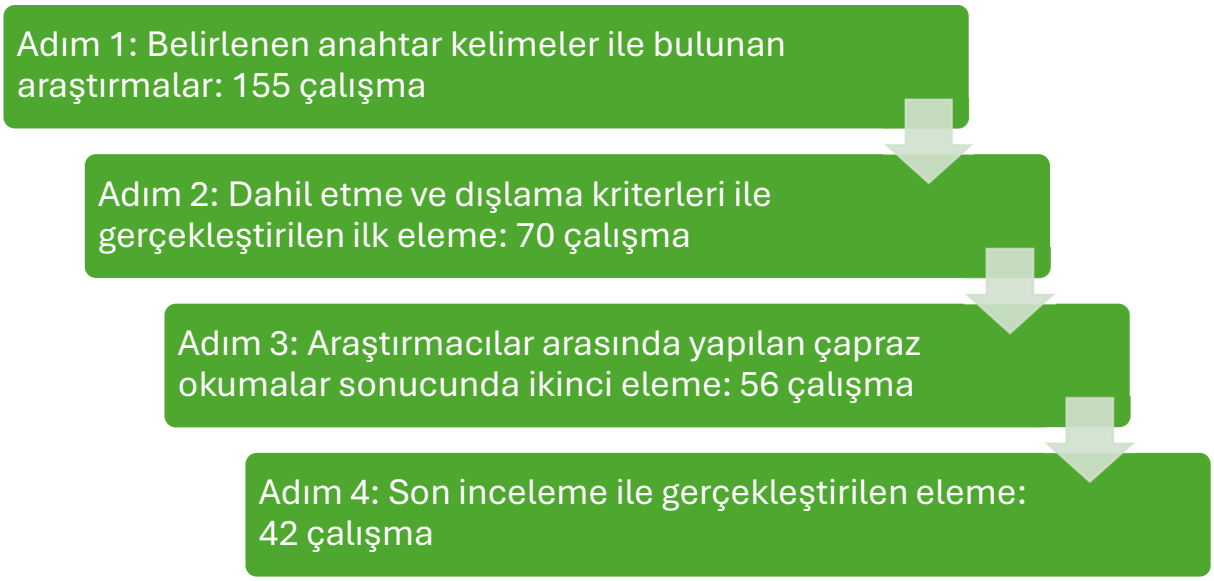
Dahil edilme kriterleri

- Araştırmanın katılımcılarının özel gereksinimli birey olması
- Araştırma yönteminin deneysel/ yarı deneysel olması
- Araştırmaya katılan ebeveynlere eğitim veriliyor olması

Dışlama kriterleri

- Katılımcı çocukların tipik gelişim gösteriyor olması
- Katılımcı çocuklara öğretim/uygulama yapılmamış olması
- Katılımcı çocuklara yönelik bağımlı değişken olmaması
- Katılımcı aile üyesinin anne- baba olmaması
- Yöntem, katılımcılar ve deney sürecinin açık şekilde yazılmamış olması

Şekil 1 tarama sürecindeki akışı göstermektedir. Araştırmacılar tarafından belirlenen anahtar kelime öbekleri ''aile eğitimi, ebeveyn eğitimi, ebeveyn koçluğu, vb.'' tarama sonucunda toplam 155 yüksek lisans ve doktora tezine ulaşılmıştır. Bulunan tezler araştırmacılar tarafından belirlenen dahil etme / dışlama kriterlerine göre değerlendirilmiştir. Belirlenen ölçütlerle gerçekleştirilen ilk eleme sonucunda 85 çalışma araştırma dışında bırakılarak sayı 70 çalışmaya düşürülmüştür. Araştırmacılar belirlenen dahil etme / dışlama ölçütlerine göre yaptıkları çapraz okumalar sonucunda ikinci eleme gerçekleştirilmiş ve eldeki çalışma sayısı 56'ya düşmüştür. Son incelemeler ışığında da toplam 42 çalışma araştırmaya dahil edilmiştir.



Şekil 1. *Araştırmanın Tarama Süreci*

2.4 Verilerin Analizi

Dahil edilen 42 çalışmanın analiz aşamasında nicel betimsel analiz yöntemi kullanılmıştır. İncelenen araştırmaların analiz edilmesinde kullanılan Kategoriler şunlardır; a) Çalışmanın temel betimsel özellikleri, b) Çalışmanın yöntemi, c) çalışmanın amaç ve bulgularıdır. Araştırmalar, belirlenen değişkenler: a) araştırmanın yazarı, yılı ve kaynak başlığı, b) tez türü(doktora/ yüksek lisans), c) araştırmanın üzerinde çalıştığı konu, d) araştırmanın katılımcı sayıları(çocuk ve ebeveyn) ve yetersizlik türleri, e) katılımcı çocukların yaş ve cinsiyet özellikleri, e) araştırmanın yöntemi, f) araştırmada kullanılan yöntem modelleri, g) katılımcı ebeveynler ile uygulama/ çalışma yapılan ortam, h) araştırmanın izleme, genelleme, uygulama güvenirliği, gözlemciler arası güvenirlik ve sosyal geçerlilik verileri, ı) araştırmanın sonuçları göz önünde bulundurularak incelenmiştir. Tablo 1'de incelenen araştırmalar konularına göre sıralanarak, araştırmaların izleme(İ), Genelleme(G), uygulama güvenirliği (UG), gözlemciler arası güvenirlik (GAG) ve sosyal geçerlilik (SG) verilerinde, veri varsa (+), veri yoksa (-) olarak işaretlenmiştir. Tablo 1'de yer alan değişkenler kodlandıktan sonra her iki yazar bir araya gelerek sonuçları karşılaştırmıştır. Huberman'ın (1994) önerdiği;

Güvenirlik = Görüş Birliği / Görüş Birliği+ Görüş Ayrılığı

güvenirlik formülü ile gözlemciler arası güvenirlik verisi analiz edilerek hesaplanmıştır. Görüş ayrılığı yaşanan çalışmalarda ortak karara ulaşılması sonucunda yazarların hazırladıkları tablolar tek bir tablo haline getirilmiştir. Gözlemciler arası güvenirlik, %90 olarak bulunmuştur. İlerleyen bölümde veri tabloları bulunmaktadır.

Tablo 1. *Ebeveyn Aracılı Uygulamalara İlişkin Alanyazı – Özbakım Becerileri ve Günlük Yaşam Becerileri Konu Alan Çalışmalar*

Kaynak	Tez	Konu	Katılımcı	Yaş / Cinsiyet	Yöntem	Model	Ortam	İ/G/UG/GAG/SG	Sonuç
Cavkaytar, (1998)	Doktora	Özbakım ve Günlük Yaşam Becerileri	3 anne ve ZY'li çocukları	16y E 21y E 14y K	Tek denekli	Beceriler Arası çoklu yoklama	Kurum + ev	+/-/-/+/-	Etkili
Özcan, (2004)	Yüksek Lisans	Tuvalet becerisi	3 anne ve Zy'li Çocukları	5y E 4y E 5y E	Tek denekli	Yoklama evreli denekler arası çoklu yoklama modeli	Kurum + ev	+/-/+/+/-	Etkili
Diler Sönmez, (2008)	Doktora	Tuvalet becerisi	3 anne ve ZY'li çocukları	5y3a 2y11a 4y7a	Tek denekli	AB modeli	Ev	-/-/+/-/+	Etkili
Çakmak, (2011)	Doktora	Özbakım becerisi	3 anne ve GY'li çocukları	5y4a E 5y7a K 5y2a K	Tek denekli	Denekler arası çoklu yoklama + beceriler arası çoklu yoklama deseni	Kurum + ev	+/-/+/+/+	Etkili
Yekta, (2023)	Doktora	Günlük Yaşam Becerisi	4 anne ve ZY'li çocukları	17y K 14y E 11y K 13y K	Tek denekli	Çiftler (anne Çocuk) arası yoklama denemeli çoklu yoklama modeli	Web tabanlı + ev	+/+/+/+/+	Etkili
Arvas, (2023)	Yüksek Lisans	Özbakım becerisi	4 anne ve ZY'li çocukları	17y K 16y E 17y E 14y K	Tek denekli	Katılımcılar arası yoklama denemeli çoklu yoklama	Kurum	+/+/+/+/+	Etkili
Günlü, (2022)	Doktora	Özbakım Becerisi	3 baba ve OSB'li çocukları	15 E 16 E 20 E	Tek denekli	Denekler arası yoklama evreli çoklu yoklama deseni + beceriler arası çoklu yoklama deseni	Kurum	+/-/+/+/+	Etkili
Tavukçu, (2021)	Yüksek Lisans	Güvenlik Becerisi	3 anne ve OSB'li çocukları	13 E 10 E 6 K	Tek denekli	Çiftler arası yoklama denemeli çoklu yoklama modeli	Ev	+/+/+/+/+	Etkili
Uçar Rasmussen, (2021)	Doktora	Özbakım Becerisi	3 anne ve OSB'li çocukları	12 E 10 E 9 K	Tek denekli	AB modeli ve Yoklama Evreli Katılımcılar arası çoklu Yoklama Modeli	Web tabanlı	-/+/+/+/+	Etkili
Bahçalı, (2020)	Doktora	Alışveriş becerisi	4 anne, 1 baba ve OSB'li çocukları	16y7a E 16y11a E 17y11a E 17y5a E	Tek denekli	Katılımcılar arası yoklama denemeli çoklu yoklama modeli	Ev	+/+/+/+/+	Etkili
Ünver, (2019)	Yüksek lisans	Serbest zaman etkinlikleri	2 anne, 1 baba ve OSB'li çocukları	8 E 7 E 4 K	Tek denekli	Çiftler arası yoklama denemeli çoklu yoklama modeli	Ev	+/+/+/+/+	Etkili

Kaynak	Tez	Konu	Katılımcı	Yaş / Cinsiyet	Yöntem	Model	Ortam	İ/G/UG/GAG/SG	Sonuç
Akın Bülbül, (2012)	Yüksek lisans	Özbakım becerisi	1 anne, 3 baba ve ZY'li çocukları	17 E 15 E 14 E 15 E	Tek denekli	Denekler arası çoklu yoklama modeli	Ev	+/+/+/-/+	Etkili
Aktaş, (2020)	Yüksek lisans	Özbakım becerisi	11 anne ve 22 ZY'li çocuk	14-18 yaş aralığı Hepsi kız	Nicel	Tek kör, randomize kontrollü deneysel	Kurum	+/+/-/-/-	Etkili

Tablo 1. *Ebeveyn Aracılı Uygulamalara İlişkin Alanyazı – Etkileşim, Sosyal Beceri ve Oyun Becerileri Konu Alan Çalışmalar*

Kaynak	Tez	Konu	Katılımcı	Yaş	Yöntem	Model	Ortam	İ/G/UG/GAG/SG	Sonuç
Karaaslan, (2010)	Doktora	Etkileşim davranışları / gelişimsel davranışları	19 anne ve 9 OSB'li, 10 ZY'li çocuk	22-65 ay arası 9K 10E	karma	Ön test- Son test	Kurum	-/-/+/+/+	Etkili
Yıldız, (2023)	Doktora	Nesne ve jest taklit	3 anne ve OSB'li çocukları	26a E 46a E 38a E	Tek denekli	Çiftler (anne-çocuk) arası yoklama denemeli çoklu yoklama modeli	Web tabanlı	+/+/+/+/+	Etkili
Kaymak, (2024)	Doktora	Etkileşimsel davranışları	20 baba ve OSB'li çocukları	36-78 ay 18E 2K	Nicel	Ön test-son test	Web tabanlı	-/-/+/-/+	Etkili
Yetkin, (2023)	Doktora	Etkileşim davranışları	11 anne, 5 baba ve 16 OSB'li çocukları	42-72 ay 14E 2K	Karma	Ön test- son test	Web tabanlı	-/-/+/+/+	Etkili
Yılmaz, (2023)	Yüksek lisans	Ortak dikkat ve jest	2 anne ve OSB'li çocukları	6y 6y	Tek denekli	Davranışlar arası çoklu yoklama deseni	Ev	+/-/+/+/-	Etkili
Koca, (2021)	Yüksek lisans	Etkileşim davranışları	14 anne ve OSB'li çocukları	24-36 ay arası 12E 2K	Nicel	Ön test-son test	Web tabanlı + kurum	-/-/-/+/-	Deney grubu annelerin davranışlarında artış görülmüştür. Deney grubu çocuklarda anlamlı fark bulunmamıştır.
Gıcı-Vatansever, (2018)	Doktora	Ortak dikkat	4 anne ve OSB'li çocukları	5y E 5y5a E 6y E 5y5a E	Tek denekli	Çiftler arası çoklu başlama düzeyi	Ev	+/+/+/+/+	Etkili
Besler, (2015)	Yüksek lisans	Oyun becerisi	3 anne ve OSB'li çocukları	6y E 6y E 5y E	Tek denekli	Katılımcılar arası yoklama evreli çoklu yoklama modeli	Kurum	+/+/+/+/+	Etkili
Kizir, (2018)	Doktora	Temel Taklit becerileri	4 anne ve OSB'li çocukları	5yaş E 5y5a E 6yaş E 5y5a E	Tek denekli	Yoklama evreli denekler arası çoklu yoklama modeli	Web tabanlı	+/+/+/+/+	Etkili

Kaynak	Tez	Konu	Katılımcı	Yaş	Yöntem	Model	Ortam	İ/G/UG/GAG/SG	Sonuç
Öztürk, (2020)	Doktora	Etkileşim davranışları	3 anne ve Down S.'lu çocukları	39aE 43a E 42a E	Karma	Ab modeli	Ev	+/-/+/+/+	Etkili
Yiğit, (2022)	Yüksek lisans	Etkileşim davranışları	17 anne ve Down S.'lu çocukları (8 deney- 9 kontrol çifti)	25-64 ay arası 13E 4 K	Karma	Ön test- son test	Web tabanlı	-/-/+/+/+	Etkili
Gürel Selimoğlu, (2015)	Doktora	Etkileşim davranışları	4 anne ve OSB'li çocukları	6y E 4y E 3y2a K	Tek denekli	Denekler arası çoklu başlama	Kurum	-/+/+/+/+	Etkili
Toper Korkmaz, (2015)	Doktora	Etkileşim davranışları	6 anne ve OSB'li çocukları	34-67 ay 5E 1K	Karma	Ön test- son test	Ev	-/-/+/+/+	Etkili

Tablo 1. *Ebeveyn Aracılı Uygulamalara İlişkin Alanyazı – Dil Konuşma ve İletişim Becerilerini Konu Alan Çalışmalar*

Kaynak	Tez	Konu	Katılımcı	Yaş/ Cinsiyet	Yöntem	Model	Ortam	İ/G/UG/GAG/SG	Sonuç
Pektaş Karabekir, (2021)	Doktora	İletişim becerisi ve problem davranış	3 anne ve OSB'li çocukları	4y4a E 4y7a E 4y E	Tek denekli	Anne-çocuk çiftleri arası yoklama denemeli çoklu yoklama modeli	Ev	+/+/+/+/+	Etkili
Bilmez, (2020)	Doktora	İletişim becerisi	3 anne ve OSB'li çocukları	5y4a E 4y8a E 4y6a E	Tek denekli	Çiftler (anne-çocuk) arası yoklama denemeli çoklu yoklama modeli	Kurum + ev	+/+/+/+/+	Etkili
Tomris, (2019)	Doktora	Sözel Taklit Dil gelişimi Etkileşimsel davranışlar	9 anne, 1 baba ve Down S.'lu çocukları	25- 48 ay 4E-6K	Karma	Öntest-Sontest Denkleştirilmemiş Gruplu Karma Yöntem Deneysel Deseni	Ev ve web tabanlı	+/-/+/+/+	Etkili
Ünlü, (2012)	Doktora	Alıcı dil becerileri Taklit	14 anne baba çifti ve 14 OSB'li çocukları	3-8 yaş tamamı erkek	Nicel	Ön-test son-test	Kurum	+/+/+/+/+	Ebeveynde Etkili, Çocuklarda fark yok
Noyan Erbaş, (2019)	Doktora	Dil gelişimi Etkileşim davranışları	12 anne, 2 baba ve OSB'li çocukları	24-48 yaş arası 10E ve 4K	Nicel	Denekler içi tekrarlı ölçümler deseni	Kurum + ev	+/-/+/+/-	Etkili
Turgut, (2023)	Doktora	Alıcı dil	3 anne ve OSB'li çocuğu	7 E 2y5a E 9y E	Tek denekli	Anne-çocuk çiftleri arası eşzamanlı olmayan çoklu başlama düzeyi modeli	Web tabanlı	+/+/+/+/+	Etkili
Aydın, (2023)	Doktora	Kekemelik	12 kekeme çocuk ve anne babaları (12A – 12B)	3-6 yaş 6E 6K	Karma	Tek gruplu ön test-son test, izleme ön deneysel çalışma	Web tabanlı	+/-/+/-/-	Etkili
Şimşek, (2018)	Doktora	Dil gelişimi	10 anne ve İY'li çocukları	3-4 yaş 5E 5K	Nicel	Ön test- son test	Kurum	+/-/-/-/-	Etkili

Tablo 1. *Ebeveyn Aracılı Uygulamalara İlişkin Alanyazı – Problem Davranış ve Otistik Davranışları Konu Alan Çalışmalar*

Kaynak	Tez	Konu	Katılımcı	Yaş/ Cinsiyet	Yöntem	Model	Ortam	İ/G/UG/GAG/SG	Sonuç
Yalım, (2023)	Yüksek lisans	Otistik davranışlar ve gelişim özelliklei	20 ebeveyn ve OSB'li çocukları	2-8 yaş arası	Nicel	Tek gruplu ön test-son test	Web tabanlı	-/-/-/-/-	Etkili
Günnar, (2023)	Yüksek lisans	Basmakalıp davranışlar	5 anne ve OSB'li çocukları	6,7,7,11 Hepsi erkek	Tek denekli	eş zamanlı olmayan çoklu başlama ve ABAB modeli	Web tabanlı	+/-/+/+/+	Etkili
Yıldırım, (2021)	Doktora	Problem davranış	4 anne ve ZY'li çocukları	3E 1K	Karma	Ölçüt aralığının sınırlandırıldığı değişen ölçütler modeli	Kurum	-/-/+/-/-	Etkili
Ulaş, (2022)	Doktora	Problem davranış	2 anne baba çifti ve 1 anne ve 3 OSB'li çocukları (3A- 2 B)	3y3a E 3y10a E 3y2a E	Tek denekli	Eş zamanlı olmayan çoklu başlama modeli	Kurum	+/-/-/-/+	Etkili
Tavil, (2005)	Doktora	Problem davranış	1 anne ve ZY'li çocuğu	10y E	Tek denekli	AB modeli	Kurum	-/-/-/+/-	Etkili

Tablo 1. *Ebeveyn Aracılı Uygulamalara İlişkin Alanyazı – Akademik Beceri ve Kavram Öğretimi Konu Alan Çalışmalar*

Kaynak	Tez	Konu	Katılımcı	Yaş/ Cinsiyet	Yöntem	Model	Ortam	İ/G/UG/GAG/SG	Sonuç
Demirci, (2015)	Yüksek lisans	Renk öğretimi	5 anne ve OSB'li çocukları	6-14 yaş arası	Nicel	Tek grup Ön test- son test	-----	-/-/-/-/-	Etkili
Can Toprakçı, (2006)	Yüksek lisans	Matematik	3 anne ve ZY'li çocukları	10-11-11	Tek denekli	Değişen koşullar deseni	Kurum	+/+/-/-/+	Etkili
Açıkgöz, (2021)	Yüksek lisans	Akıcı okuma	1 anne ve ÖÖG'li çocuğu	10 E	Tek denekli	Davranışlar arası yoklama evreli çoklu yoklama	Ev	+/-/+/+/+	Etkili

3. BULGULAR

3.1. İncelenen araştırmaların genel özellikleri

Tarama sonucunda belirlenen ölçütleri karşılayan toplam 41 çalışmaya ulaşılmıştır. Bu çalışmaların 15'i yüksek lisans tezi, 27'si doktora tezidir.

3.2 Araştırmaların konu bulguları

İncelenen araştırmaların konularına göre sınıflandırıldığında; özbakım ve günlük yaşam becerilerini konu alan çalışmaların %32,5 (*f:*13), etkileşim, sosyal beceri ve oyun becerilerini konu alan çalışmaların %32,5 (*f*:13), dil konuşma ve iletişim becerileri konu alan çalışmaların %20 (*f*:8), problem davranış ve otistik davranışları konu alan çalışmaların %12,5 (*f*:5), akademik becerileri konu alan çalışmaların %7.5 (*f*:3) oranında çalışma bulunmaktadır. Tablo 2 görüldüğü üzere %32,5 ile en fazla özbakım ve günlük yaşam becerileri ve etkileşim, sosyal beceri ve oyun becerileri konuları çalışılırken %7,5 oran ile en az akademik beceriler çalışılmıştır.

Tablo 2.*Araştırmaların Konu Bulguları*

Değişkenler	Frekans	Yüzde
Özbakım ve Günlük Yaşam Becerisi	13	32.5
Etkileşim, Sosyal Beceri ve Oyun becerileri	13	32.5
Dil Konuşma ve İletişim Becerileri	8	20
Problem Davranış ve Otistik Davranışlar	5	12.5
Akademik Beceri	3	7.5

3.4. Araştırmaların yöntem ve model bulguları

Tablo 3 incelendiğinde tek denekli araştırma yöntemini kullanan %61.90 (*f*:26), nicel araştırma yöntemini kullanan %19.04 (*f*:8) ve karma yöntem kullanan %19.04 (*f*:8) oranında çalışma olduğu görülmüştür.

Tablo 3.*Araştırmaların Yöntem Bulguları*

Değişkenler	Frekans	Yüzde
Tek denekli	26	61.90
Nicel araştırma	8	19.04
Karma	8	19.04

3.3. Araştırmaların katılımcı bulguları

Araştırmaların çocuk katılımcı grubunu OSB, zihin yetersizliği, işitme yetersizliği, görme yetersizliği, kekemelik ve özgül öğrenme güçlüğü olan çocuklar oluşturmaktadır. Katılımcı özelliklerine bakıldığında OSB tanılı çocuklar %59.23'ünü (*f*:170), zihin yetersizliği tanılı çocuklar %31.70'ini (*f*:91), işitme yetersizliği tanılı çocuklar %3.48'ini(*f*:10), görme yetersizliği tanılı çocuklar %1.04'ünü oranında (*f*:3), kekemelik tanılı çocuklar %4.18'ini(*f*:12), özgül öğrenme güçlüğü tanılı çocuklar %0.34'ünü (*f*:1) oluşturmaktadır. En çok OSB tanılı çocuklarla çalışma yapılırken, en az özgül öğrenme güçlüğü olan çocuklarla çalışmalar yapılmıştır.

Anne katılımcıların %71.23 oranında (*f*:208), baba katılımcıları %21.91 oranında (*f*:64) ve sadece ebeveyn olduğunu belirten %6.84 (*f*:20) çalışma bulunmaktadır. Tablo 4'te araştırmanın katılımcı bulguları sırasıyla verilmiştir.

Tablo 4.*Araştırmaların Katılımcı Bulguları*

Değişkenler	**Frekans**	**Yüzde**
OSB	170	59.23
Zihinsel yetersizlik	91	31.70
İşitme Yetersizliği	10	3.48
Görme Yetersizliği	3	1.04
Kekemelik	12	4.18
Özgül Öğrenme Güçlüğü	1	0.34
Ebeveyn Katılımcı		
Anne	208	71.23
Baba	64	21.91
Ebeveyn	20	6.84

3.4 Araştırmaların Çocuk Katılımcı Cinsiyet Bulguları

Araştırmalara katılan çocukların cinsiyet bulgularına bakıldığında erkeklerin %62.02 (*f*:178), kızların %26.48 (*f*:76) ve cinsiyeti belirtilmeyen çocukların %11.49 (*f*:33) oranında olduğu görülmüştür. Tablo 5'te araştırmanın çocuk katılımcı cinsiyet bulguları sırasıyla verilmiştir.

Tablo 5. *Araştırmaların Çocuk katılımcı Cinsiyet Bulguları*

Değişkenler	**Frekans**	**Yüzde**
Erkek	178	62.02
Kız	76	26.48
Belirtilmemiş	33	11.49

3.5 Araştırmaların Ebeveyn Eğitimi Ortam Bulguları

Araştırmalarda ebeveynlere uygulanan çalışma/eğitim ortam bulgularına bakıldığında ev, kurum ve web tabanlı ortamlar ve bunların birlikte kullanıldığı ortamlar olduğu görülmüştür. Yapılan çalışmalar ev ortamının %34 (*f*:17), kurum ortamının %38 (*f*:19), web tabanlı ortamın %26 (*f*:13) kullanıldığı görülmüştür. Belirtilmeyen ortam oranı %2'dir (*f*:10). Tablo 6'da araştırmanın ebeveyn eğitimi ortam bulguları sırasıyla belirtilmiştir.

Tablo 6.*Araştırmalarım Ebeveyn Eğitimi Ortam Bulguları*

Değişkenler	**Frekans**	**Yüzde**
Ev	17	34
Kurum	19	38
Web tabanlı	13	26
Belirtilmemiş	1	2

3.6 Etkililik ve Güvenilirlik Bulguları

Araştırmalar etkililik ve güvenirlik verilerine göre incelendiğinde çalışmaların %66.66 (*f*:28) izleme verisinin toplandığı, %42.85 (*f*:18) genelleme verisinin toplandığı, %78.57 (*f*:33) uygulama güvenirliği verisinin toplandığı, %73.80 (*f*:31) gözlemciler arası güvenirlik verisinin toplandığı ve %71.42 (*f*:30) sosyal geçerlik verisinin toplandığı görülmüştür. Tablo 7'de araştırmaların etkililik ve güvenirlik bulguları sırasıyla verilmiştir.

Tablo 7.*Araştırmaların Etkililik ve Güvenilirlik Bulguları*

Değişkenler	Frekans	Yüzde
İzleme		
Veri toplanmış (+)	28	66.66
Veri toplanmamış (-)	14	33.33
Genelleme		
Veri toplanmış (+)	18	42.85
Veri toplanmamış (-)	24	57.14
Uygulama Güvenirliği		
Veri toplanmış (+)	33	78.57
Veri toplanmamış (-)	9	21.42
Gözlemciler Arası Güvenilirlik		
Veri toplanmış (+)	31	73.80
Veri toplanmamış (-)	11	26.19
Sosyal geçerlilik		
Veri toplanmış (+)	30	71.42
Veri toplanmamış (-)	12	28.57

4. SONUÇ, TARTIŞMA VE ÖNERİLER

Bu araştırmanın amacı 1998-2024 yılları arasında Türkiye'de özel gereksinimli bireylere yönelik yapılmış ebeveyn aracılı uygulamaları içeren tez çalışmalarının sistematik olarak incelenmesidir. Araştırmacılar tarafından herhangi bir yetersizliği bulunan bireylere yönelik ebeveyn aracılı uygulamalar yapılan araştırmanın amaçları doğrultusunda belirlenen değişkenler açısından incelenmiş, elde edilen veriler bulgular başlığı altında açıklanmıştır. Anahtar sözcük olarak '' ebeveyn koçluğu, aile eğitimi, ebeveyn eğitimi, anne eğitimi, baba eğitimi'' belirlenmiş ve farklı kombinasyonları ile Yükseköğretim Kurulu Başkanlığı (YÖK) Ulusal Tez Merkezinde yapılan incelemede 155 çalışmaya rastlamıştır. Çalışmaların 42'si araştırmaya dahil edilirken 113'ü dışlanmıştır. İncelenen araştırmaların 27'si doktora (Aydın, 2023; Bahçalı 2020; Bilmez, 2020; Cavkaytar, 1998; Çakmak 2011; Yekta 2023; Diler Sönmez, 2008; Gıcı Vatansever, 2018; Günlü, 2022; Gürel Selimoğlu, 2015; Karaaslan, 2010; Kaymak, 2024; Kizir, 2018; Noyan Erbaş, 2019; Öztürk, 2020; Pektaş Karabekir, 2021; Şimşek, 2018; Tavil, 2005; Tomris, 2019; Toper Korkmaz, 2015; Turgut, 2023; Uçar Rasmussen, 2021; Ulaş, 2022; Ünlü, 2012; Yekin, 2023; Yıldırım, 2021; Yıldız, 2023), 15'i yüksek lisans (Açıkgöz, 2021; Akın Bülbül, 2012; Aktaş, 2020; Arvas, 2023; Besler, 2015; Can Toprakçı, 2006; Demirci, 2015; Günnar, 2023; Koca, 2021; Özcan, 2004; Tavukçu, 2021; Ünver, 2019; Yalım, 2023; Yılmaz, 2023; Yiğit, 2022) tezidir.

Ebeveyn aracılı uygulamalar ile gerçekleştirilmiş çalışmalar incelendiğinde çalışma konusunun özbakım ve günlük yaşam becerileri (Cavkaytar, 1998; Özcan, 2004; Diler Sönmez, 2008; Çakmak, 2011; Yekta, 2023; Arvas, 2023; Günlü, 2022; Tavukçu, 2021; Uçar Rasmussen, 2021; Bahçalı, 2020; Ünver, 2019; Akın Bülbül, 2012; Aktaş, 2020), sosyal

etkileşim, sosyal beceri ve oyun becerileri (Karaaslan, 2010; Yıldız, 2023; Kaymak, 2024; Yetkin, 2023; Yılmaz, 2023; Koca, 2021; Gıcı-Vatansever, 2018; Besler, 2015; Kizir, 2018; Öztürk, 2020; Yiğit, 2022; Gürel Selimoğlu, 2015; Toper Korkmaz, 2015), dil, konuşma ve iletişim becerileri (Pektaş Karabekir, 2021; Bilmez, 2020; Tomris, 2019; Ünlü, 2012; Noyan Erbaş, 2019; Turgut, 2023; Aydın, 2023; Şimşek, 2018), problem davranış ve otistik davranışlar (Yalım, 2023; Günnar, 2023; Yıldırım, 2021; Ulaş, 2022; Tavil, 2005), akademik beceriler (Demirci, 2015; Can Toprakçı, 2006; Açıkgöz, 2021) olduğu görülmüştür**.** Tablo 2 incelendiğinde Özbakım ve günlük yaşam becerileri ile sosyal etkileşim, sosyal beceri ve oyun becerileri konularının daha fazla tercih edilmesinin, özel gereksinimli bireylerin yoğun olarak ev ortamında aile bireyleri ile vakit geçirmeleri, onlarla sosyalleşme ihtiyaçları gereği ailelerin bu konuda desteğe ihtiyaç duymalarından kaynaklandığı düşünülebilir. Özel gereksinimli bireylerin problem davranışlarına ya da akademik becerilerine yönelik gerçek eğitim ortamlarında yapılan öğretim süreçlerinde bireyler için öğretim planlanması, ipucu türleri, pekiştireçler ve çevre düzenlemesi gibi stratejilerin kullanması, bunların öğretim yapan kişilerce bilinmesini gerektirir (Kurt, 2014; Lovaas, 2005; Tekin-İftar ve Değirmenci, 2014). Problem davranış ve akademik beceriler konularında kullanılacak yöntemlerin uzmanlık gerektirmesi, bu uzmanlığın ailelere kazandırılmasının zor olması, bu konuları ele alan çalışmaların daha az tercih edilmesinin sebebi olabilir.

Ele alınan araştırmalarda kullanılan yöntemler incelendiğinde tek denekli araştırma modeli ile (Açıkgöz, 2021; Akın Bülbül, 2012; Arvas, 2023; Bahçalı, 2020; Besler, 2015; Bilmez, 2020; Can Toprakçı, 2006; Cavkaytar, 1998; Çakmak, 2011; Diler Sönmez, 2008; Gıcı Vatansever, 2018; Günlü, 2022; Günnar, 2023; Gürel Selimoğlu, 2015; Kizir, 2018; Özcan, 2004; Pektaş Karabekir, 2021; Tavil, 2005; Tavukçu, 2021; Turgut, 2023; Uçar Rasmussen, 2021; Ulaş, 2023; Ünver, 2019; Yekta, 2023; Yıldız, 2023; Yılmaz, 2023),nicel araştırma modeli ile (Aktaş, 2020; Demirci, 2015; Kaymak, 2024; Koca, 2021; Noyan Erbaş, 2019; Şimşek, 2018; Ünlü, 2012; Yalım, 2023), karma araştırma modeli ile (Aydın, 2023; Karaaslan, 2010; Öztürk, 2020; Tomris, 2019; Toper Korkmaz, 2015; Yetkin,2023; Yıldırım, 2021; Yiğit, 2022) gerçekleştirilmiştir. İncelenen araştırmaların çoğu tek denekli araştırma modeli ile gerçekleştirilmiştir. Tek denekli araştırma modelinin çok tercih edilmesinin sebebi araştırmacıların çoğunluğun özel eğitim anabilim dalında tez çalışması yapmış olması olabilir. Tek denekli araştırmalar, bireysel farklılıkları göz önünde bulundurarak, bireysel müdahalelerin etkisinin değerlendirilmesinde oldukça etkili modeller olmasından dolayı özel eğitim alanında sıklıkla kullanılmaktadır. Nadir görülen durumlar ve heterojen gruplarda çalışılmasına olanak sağlayan tek denekli araştırma modelleri birey bazında ayrıntılı veri toplanarak değişkenlerin doğrudan ve sürekli olarak değerlendirilmesini sağlar (Alberto ve Troutman, 1986)

Araştırmaların çocuk katılımcıları incelendiğinde zihinsel yetersizlikten etkilenmiş bireylerin yer aldığı araştırmalar (Akın Bülbül, 2012; Aktaş, 2020; Arvas, 2023; Can Toprakçı, 2006; Cavkaytar, 1998; Diler Sönmez, 2008; Özcan, 2004; Öztürk, 2020; Tavil, 2005; Tomris, 2019; Yekta, 2023; Yıldırım, 2021; Yiğit, 2022), OSB'den etkilenmiş bireylerin yer aldığı araştırmalar (Bahçalı, 2020; Besler, 2015; Bilmez, 2020; Ünlü, 2012; Demirci, 2015; Gıcı Vatansever, 2018; Günlü, 2022; Günnar, 2023; Gürel Selimoğlu, 2015; Kaymak, 2024; Kizir, 2018; Koca, 2021; Noyan Erbaş, 2019; Pektaş Karabekir, 2021; Tavukçu, 2021; Toper Korkmaz, 2015; Turgut, 2023; Uçar Rasmussen, 2021; Ulaş, 2023;Ünver, 2019; Yalım, 2023; Yetkin, 2023; Yıldız, 2023; Yılmaz, 2023), hem zihinsel yetersizlik hem de otizm spektrum bozukluğundan etkilenmiş bireylerin birlikte yer aldığı araştırma (Karaaslan, 2010), işitme yetersizliği olan bireylerin yer aldığı araştırma (Şimşek, 2018), görme yetersizliği olan bireylerin yer aldığı araştırma (Çakmak, 2011), kekemelikten etkilenmiş bireylerin yer aldığı

araştırma (Aydın, 2023), özgül öğrenme güçlüğü yetersizliğinden etkilenmiş bireylerin yer aldığı araştırma (Açıkgöz, 2021) bulunmaktadır. DSM-V (2013) ile tanılama kriterlerinde yapılan değişikliklerden sonra OSB'nin görülme sıklığı dört kattan fazla artarak, CDC'nin (Hastalıkları Önleme ve Müdahale Merkezi) raporlarına göre OSB'nin yaygınlığı 36 da çocukta 1 olarak belirlenmiştir (Maenner vd., 2023). Son yıllarda, dünya genelinde OSB vakalarının sayısında belirgin bir artış kaydedilmesi (Joon ve ark., 2021), OSB'yi araştırmacılar tarafından popüler bir konu haline getirmiştir. Yükselen OSB vaka sayısı beraberinde artan aile ihtiyaçlarını da getirdiği söylenebilir. Tüm bu durumlar göz önüne alındığında ailelerin terapi ve eğitim ve destek ihtiyaçlarının artması, ebeveyn aracılı uygulamalara yönelik araştırma yönelimini artırmış olabilir.

Araştırma verilerinde dikkat çeken bir başka durum ise erkek çocuk sayısının fazlalığıdır. Daha çok küçük yaş grubundan erkek OSB olan bireyler ile çalışma yapıldığı görülmektedir. Otizmin kadınlara oranla erkeklerde daha fazla görülmesi (CDC,2019 aktaran Kizir, 2019) değerlendirildiğinde araştırmalara katılan 287 çocuğun 170'inin OSB tanılı olması buna sebep gösterilebilir.

İncelenen araştırmalardan yola çıkarak ergenlik dönemindeki OSB olan bireylere yönelik sınırlı sayıda çalışma yapıldığı söylenebilir. Ergenlik dönemindeki çocuklarla yapılan çalışma sayısının 5 (Bahçalı,2020; Demirci, 2015; Günlü, 2022; Tavukçu, 2021; Uçar Rasmussen, 2021) olduğu görülmektedir. OSB olan bireylerin erken dönemde eğitim almadıklarında ileriki yaşlarda iletişimde sınırlılıklarından dolayı verilen yönergeleri yerine getirmekte sorunlar ve yoğun davranış problemleri sonucunda kendilerine ve çevrelerindeki insanlara zarar vermeleri sebebi ile bu yaş grubu ile yapılan çalışmaların kısıtlı olduğu söylenebilir. Araştırmacıların etik kaygılar sebebi ile öğrencilerin kendilerine zarar vermelerini engellemek için bu yaş grubuyla çalışma yapmaktan çekindikleri düşünülebilir. Bunun yanında başka bir açıdan düşünüldüğünde ise erken yaşlardan itibaren yoğun eğitim desteği alan bireylerin sosyal beceri, günlük yaşam ve iletişim becerileri ile ilgili ihtiyaçlarının giderildiği ilerleyen yaşlarda bu konularda çok fazla desteğe ihtiyaç duymadıkları varsayılabilir. İlerleyen yaş ile, değişen ihtiyaçlar doğrultusunda cinsel eğitim, cinsel sağlık, menstrüasyon becerileri gibi konularda desteğe ihtiyaç duyabilirler. Bu konularda yapılmış ebeveyn aracılı tez çalışmalarına rastlanamamış olması, alanyazındaki ihtiyacı göstermektedir.

Araştırmaların ebeveyn katılımcıları incelendiğinde anne katılımcıların yer aldığı araştırmalar (Açıkgöz, 2021; Aktaş, 2020; Arvas, 2023; Besler, 2015; Bilmez, 2020; Can Toprakçı, 2006; Cavkaytar, 1998; Çakmak, 2011; Demirci, 2015; Diler Sönmez, 2008; Gıcı Vatanser, 2018; Günnar, 2023; Gürel Selimoğlu, 2015; Karaaslan, 2010; Kizir, 2018; Koca, 2021; Özcan, 2004; Öztürk, 2020; Pektaş Karabekir, 2021; Şimşek, 2018; Tavil, 2005Tavukçu, 2011; Toper Korkmaz, 2015; Turgut, 2023; Uçar Rasmussen 2021; Yetka, 2023; Yıldırım, 2021; Yıldız, 2023; Yılmaz, 2023; Yiğit, 2022;), baba katılımcıların yer aldığı araştırmalar (Günlü, 2022; Kaymak, 2023) katılımcı grup olarak ebeveyn yazılan çalışmalar (Yalım, 2023), anne ve babaların da dahil olduğu çalışmalar (Akın Bülbül, 2012; Aydın, 2023; Bahçalı, 2020; Noyan Erbaş, 2019; Tomris, 2019; Ulaş, 2022; Ünlü, 2012; Ünver, 2019; Yetkin, 2023) bulunmaktadır. Çalışmaların büyük bir kısmında anne katılımcılar yer almıştır. Bazı araştırmalarda ise hem anne hem de baba katılımcılar dahil edilmiştir. Bunun yanında bazı çalışmalarda katılımcı bilgisi net olarak belirtilmemiş, sadece ebeveyn katılımcılar olarak bilgi verilmiştir. Yapılan incelemeler sonucunda anne katılımı sayısının baba katılımcı sayısına oranla daha yüksek olduğu görülmekte alanyazında yapılan diğer derleme çalışmaları ile paralellik göstermektedir (Bahçalı & Odluyurt, 2021; Kizir, 2019; Lai & Oei, 2014).

İncelenen tez çalışmaların büyük bir kısmında anne katılımcıların yer almasının sebebinin, çocukların bakım ve eğitim sorumluluğunun yaşadığımız toplumun kültürü gereği genellikle anneler tarafından üstlenilmesi, annelerin çoğunun ev hanımı olmasına karşın babaların işleri evde sürekli bulunamamaları ile ilişkili olduğu düşünülmektedir.
İncelenen araştırmalar göstermektedir ki 2020 COVİD-19 pandemi dönemi öncesinde sadece 1 tanesi web tabanlı ortamda gerçekleştirilen çalışma var iken (Kizir, 2018), pandemi ve sonrasında bu sayı 11'e çıkmaktadır (Aydın, 2023; Günnar, 2023; Kaymak, 2024; Tomris, 2019; Turgut, 2023; Uçar Rasmussen, 2021; Yalım, 2023; Yekta, 2023; Yetkin, 2023; Yıldız, 2023; Yiğit, 2022). COVİD-19 pandemisinde okulların kapanması eğitimi hızlı bir şekilde web tabanlı uygulamalara dönüştürmüş (Şenol ve Can-Yaşar, 2020) bu dönüşümle birlikte aileler eğitim ve terapi ihtiyaçlarını yeterince karşılayamaz duruma gelmiştir (Karahan vd., 2021, s. 79-105). Bu nedenle hem COVİD-19 hem de gelecekteki olası salgın ve afetlerin eğitimde aksaklığa sebep olmaması, özel gereksinimli bireylerin ve ailelerin eğitim, terapi ve destek ihtiyaçlarının karşılanması için web tabanlı uygulamaların önem kazandığı ve gelecekte de bu uygulamaların çoğalacağı düşünülmektedir.
Tüm bu bilgilerin ışığında yapılan sistematik derleme özetle göstermektedir ki; incelenen araştırmaların büyük bir bölümü yarı deneysel çalışma yöntemi olan tek denekli araştırma yöntemleri ile gerçekleştirilmiştir. Ebeveyn katılımcıların büyük bir kısmını anneler oluşturmaktadır, katılımcıların büyük çoğunluğunu OSB olan bireyler oluşturmaktadır. Tüm katılımcıların 178'i erkek iken sadece 76'sı kız çocuğudur. Araştırmaların büyük çoğunluğunda ebeveyn eğitimi ortamı kurum ortamı iken, COVİD-19 pandemisi ile web tabanlı eğitim ortamlarında artış görülmüştür. İncelenen araştırmalarda sadece 2 araştırmada çocuklar ile sosyal ortamlarda uygulama yapılmıştır (Bahçalı, 2020; Bilmez, 2020). İncelenen araştırmaların bulgularına göre, çoğu araştırma ebeveyn aracılı uygulamaların özel gereksinimli bireylere hedef becerilerin öğretiminde etkilidir.

4.1. Gelecek Araştırmalara Yönelik Öneriler

Ebeveyn aracılı uygulamalar, ebeveynlere sunulan eğitimler yoluyla ebeveynin çocuklarına eğitim ya da çalışma sunabilmesini amaçlamaktadır. Alanyazın incelendiğinde ebeveyn aracılı uygulamaları kullanan araştırmalarda ebeveynlerin başarılı bir şekilde uygulama gerçekleştirdiklerini ve özel gereksinimli çocuklarda hedeflenen amaçlara ulaşıldığını göstermiştir. Bu bilgiler ışığında alanda çalışan uzmanlara gelecek araştırmalara yönelik şunlar önerilebilir;

- OSB olan ergen bireylerin ebeveynlerine uzmanlar tarafından aile eğitimi ya da koçluk desteği sağlanarak bilimsel kanıta dayalı uygulamalar öğretilebilir.
- OSB olan ergen kız çocuklarının menstrüasyon özbakım becerilerine yönelik ebeveyn aracılı uygulamalar ile çocukların ihtiyaç duyduğu becerileri edinmeleri sağlanabilir.
- Ergen özel gereksinimli bireylerin cinsel eğitim, cinsel sağlık, cinsel hijyen vb. ihtiyaçlarına yönelik ebeveyn aracılı uygulamalar geliştirilebilir.
- Baba katılımcıların yer aldığı ebeveyn aracılı uygulamalar ile öğretim ve çalışmaların kişi boyutunda genellenmesi sağlanabilir.
- Ebeveyn aracılı uygulamalar ile çocukların eğitim kurumlarında öğrendikleri bilgi ve beceriler ev ortamında ebeveynleri tarafından tekrar edilebilir, izleme ve genelleme çalışmalarına katkıda bulunulabilir.
- Ebeveyn aracılı uygulamaların sonuçlarının etkili çıkması sebebi ile benzer araştırmaların gerçekleştirilmesi ve alanda çalışan uzmanların farklı becerilerin öğretilmesini amaçlayan uygulamalar geliştirmelerinin alana katkı sağlayacağı düşünülmektedir.

5. KAYNAKÇA

Açıkgöz, Murat H. (2021). *Aile eğitimi ve performans geri bildiriminin özel öğrenme güçlüğü olan çocuğa sahip bir annenin akıcı okuma stratejilerini kullanma düzeyine etkileri*. Yüksek Lisans Tezi. Eskişehir Osmangazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Eskişehir.

Akın Bülbül, I. (2012*). Zihinsel yetersizlikten etkilenmiş erkek ergenlere ebeveynleri aracılığıyla uygun mastürbasyon yapma becerisinin kazandırılmasında eşzamanlı ipucuyla öğretimin etkililiği*. Yüksek Lisans Tezi. Abant İzzet Baysal Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı.

Akosmanoğlu, E., & Bedel, A. (2021). Okul öncesi eğitim programı ile bütünleştirilmiş aile destek eğitim rehberliğinin (OBADER) annelerin çocuklarına karşı tutumlarına etkisinin incelenmesi. *Erken Çocukluk Çalışmaları Dergisi*, *5*(1), 44–65. https://doi.org/10.24130/eccd-jecs.1967202151257

Aktaş, G. (2020). *Zihinsel yetersizliği olan ergenin menstrüasyon öz bakım becerisini geliştirmede hemşire ve ebeveyn eğitiminin karşılaştırmalı etkililiği*. Yüksek Lisans Tezi. Mersin Üniversitesi, Sağlık Bilimleri Enstitüsü, Hemşirelik Anabilim Dalı, Mersin.

Alberto, P., Troutman, A.C. (1986). *Applied Behavior Analysis For Teachers*, Second Edition, Ohio: Merrill Publishing Company.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders-5 [DSM-5]*, Arlington: American Psychiatric Association Publications.

Arvas, E. (2023). *Ebeveynlerin zihinsel yetersizliği olan çocuklarına etkinlik çizelgeleri ile cinsel gelişimine ilişkin hijyen becerilerini öğretmeleri için sunulan koçluk*. Yüksek Lisans Tezi. Dokuz Eylül Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, İzmir.

Ataman, A. (2003). *Özel gereksinimli çocuklar ve özel eğitime giriş*. Gündüz Eğitim ve Yayıncılık

Aydın, N. (2023). *Kekemeliği olan 36-72 ay arası çocuklarda tele-terapi ile sunulan palin ebeveyn çocuk etkileşimli terapi programının incelenmesi: bir karma yöntem çalışması*. Doktora Tezi. Üsküdar Üniversitesi, Sağlık Bilimleri Enstitüsü, Dil ve Konuşma Terapisi Anabilim Dalı, İstanbul.

Bahçalı, T. (2020). *Ebeveynlerin aşamalı yardımla öğretim becerileri ve otizmli ergenlerin hedef becerisi üzerine ebeveyn koçluğunun etkililiği*. Doktora Tezi. Anadolu Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Eskişehir.

Barkaia, A., Stokes, T. F., & Mikiashvili, T. (2017). Intercontinental telehealth coaching of therapists to improve verbalizations by children with autism. *Journal of Applied Behavior Analysis*, 50(3), 582-589.

Besler, F. (2015). *Anneler tarafından sunulan video modelle öğretimin otizmli çocuklara oyun becerisi öğretmedeki etkililiği*. Yüksek Lisans Tezi. Anadolu Üniversitesi, Sosyal Bilimler Enstitüsü, Uygulamalı Davranış Analizi Anabilim Dalı, Eskişehir.

Bilmez, H. (2020). *Otizm spektrum bozukluğu olan çocukların ebeveynlerine sunulan koçluk uygulamalarının ebeveynlerin öğretim becerileri ve çocukların iletişim becerileri üzerine etkileri*. Doktora Tezi. Anadolu Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Eskişehir.

Can Toprakçı, N. (2006). *Kurumda eğitim alan zihinsel engelli öğrencilerin annelerine genişletilmiş aile eğitim programının uygulanmasının öğrencilerin matematik ders amaçlarını edinmelerine sürdürmelerine ve genellemelerine olan etkisi*. Yüksek Lisans Tezi. Gazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Ankara.

Cavkaytar, A. (1999). Zihin engellilere özbakım ve ev içi becerilerinin öğretiminde bir aile eğitimi programının etkililiği. *Özel Eğitim Dergisi*, 2 (3), 40-50.

Çakmak, S. (2011). *Görme engeli olan çocuklara özbakım becerilerini kazandırmada video ile model olunarak sunulan aile eğitim programının etkililiği*. Doktora Tezi. Gazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Bölümü, Ankara.

Demirci, İ. (2015). *Renk öğretimine yönelik hazırlanan aile eğitim programının etkililiği*. Yüksek Lisans Tezi. Gazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Resim İş Eğitimi Anabilim Dalı, Ankara.

Erbaş, N. (2019). *Otizm spektrum bozukluğuna sahip olan çocukların ebeveynlerine yönelik olan hanen more than words eğitim programının ebeveyn ve çocuk davranışları üzerindeki etkisinin incelenmesi.* Doktora Tezi. Hacettepe Üniversitesi, Sağlık Bilimleri Enstitüsü, Dil ve Konuşma terapisi Programı, Ankara.

Gıcı Vatansever, A. (2018). *Otizm spektrum bozukluğuna sahip çocuğu olan annelere sunula koçluk uygulamalarının annelerin öğretim becerilerini ve çocuklarının ortak dikkate tepki verme becerilerini edinmeleri üzerindeki etkileri*. Doktora Tezi. Trakya Üniversitesi, Sosyal Bilimler Enstitüsü, Engelli Çalışmaları Anabilim Dali, Edirne.

Günlü, Y. (2022). *Otizm spektrum bozukluğu olan bireylere kişisel bakım becerileri kazandırmada baba eğitim programının etkililiği*. Doktora Tezi. Gazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Ankara.

Günnar, Betül H. (2023). *Çevrimiçi ebeveyn koçluğunun ebeveynlerin tepkiyi yarıda kesme ve yeniden yönlendirme uygulamasını edinmeleri ve otizm spektrum bozukluğu olan çocuklarının basmakalıp davranışları üzerindeki etkisi*. Bursa Uludağ Üninersitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Bursa.

Hendricks, D. R., & Wehman, P. (2009*). Transition from school to adulthood for youth with autism spectrum disorders*: Review and recommendations. *Focus on Autism and Other Developmental Disabilities, 24*(2), 77 88.
https://doi.org/10.1177/1088357608329827

İlkhan Yetkin, A. (2023). *Otizm spektrum bozukluğu olan çocukların ebeveynlerine çevrimiçi koçluk ile sunulan doğal öğretim müdahale programının etkililiği*. Doktora Tezi. Anadolu Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Eskişehir.

Ingersol, B., and Gergans, S. (2007). The effect of a parent-implemented imitation intervention on spontaneous imitation skills in young children with autism. *Research in Developmental Disabilities* 28, 163–175.

Karaaslan, Ö. (2010). *Etkileşime dayalı erken eğitim programı'nın (edep) gelişimsel yetersizliğe sahip çocuklar ve anneleri üzerindeki etkililiği*. Doktora Tezi. Anadolu Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Eskişehir.

Karabekir Pektaş, E. (2021). *Çocuklarında otizm spektrum bozukluğu olan ebeveynlere sunulan koçluk uygulamalarının anne-çocuk çiftleri üzerindeki etkileri*. Doktora Tezi. Anadolu Üniversitesi, Eğitim bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Eskişehir.

Karahan, S., Yildirim Parlak, S., Demiroz, K., Kaya, M., & Kayhan, N. (2021). Experiences of the mothers to cope with the problem behaviors of the children with special needs during coronavirus (COVID-19) process. *Journal of Qualitative Research in Education*, 25, 76-101.

Kaymak, A. (2024). *Otizm spektrum bozukluğu olan çocukların babalarına sunulan eteçom programı çevirimiçi grup müdahalesinin etkililiği*. Doktora Tezi. Eskişehir Osmangazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Eskişehir.

Kizir, M. (2018). *Ayrık denemelerle öğretimin çevrimiçi sunulan aile eğitim programıyla kazanımının incelenmesi*. Doktora Tezi. Bolu Abant İzzet Baysal Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Bolu.

Kizir, M. (2019). Otizm spektrum bozukluğu'na yönelik uzaktan koçluk uygulamalarının incelenmesi. *Çukurova Üniversitesi Eğitim Fakültesi Dergisi*, 48(2), 1072-1110.

Koca, B. (2021). *Otizm spektrum bozukluğu olan çocuklara ebeveyn merkezli sosyal iletişim öğretimi müdahale programının etkililiğinin incelenmesi.* Yüksek Lisans Tezi. Ankara Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Ankara.

Kurt, O. (2014). Otizm Spektrum Bozukluğu ve bilimsel temelli uygulamalar. Tekin-İftar, E. (Ed.), *Otizm Spektrum Bozukluğu Olan Çocuklar ve Eğitimleri* (ss. 81-116, 3. Baskı). Ankara: Vize.

Lai, W. W., & Oei, T. P. S. (2014). Coping in parents and caregivers of children with autism spectrum disorders (ASD): A review. *Review Journal of Autism and Developmental Disorders*, 1(3), 207-224. doi: 10.1007/s40489-014-0021-x

Lovaas, O. I. (2005*). Gelişimsel Engelli Çocukların Eğitimi: Benim Kitabım*, Çev. Sorias, E., Aksel, S., Tekinsav-Sütcü, S., Çengelci-Özekes, B., & Yılmaz-Irmak, T. İstanbul: Sistem.

Millî Eğitim Bakanlığı. (2018). *Özel Eğitim Hizmetleri Yönetmeliği*. Özel Eğitim Rehberlik ve Danışma Hizmetleri Genel Müdürlüğü.

Özcan, N. (2004). *Zihin özürlü çocuklara tuvalet becerisi öğretimine yönelik aile eğitim programının etkililiği*. Yüksek Lisans Tezi.Anadolu Üniversitesi, Eğitim Bilimleri Enstitüsü, Eskişehir.

Öztürk, N. (2022). *Down sendromlu çocukların gelişimine ve anne-çocuk etkileşim davranışlarına dır/floortime modeline dayalı müdahale programının etkisinin incelenmesi*. Doktora Tezi. Ankara Üniversitesi, Sağlık Bilimleri Enstitüsü, Çocuk Gelişimi Anabilim Dalı, Ankara.

Rush, D. D., and Shelden, M. L. (2005). *Evidence-based definitions of coaching practices*. CASEinPoint, 1 (6), 1-6.

Selimoğlu, G. (2015). *Etkileşim temelli erken çocuklukta müdahale programının (eteçom) otizm spektrum bozukluğu sergileyen çocukların sosyal etkileşim becerileri ve anne-çocuk etkileşimi üzerindeki etkililiği*. Doktora Tezi. Gazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Ankara.

Şenol, F. ve Can Yaşar, M. (2020). COVID-19 Pandemisi süresinde öğretmen ve ebeveyn gözünden "özel eğitim" *Milli Eğitim Dergisi*, 49(1), 439-458.

Simacek, J., Elmquist, M., Dimian, A. F., & Reichle, J. (2021). Current trends in telehealth applications to deliver social communication interventions for young children with or at risk for autism spectrum disorder. *Current Developmental Disorders Reports*, 8, 15-23.

Sönmez-Diler, N. (2008). *Eve dayalı gündüz tuvalet kontrolü aile eğitimi programı'nın annelerin kuruluk kaydı tutma ile gündüz tuvalet kontrolü kazandırma becerisini ve çocukların gündüz tuvalet kontrolünü kazanmasındaki etkisi*. Doktora Tezi. Gazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Ankara.

Şimşek, Ş. (2018). *Anne eğitim programının işitme engelli çocukların dil gelişimlerine etkisinin incelenmesi*. Doktora Tezi. Ankara Üniversitesi, Fen Bilimleri Enstitüsü, Ev Ekonomisi (Çocuk Gelişimi ve Eğitimi) Anabilim Dalı, Ankara.

Tavil, Yusuf Z. (2005). *Davranış denetimi aile eğitim programının annelerin davranışsal işlem süreçlerini kazanmalarına etkisi*. Doktora Tezi. Gazi Üniversitesi. Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Ankara.

Tavukçu, D. (2021). *Otizm spektrum bozukluğu olan çocuğa sahip annelere sunulan koçluk uygulamalarının annelerin öğretim becerilerini ve çocuklarının güvenlik becerilerini edinmeleri üzerindeki etkisi*. Yüksek Lisans Tezi. Anadolu Üniversitesi, Sosyal Bilimler Enstitüsü, Uygulamalı Davranış Analizi Anabilim Dalı, Eskişehir.

TDK (Sozluk, 2024). *Aracı*. Erişim adresi:https://sozluk.gov.tr/

Tekin-İftar, E., & Değirmenci, H. D. (2014). Otizm Spektrum Bozukluğu Olan Çocukların Eğitimi. Tekin-İftar, E. (Ed.), *Otizm Spektrum Bozukluğu Olan Çocuklar ve Eğitimleri* (ss. 265-319, 3. Baskı). Ankara: Vize.

Tomris, G. (2019). *Down sendromlu çocuğu olan ebeveynlere yönelik geliştirilen doğal öğretime dayalı erken müdahale(dödem) programının ebeveyn ve çocukları üzerindeki etkililiği*. Doktora Tezi. Anadolu Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Eskişehir.

Toper-Korkmaz, Ö. (2015). Eve dayalı olarak gerçekleştirilen etkileşim temelli erken çocuklukta müdahale programını (ETEÇOM) otizm spektrum bozukluğu tanılı çocuklar ve anneleri üzerindeki etkililiği. Doktora Tezi. Anadolu Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Eskişehir.

Turgut, F. (2023). *Tele-sağlık uygulamalarının aile davranışları ve otizm spektrum bozukluğu olan çocukların hedef davranışları üzerindeki etkileri.* Doktora Tezi. Anadolu Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Eskişehir.

Uçar Rasmussen, M. (2021). *Video konferans aracılığıyla uzaktan eğitimle sunulan aile eğitim programının annelerin etkinlik çizelgesi hazırlama ve uygulamadaki etkililiği*. Doktora Tezi. Bolu Abant İzzet Baysal Üniversitesi, Lisansüstü Eğitim Enstitüsü, Özel Eğitim Anabilim Dalı, Bolu.

Ulaş, S. (2022). *Ebeveyn çocuk etkileşim terapisinin Türk kültürüne uyarlanarak otizm tanılı çocuklar ve tipik gelişim gösteren çocuklar ile ebeveynleri üzerinde etkililiğinin incelenmesi*. Doktora Tezi. Atatürk Üniversitesi, Eğitim Bilimleri Enstitüsü, Rehberlik ve Psikolojik Danışmanlık Bilim Dalı, Erzurum.

Uman, L. S. (2011). Systematic Reviews and Meta-Analyses. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, 20(1), 57-57.

Ünlü, E. (2012). *Anne-babalara sunulan otizm spektrum bozukluğu gösteren çocuklara yönelik ayrık denemelerle öğretim programının (ADÖSEP) etkililiği*. Doktora Tezi. Anadolu Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Eskişehir.

Ünver, M. (2019). *Ailelerin otizm spektrum bozukluğu olan çocuklarına serbest zaman etkinliklerini gerçekleştirirken tablet aracılığıyla sundukları etkinlik çizelgelerinin etkililiği*. Yüksek Lisans Tezi. Anadolu Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Eskişehir.

Varol, Nihal; Aile Eğitimi, kök Yayıncılık 2005.

Varol, N. (2006). *Aile eğitim çalışmalarının planlanması*. Eğitim ve Bilim.

Vuran, S. (1997). Zihin Engelli Çocuk Annelerine Ödüllendirme ve Eleştirmemenin Kazandırılmasında Bilgilendirme, Dönüt Verme, Dönüt Verme ve Ödüllendirmenin Etkinliği. Doktora Tezi. Anadolu Üniversitesi.

Yalım, Ş. (2023). *Otizmli çocuklara, öğrenmenin ön koşul becerilerinin, ebeveyleri tarafından floortime oyun terapisi ile kazandırılmaya çalışılmasının, otistik davranışlar ile gelişim alanlarındaki becerilerine ve ebeveynlerinin stres düzeylerine etkisinin incelenmesi*. Yüksek Lisans tezi. İstanbul Gelişim Üniversitesi, Lisansüstü Eğitim Enstitüsü, Psikoloji Anabilim Dalı, İstanbul.

Yekta, Y. (2023). *Özel gereksinimli çocuğu olan annelere çevirimiçi bug in ear(BIE) teknolojisi ile sunulan koçluğun çocukların ev içi becerilerini kazanmasına etkisi*. Doktora Tezi. Eskişehir Osmangazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Eskişehir.

Yıldırım, B. (2021). *Zihin engelli çocukların problem davranışlarının azaltılmasında anne gereksinimlerine yönelik geliştirilen anne çocuk etkileşimi programının etkisinin incelenmesi*. Doktora Tezi. Selçuk Üniversitesi, Sosyal Bilimler Enstitüsü, Çocuk Gelişimi Eğitimi ve Ev Yönetimi Anabilim Dalı, Konya.

Yıldız, K. (2023). *Otizm spektrum bozukluğu olan çocukların annelerine koçluk desteğiyle sunulan karşılıklı taklit eğitiminin anne ve çocuk davranışları üzerindeki etkililiği*. Doktora Tezi. Anadolu Üniversitesi, Lisansüstü Eğitim enstitüsü, Eskişehir.

Yılmaz, A. (2023). *Milieu öğretim tekniklerinin öğretimine yönelik aile eğitim programının otizm spektrum bozukluğu tanılı çocuklarda ortak dikkat ve jestleri kullanmaya etkisi*. Yüksek Lisans Tezi. Biruni Üniversitesi, Lisansüstü Eğitim Enstitüsü, Özel Eğitim Anabilim Dalı.

Yiğit, H. (2022). *Nitelikli kitap okuma (NİKO) erken müdahale programının down sendromlu çocuğu olan ebeveynlerin kitap okuma ve çocuklarının etkileşimsel davranışları üzerindeki etkileri*. Yüksek Lisans Tezi. Anadolu Üniversitesi, Eğitim Bilimleri Enstitüsü, Özel Eğitim Anabilim Dalı, Eskişehir.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

POST TRUTH ÇAĞDA LİSANSÜSTÜ ÖĞRENCİLERİNİN YENİ MEDYA İÇERİĞİNE YÖNELİK TUTUMLARI

Arş. Gör. Dr, Eren DEMİRKIRAN
Bahçeşehir Üniversitesi, İletişim Fakültesi, Reklamcılık Bölümü
ORCID: 0000-0001-5537-5545

Öz
Günümüz dünyasında günlük hayatın bir parçası haline gelen yeni medyada yer alan içeriklerin güvenirliği tartışma konusu olmuştur. Yeni medyadaki anonim ve hızla yayılan haberler anonim özelliklerinden dolayı güvensiz kabul edilmektedirler. Yalan haberlerin yeni ve geleneksel medyada sıklıkla yer aldığı ve meşrulaştığı bu dönem post truth çağ olarak adlandırılmıştır. Gerçekliğin önemini yitirdiği post truth çağda yeni medya ve içeriğine yönelik tutumlarda incelenmeye başlanmıştır. Ülkemizdeki nüfusun çok küçük bir oranını temsil eden lisansüstü öğrencilerinin yeni medyada haber içeriklerine yönelik tutumları araştırmada incelenmiştir. Araştırmanın amacı lisansüstü öğrencilerinin haber içeriklerine yönelik tutumlarının boyutlarını ve bu tutumların demografik değişkenlere göre farklılaşmasını incelemektir. Araştırmada lisansüstü öğrencilerinin yeni medyadaki haber içeriklerine yönelik olumsuz tutumlara sahip olduğu ortaya konmuştur
Anahtar Kelimeler: Post truth, Yeni medya, Yalan haber

GRADUATE STUDENTS' ATTITUDES TOWARDS NEW MEDIA CONTENT IN THE POST TRUTH AGE

Abstract
Nowadays, Reliability of contents of the new media that has become part of daily life has been controversial issue. Anonymus and fast spreading news on new media is regarded as unreliable due to its anonymus features. The era that fake news are widespread and regarded legal on both new and traditional media is named post truth era. On post truth era that truth lost its impotance, attitudes towards new media and its content are began to be examined. Attitudes on news content on new media of post graduate students that is small portion of population of our country are examined in the research. The research focus on dimensions their attitudes and differentiation of those attitudes according to demographic variables.The research revealed that post graduate student have negative attitudes towards news content on news media.
Keywords: Post truth, New media, Fake news

Giriş
Gerçek günlük hayat içerisinde ve felsefe alanında sürekli tartışılagelen, öznel ve nesnel değerlendirmeler ile tanımlanmaya çalışılan bir olgu olarak toplumları meşgul etmiştir. Gerçek ya da doğru nesnel olarak tanımlanamadığında bireyler kendi inanışları ve çıkarları doğrultusunda gerçeği tanımlamış ve savunmuşlardır. Aristo gerçeği ve yanlışı *" Olan şeye yok ya da olmayan şeye var demek yanlış, olan şeye var ve olmayan şeye yok demek doğrudur*" olarak tanımlamıştır. (Akt, Mcintyre,2019)
Gerçek kavramı olgular çerçevesinde nesnel bir hal alırken kitle iletişim araçları 20. yüzyıl boyunca gelişti ve yaygınlaştı. 21. yüzyılda ise yeni medya ile iletişim farklı bir boyut kazandı. Yeni medya geleneksel medya araçlarının hegemonyası güç kaybetmeye başladı.

Yeni medyada haberlerin hızla yayılması ve kontrol etmenin zorlaşması iletişimin hızını ve boyutunu değiştirdi. Yeni medyadaki her bireyin olası bir haber kaynağı durumuna gelmesi ile geleneksel medyanın etkinliği azaldı.
21. yüzyılda yaşanan gelişmeler ile birlikte gerçek (Hakikat) kavramının anlamını yitirdiği ve yaşanan dönemin gerçeğin bittiği veya gerçek sonrası çağ olarak adlandırıldığı öne sürülmektedir. Bu döneme İngilizcede sonra gelen anlamındaki post sıfatı ve gerçeklik anlamındaki truth kelimesinin birleşimi ile Post Truth çağ adı verilmiştir.

Post Truth Çağ

Post truth kavramı anlamını oluşturan kelimelerin doğrudan çevrildiği doğrusu sonrası, doğrudan sonra gelen anlamlarına gelmez. Post truth, olgusal gerçekliğin önemini yitirdiği, ikinci plana itildiği bir dönemi tanımlar. Oxford sözlüğüne göre Post Truth, "*insanların duygu ve inançlara olgusal gerçeklerden daha fazla önem verdiği dönem*"dir. (Oxford., 2019) Post truth çağda kişisel fikirler ve inançlar kamuoyunu belirlemede olgusal gerçeklerden daha etkilidir.
Post truth kelimesi 2016 yılından yılın kelimesi seçilmiştir. Kelimenin yaygın olarak kullanılması Amerikan başkanlık seçimlerin Trumph tarafından söylenen gerçekdışı ifadeler ve Brexit sırasındaki tartışmalar etkili olmuştur. Siyasal kampanyalar ve siyasi tartışmalar sırasında öne sürülen argümanların olgusal gerçekler yerine, çarpıtılmış gerçekler ve kanıtlanmayan iddialarda oluştuğu ve toplumun çoğunluğu tarafından sorgulanmadan, doğal kabul edildiği bir ortam post truth çağın yayınlaşmış halidir. Post truth çağı yalan haberler ve dayanaksız ifadeler ile sınırlandırmak bu çağın gerçek sebepleri hakkında yanılgıya yol açar. Post truth çağ bilgi ve gerçekliğe sahip olmanın ve bunları savunmanın elitist bir yaklaşım olduğunu ileri sürülerek marjinal olarak nitelendirildiği ve değerinin düşürüldüğü bir dönemdir. (Lewandowsky, Ecker, & Cook, 2017) Bilgi sahibi entelektüel bireyleri ve bilim insanlarını toplumun gerçeklerinden habersiz ve topluma yukarıdan bakan bireyler olarak görmek ve çalışmalarını değersizleştirmek post truth çağda yaygın bir durumdur. Bilimsel yöntemler ile elde edilen bilgilerin kabul edilmediği ve kaynağı belirsiz ve yaygın inanışların doğru kabul edildiği bir ortamda bilgi toplumdan dışlanan bir niteliğe bürünür. Toplumda, bilgi değersizleştiğinde toplum akıl yerine demagogların sözleri ile yönlendirilmeye başlanır. Son yıllarda özellikle sağlık konusunda olgusal gerçeklere dayanmayan ifadeler sıklıkla medyada yer almaktadır. Aşı karşıtlığı hareketi, sağlığı tehlikeye atabilecek beslenme rejimleri post truth çağda yaygınlaşmıştır.
Post truth çağda gerçek olmayan olguların gerçeklerden etkin ve etkileyici olmasının sebeplerinden biri de gerçek olmayan bilgilerin hızla yayılması ile birlikte popüler olmasıdır. Popüler olan bilgiye sahip birey bu, genellikle sıra dışı olan, bilgi ile diğer insanlar arasında popüler hale gelebilmektedir. Bu bilgiler özellikle popülerlik ve beğeninin önem kazandığı yeni medyada hızla yayılmaktadır. Bu durum hegemonyayı güçlendirmektedir. (Jaques, Islar, & Lorg, 2019) Siyasal ve toplumsal sorunların yoğun olduğu dönemlerde gerçek dışı bilgilerin, komplo teorilerinin ve söylentilerin yayılma ve inanılması hızlı olur. Belirsizlikten korunma, gerçeklikten kaçış ve çoğunluğa uyma bu durumda etkilidir. (Le bon, 2016)
Gerçekdışı bilginin etkin olmasını bir sebebi ise cahil ve bilgisiz inşaların sahip oldukları özgüveni tanımlayan Dunning Kruger etkisidir. Dunning Kruger etkisine göre bir bireyin hakkında az bilgiye sahip olduğu bir konuda çok bilgili sanması ve yüksek özgüvene sahip olmasıdır. (Dunning, 2011) İnsanların popüler olmak ve amacıyla bilgi sahip olmadıkları ya da az bilgi sahibi oldukları konular hakkında kendilerini uzman, otorite ilan etmeleri ve yüksek özgüvene sahip olmaları post truth çağda sıklıkla rastlanan bir durumdur.

Konu üzerine eğitimi ve bilgisi olmayan bireylerin özellikle toplum tarafından ilgiyle izlenen sağlık, hukuk ve din gibi konularda deney ve akılcılığa dayanmayan ifadeler ile kendi taraftar gruplarının oluşturdukları sıklıkla görülmektedir.
Post truth çağ bilimsel yöntemlerin, bilgilerin yerini duyumlara dayanan bilgilerin, duygu ve hislerin olgulardan daha önemli hala gelmesi ile başladı. Bireylerin pragmatik tutumları ve ben merkezci yaklaşımları dolaylı yoldan da olsa post truth çağın gelişimine katkıda bulundu. Post truth çağda gerçeklik ve olgusallık, popülizm ve bireyselliğin gerisinde kalarak insanlık tarihinde tartışmalı bir dönem haline geldi. (Mcintyre, 2019)

Yalan Haber

Post truth kavramı, yalan kavramı, özellikle de yalan haber kavramı ile yakından ilgilidir. Yalan ve yanlı haberler post truth çağın oluşmasında etkilidir. Yalan ve yanlı haberler tarihin farklı dönemlerinde farklı amaçlar ile kullanılmıştır. Siyasi rakipleri etkisiz hale getirmek, toplumdaki belirli gruplara karşı şiddet kullanmayı meşru kılmak, savaş ilanlarını meşru ve haklı hale getirmek için yalan ve manipülatif haberler kullanılmıştır.
Yalan haberler post truth çağda ortaya çıkan bir olgu değildir Post truth çağda yalan haberlerin doğal, olağan kabul edilmesi ve normalleştirilmesi post truth çağın yalan haber ile özdeşleştirilmesinde etkili olmuştur. Yalan haberlerin tarihi medyanın tarihi kadar eskidir. (Taş & Taş, 2018) Yalan haber geleneksel medya içerisinde egemen güçlerin istediği doğrultusunda yayın yapmıştır. 6-7 Eylül olaylarının Atatürk'ün doğduğu eve bomba atılmasın yalan haberinin İstanbul ekspres gazetesinde yayınlanmasından sonra başlaması yakın tarihimizde yalan haberlerin en önemli örneklerindendir. (Uluk, 2018) Geleneksel medyada özellikle gazetelerin satış rakamlarının ve televizyonların izlenme oranlarının azalması gazetelerin reklam gelirlerinde önemli düşüşlere neden olmuştur. Reklam gelirlerinin azalması gazeteleri içerik, boyut ve nitelik olarak küçülmeye zorlamıştır. Artan maliyetler haber toplama, gazete basım maliyetlerinin azaltılması ile düşürülmeye ve satış rakamlarını artırmaya yönelik çalışmalar ile dengelenmeye çalışılmıştır. Satış rakamlarını artırmak için ilgi çekici, şiddet içerikli, sansasyonel haberlerin öne çıkarılması gibi yöntemler kullanılmıştır. Değişen teknoloji iler birlikte internet ortamında da yer alan haber kaynakları internet sitesine trafik çekmek, sitedeki tıklanma oranını artırmak için vurucu ve gizemli cümlelerden oluşan yanıltıcı haber yayıncılığına yönelmişlerdir. Bu tür haberlerin yaygınlaşması ve yeni medyada da etkin olarak paylaşılması bireylerde internet ve yeni medya platformlarında yer alan haberlere yönelik bir önyargı oluşturmuştur. Haberlerin gerçekliği ve özgünlüğü sorgulanmaya başlanmıştır. Reklam içeriklerinin yoğun olarak bulunduğu sitelerde haber okumanın zorlaşması ve haber görünümlü reklam içeriklerinin yaygınlaşması internet sitelerinde haberlere güveni düşürmüştür.
Yeni medyanın ortaya çıkması ve yaygınlaşması ile birlikte yalan haberler daha yaygın ve anlaşılması zor duruma gelmişlerdir. Yeni medyanın katılıma dayanan ve merkezsiz yapısı nedeniyle her birey yeni medyada bir haber kaynağı durumundadır. Bir merkezin ve merkezi denetimin olmaması özgür, demokratik ve sınıflardan bağımsız bir medyaya olanak sağlamaktadır Yeni medya bireyler ve kitleler arasında etkileşimli, anında, hiyerarşiden uzak, zaman ve uzamdan bağımsız iletişim olanağına sahiptir. (Güngör, 2011, s. 312-315) Geleneksel medyada sadece belirli zamanlarda yayınlanan tek yönlü iletişim, yeni medya ile birlikte her an ulaşılabilen çok yönlü bir niteliğe bürünmüştür.
Yeni medyada yalan haberler geleneksel medyaya göre daha hızlı yayılabilmektedir. İdeoloji ve yaşam tarzlarına göre var olan gruplara üye bireylerin benzer düşüncelere sahip olması bireylerin belirli konularda daha hassas ve ilgili olmalarına neden olmaktadır. Bu durum bireyleri manipülasyon ve yalan haberlere daha açık hala getirmektedir.

Karşıt görüş, ideoloji ve toplumsal gruplara yönelik eleştirel, aşağılayıcı ve nefret içeren içerikler yeni medyada hızla yayılabilmektedir. Yeni medyadaki içeriklerin anonim yapısı haber niteliği taşıyan içeriklerin doğrulanmasını ve denetlenmesini zorlaştırmaktadır. Yeni medyada temsil edilen toplumsal veya ideolojik grubun benlik algısını güçlendirmek için kullanılan biz dili ve nefret söylemi gruplar arasındaki farklılıklara ve bu farklılıkların temeline odaklanmaktadır. İç veya dış politika nedeniyle toplumsal ayrım ve gerilimlerin fazla olduğu dönemlerde yeni medyadaki yalan ve manipülatif haber ve yorumlar fazlalaşmaktadır. Gerilimin tarafları kendi destekçilerinin desteğini devam ettirmek, pekiştirmek ve karşı düşünceyi değersiz kılmak için yeni medyayı etkin olarak kullanırlar.
Yeni ve geleneksel medyadaki haberleri okuma ve içeriklere karşı tutum bireyin sahip olduğu ideoloji ve yaşam tarzı ile yakından ilgilidir. Medya araçlarının sahiplik ve ideolojik konumları hitap ettikleri izleyici kitlelerine etkilemektedir. Takip edilen medya aracına göre haberlere eleştirel, muhalif ve kabullenici bir yaklaşım içinde bulunulabilir. Bireyler karşılaştıkları haberleri, özellikle karşıt düşünceyi temsil eden medya kuruluşlarında, kabul ve reddetme konusunda eleştirel bir bakış açısına sahiptirler. Medya okuryazarlığı haberlerin algılanması, anlamlandırılması ve çözümlenmesi konusundaki bireyin sahip olduğu beceriler olarak bireyin haberlerin gerçek mesajları anlamasını sağlamaktadır. (Güngör, 2011, s. 302) Medya okuryazarlığı eğitimine sahip bir birey yalan ve yanlı haberlerin manipülatif ve yanıltıcı içeriğine karşı daha eleştirel bir yaklaşım ile yaklaşır.

Yeni Medya

Yeni medya ilk ortaya çıktığı andan itibaren tanım ve etki olarak tartışmaları beraberinde getirmiştir. Yeni medya geleneksel medyadan farklı olarak izleyiciyi aynı zamanda üretici ve yayıncı durumuna getirerek iletişimi tek yönlü bir monologdan çok yönlü bir diyaloga dönüştürmüştür. Artık her bireyin bir yayıncı olabildiği bir ortamda medya sahipliğinin ve yöneticiliğinin hegemonik yönü zayıflamaya başlamıştır. Yeni medya geleneksel medyadan bağımsız olduğu halde geleneksel medyayı destekleyici rolde kullanılmıştır. Geleneksel medyayı oluşturan Televizyon ve gazeteler yeni medyada da yer alarak hem dijital dünyada var olmaya hem de azalan reklam yatırımlarını yeni medya aracılığı ile devam ettirmeye çalışmışlardır. Bu şekilde geleneksel medyanın ulaşamadığı hedef kitleleri hedeflemişlerdir.
Yeni medya , *"kullanıcıların diğer kullanıcılarla çevrimiçi haber, fotoğraf, video, müzik gibi içerik paylaşımını sağlayan web sitelerine verilen ortak isim"* olarak tanımlanmaktadır. (Çakır & Tufan , 2016, s. 9) Bu tanımın yanında bireysel mesajlaşmayı sağlayan uygulamalar da yeni medya içinde yer almaktadır.
Yeni medyanın kısa sürede gelişimi ve yayılması teknolojinin demokratikleşmesi ile doğrudan ilgilidir. Yeni medyayı kullanmak için gerekli olan bilgisayar, tablet ve akıllı telefonların geniş kitlelerce ulaşılabilir olması yeni medyanın yaygınlığını artırmıştır. Teknolojik aletlerin kullanımının giderek kolaylaşması bilgi teknolojileri konusunda yeterince yetkin olmayan orta yaşlı ve yaşlı kişileri de teknoloji ve yeni medya ile tanıştırmıştır. Yeni medyanın sunduğu iletişim ve etkileşim olanağı yeni medyayı bu gruplar için çekici hale getirmiştir. Genç gruplar için ise yeni medya kullanımı çağa özel bir norm haline gelmiştir. Teknolojik aletlerin erişilebilir olması bu durumu hızlandırmıştır.
Yeni medyanın kitlelere erişimi kolaylaştıran ve etkileşime açık yapısı son yıllarda yeni medyayı siyasal hareketlerin de merkezine getirmiştir. Yeni medya hesapları üzerinden kitlelere ve rakiplerine mesajlar veren siyasetçilerin yanında bireyler ve gruplar yeni medya üzerinden siyasal hareketleri takip etmekte ve dahil olmaktadır. Geleneksel medyanın egemen güçlerinde elinde olduğu bir toplumda suskunluk sarmalını kırmanın bir alternatifi olarak yeni medya anahtar kelimeler, planlanan etkinlikler, paylaşılan içerikler ile siyasal hayatın

toplumsal yönünü yansıtan bir konuma sahip olmuştur. Sosyal gündemi takip ederek izleyici faaliyetler ile siyasal katılıma hem de içerik paylaşımı ve toplumsal hareketleri organize etme gücüyle geçici faaliyetler ile siyasal katılımda yer almaktadır. Yeni medya iletişim alternatifi olarak, yeni medya erişimine sahip kişiler için gerçek gündemi oluşturma ve hakkında konuşma olanağı sağlamaktadır. Arap baharı ve Gezi olayları sırasında protestocuların yeni medya aracığıyla organize olmaları ve seslerini duyurmaları yeni medyanın siyasal yönü açısından yakın zamandaki anlamlı örnekleri oluşturmaktadırlar.

Yeni medya bireylerin toplumu ve kendi benliklerini algılama yönünden de önemli bir rol üstlenmektedir. Bireyler kendilerini ifade etme, fikirlerini paylaşma, sahip olduklarını gösterme hem de diğer bireylerin yaşamları ile ilgili bilgiler elde etmek için yeni medyayı kullanmaktadırlar. Yeni medya toplumsal açıdan sorunlu bir davranış olsa da bireyler gösteriş yapmak, sahip olduklarını sergilemek amacıyla sosyal medyayı kullanıyorlar. Diğer insanların özel hayatlarını takip etmek ve tartışmak için yeni medyanın kullanılması etik tartışmaları beraberinde getirmiştir. Bu tartışmalara karşıt bir görüş bu davranışların her zaman var olduğunu fakat sosyal medya ile daha yaygın ve aleni olduğudur.

Yeni medyayı yaygın kılan özelliklerden biri de çevrimiçi bir günlük işlevi görmesidir. Yeni medya güzel anıların biriktirildiği ve paylaşıldığı elektronik bir ortam olarak işlev görmektedir. Yeni medya içerik paylaşımı ve oyunlar ile eğlenceli zaman geçirmeye olanak sağlamaktadır. Yeni medyayı sadece eğlence amacı kullanılmak, kitle iletişim araçlarına benzer bir işlevi yerine getirmektedir. Gündemi takip etme ve eğitim işlevlerinin yanında eğlence işlevi de yeni medyada sağlanmaktadır. Yeni medya yarattığı sanal ortam ile olduğundan farklı görünme ve hayatın gerçeklerinden kaçma olanağı sağlamaktadır. Bu durum bireyin sağlığını ve toplumsal yönünü kötü etkileyebilmektedir. Diğer bireyler tarafından yaratılan yanılsama ile kendi hayatını karşılaştıran birey kendi yaşantısı hakkında kötü düşüncelere sahip olmakta ve sahip olduğu olumsuz düşünceleri pekiştirmektedir. Yeni medya içeriği ve kullanımı ile gerçeklik ile yanılsama arasında bir konuma gelerek bireysel ve toplumsal sorunlar yol açmaktadır. Yeni medya olumlu ve olumsuz yönleri ile toplumsal yaşamda yer almaktadır. İyi ve kötü yönleri bireylerin yaşam tarzları ve toplumsal konumlanışlarına göre farklı algılanmaktadır.

Yeni medya kullanımındaki endişelerden biri de kişisel bilgilerin kolayca erişilebilir olmasıdır. Yaşanılan yerleşim yeri, iş yeri, aile fertleri ve yaşam tarzı gibi bilgilerin erişime açık olması bireyin özel hayatına ve sahip olduklarına bir tehdit unsuru olabilmektedir. Güvenlik endişeleri yeni medyayı eleştiren düşüncelerin en önemli dayanak noktalarındandır.

Amaç ve Yöntem

Araştırmanın Amacı ve Önemi

Dünyadaki teknolojik, siyasal ve toplumsal değişimler sonucunda ortaya çıkan post truth olgusu, toplumsal hayattaki birçok kavramı niteleyen bir sıfat olarak sosyal bilimlerde kendine özgü bir yer edinmiştir. Post truth toplumsal gerçekliği, siyaseti, kitle iletişimini ve bireylerarası iletişimi etkileyerek dönüştürmüştür. Toplumdaki değerler, bu değerlere ait tutumlar, yaşamın anlamı, bireyin çevreyle ilgili tutumları post truth çağda değişime uğramıştır.

Teknolojik gelişim ve teknolojinin toplumun çoğunluğu tarafından erişilebilir olması yeni medyayı günlük yaşsam etkili bir olguya dönüştürmüştür. Yeni medya Arap Baharı, Gezi Olayları gibi örneklerde olduğu gibi toplumsal olayların tartışıldığı ve organize edildiği bir katılımcı bir alan haline gelmiştir. Yeni medyanın katılımcı ve anonim yapısı, yeni medyadaki içeriklerin özellikle de haber içeriklerinin güvenirliğini sorgulamaya açmıştır.

Kaynağı belirtilmeyen ve içeriği ile uygunsuz ve tutarsız olan içeriklere karşı bireylerin tutumları farklılaşabilmektedir. Haber içeriklerini takip etmek, paylaşmak ve içeriğe güvenmek toplumun farklı sınıf ve gruplarında aynı ölçüde önemsenmemektedir. Eğittim seviyesi olarak Türkiye nüfusunun %1'den azını oluşturan lisansüstü öğrencileri bu araştırmanın evrenini oluşturmaktadır. (https://istatistik.yok.gov.tr/, 2019)
Araştırmanın amacı yeni medyadaki haber içeriklerine yönelik tutumların boyutlarını belirlemektir.
Araştırmanın hipotezleri;
Hipotez 1: Yeni Medyadaki haberlere şüphe ile yaklaşmak yüksektir.
Hipotez 2: Yeni medyadaki haberlere güven düşüktür.
Hipotez 3: Haberin dilinin şiddet içermesi haberi yeni medyada paylaşmayı olumsuz olarak etkiler.
Hipotez 4: Reklamların yer aldığı internet sitelerindeki haberlere güven düşüktür.
Hipotez 5: Güven duyulan kişilerin paylaştığı haberlere olumlu yaklaşmak yaygındır.

Araştırma Modeli

Araştırmada nicel yöntem kullanılmıştır. İnternet üzerinden anket ile katılımcılardan veri toplanmıştır. Sorulara doğru ve içtenlik ile cevap verilmesi için katılımcılara kimlik bilgisi sorulmamıştır Demografik bilgiler anketin bağımsız değişkenlerini oluşturmak için sorulmuştur. Araştırmanın yüksek lisans ve doktora öğrencilerine yönelik olduğu anket formunda belirtilmiştir. Ankette çoktan seçmeli sorular ve 5li likert ölçek kullanılmıştır. Araştırma 208 katılımcı ile gerçekleştirilmiştir. Elde edilen veri SPSS 25 programı ile analiz edilmiştir.
Ölçeğin güvenirliğini belirlemek için yapılan Cronbach's Alpha sonucunda 0,663 sonucu elde edilerek ölçeğin güvenilir olduğu belirlenmiştir. (Saruhan & Özdemirci , 2016, s. 233) Kolmogorov Smirnov testi, histogram, çarpıklık, basıklık değerlerinin incelenmesi ile parametrik testler ile hipotezlerin test edilmesinin uygun olduğu belirlenmiştir.

Katılımcıların Demografik Özellikleri

Araştırmaya katılan 208 katılımcının %61'i kadın ve %39'u erkektir. Katılımcıların % 17'si 20-24, %46'sı 25-29, % 21'i 30-34 yaş aralığında olup ve %16'sı 35 yaşından büyüktür. Yüksek lisans ve doktora öğrencisi dağılımı ise %73 ve 27'dir. Katılımcıların %80'i sosyal bilimler ve %20'si ise fen bilimlerinde öğretim görmektedirler. Katılımcıların medeni hale göre dağılımı ise %78 bekâr, %31 evli ve %1 boşanmıştır. Katılımcıların %15'i çocuk sahibidir.

Bulgular

Yeni medya yer alan haberlere şüphe ile yaklaşma ifadesinin sahip olduğu 3,89 değeri test değerinden anlamlı şekilde yüksektir. (P=0,000) Yüksek lisans (3,90) ve doktora (3,85) öğrencileri arasında yeni medyadaki haberlere şüphe ile yaklaşma arasında anlamlı bir farklılık yoktur. Eğitim görülen bilimsel alanlar arasında anlamlı bir farklılık yoktur. Fen bilimleri ve sosyal bilimlerde eğitim gören öğrencileri yeni medyada yer alan haberlere şüphe ile yaklaşma durumları benzerdir. Bu durumda 1 numaralı "yeni medyada haberlere şüphe ile yaklaşmak yüksektir" hipotezi kabul edilmiştir.
Araştırmanın ikinci hipotezini oluşturan yeni medyadaki haberlere güvenirim ifadesinin yapılan t testi sonucunda (P=0,000) 2,36 değeri ile test sonucundan anlamlı şekilde düşüktür.

Eğitim görülen bilimsel disiplin, cinsiyet ve yüksek lisans ya da doktora öğrencisi olmak demografik değişkenlere göre yeni medyadaki haberlere güven ifadesi anlamlı olarak farklılık göstermemektedir. 2 numaralı "yeni medyadaki haberlere güven düşüktür" hipotezi kabul edilmiştir.

Yeni medyada haber paylaşmak 2,36 değeri ile değeri ile ortalama test değerinden anlamlı olarak düşüktür. "Haber dilinin şiddet içermesi haber paylaşmada olumsuz yönde etkilidir" ifadesi 4,25 değeri ile (P= 0,000) test değerinden yüksek bir değere sahiptir. Haber şiddet içermesi ise haber paylaşmada olumsuz bir etkiye sahiptir. 3 numaralı "Haberin dilinin şiddet içermesi haberi yeni medyada paylaşmada olumsuz olarak etkilidir" hipotezi kabul edilmiştir. Cinsiyet, eğitim görülen bilimsel disiplin ve yüksek lisans ya da doktora öğrencisi olmak anlamlı farklılıklara sahip değildir.

Yeni medya ve internetin yaygınlaşması ile birlikte reklamlar yeni mecralar ortaya çıkmıştır. Yeni medya platformlarında belirtilen demografik bilgiler ve medya tüketim davranışları ile reklamlara göre özgün hedef kitlelerin oluşturulması ve bu hedef kitlelere göre reklamların gösterilmesi mümkün hale gelmiştir. Yeni medya platformlarında ve internet sitelerinde yer alan reklamlar içeriğe olan güveni sorgulamaya açmıştır. Araştırmada elde edilen verilere göre " reklamların yer aldığı sitelerdeki haber içeriklerine daha az güvenirim" ifadesi 3,63 değer ve P=0,00 test sonucu ile ortalamanın üstündedir. 4 numaralı "Reklamların yer aldığı internet sitelerindeki haberlere güven düşüktür" hipotezi kabul edilmiştir. Aynı ifadenin cinsiyete göre aldığı değerler anlamlı bir farklılığa sahip değildir. Eğitim alınan bilimsel disipline göre ifadeler farklılaşmaktadır. (P= 0,001) Fen bilimleri disiplininde eğitim gören öğrencilerin değeri 4,18 ve sosyal bilimler alanında 3,48'dir. Fen bilimlerinde eğitim gören öğrencilerin reklam olan internet sitelerindeki haberlere güvenme oranları daha düşüktür. Yüksek lisans ve doktora öğrencileri arasında da aynı ifadeye yönelik anlamlı olarak farklıdır. Yüksek lisans öğrencilerinin değeri 3,45 ve doktora öğrencilerinin ise 4,07'dir. Doktora öğrencilerinin reklam içeren sitelerdeki haberlere güveni daha düşüktür. Çocuk sahibi olmak da reklam içeren sitelerdeki haber içeriklerine güven duymada farklı değerlere sahiptir. Çocuk sahibi bireylerin değeri 4,20 ve çocuk sahibi olmayan bireylerin değeri 3,52'dir. Çocuk sahibi bireylerin haber içeriklerine güveni daha düşüktür.

Güvenilen insanlar tarafından paylaşılan haber içeriklerine yönelik tutumlar anonim hesaplar ve tanınmayan kişilerin paylaştığı içeriklere göre daha güvenilir kabul edilebilir. "güven duyduğum kişilerin yaptıkları paylaşımlara olumlu yaklaşırım ifadesi 3,77 değeri ve P=0,000 test sonucu ile yüksek bir değere sahiptir. 5 Numaralı "Güven duyulan kişilerin paylaştığı haberlere olumlu yaklaşmak yaygındır" hipotezi kabul edilmiştir. Eğitim görülen bilimsel alan, yüksek lisans ya da doktora öğrencisi olmak ve çocuk sahibi olmak bu ifadede anlamlı bir farka sahip değildir. Cinsiyet ise P=0,003 değeri ile anlamı bir farka sahiptir. Kadınların ifadeye yönelik değeri 3,91 ve erkeklerin değeri 3,56'dır.

İçeriklerine göre en çok güvenilen yeni medya platformu ifadesinde en yüksek değer %42 oran ile hiçbiri ifadesidir. Twitter %31, Linkedin % 19, Facebook %6 ve Instagram % 2 oranına sahiptir. Genel olarak yeni medya platformlarındaki haber içeriklerine güven düşüktür.

Tartışma ve Sonuç

Post truth çağda gerçeklik önemini yitirerek karar almada aklın dışına çıkıldığı bir dönemi tanımlamaktadır. Duygu ve inançlar olgusal gerçeklerin yerine geçerek karar almada başat bir hale gelmiştir. Post truth çağ, tarih boyunca egemen güçler tarafından kullanılan yalan haber üretme sürecini kurumsal bir hale getirerek normalleştirmiştir.

Yalan haberler yapma ve yayma işi siyasi ve toplumsal amaçları gerçekleştirmek için meşru bir yol olarak görülmeye başlanmıştır.

Teknolojinin gelişmesi ve yaygınlaşması ile yalan haber üretim ve yayma daha hızlı ve kolay hale getirmiştir. Kaynağı belirsiz ama etkileyici bir haber yeni medyada hızla geniş kitlelere ulaşabilmektedir. Yeni medyanın bilgi edinme ve diyaloga olanak sağlayan olumlu yönlerinin yanın da dezenformasyona ve kara propagandaya yol açabilecek olumsuz özelliklere de sahiptir.

Lisansüstü eğitim gören öğrencilerin yeni medyadaki haber içeriklerine yönelik tutumlarını ölçmeyi amaçlayan araştırma sonucunda lisansüstü öğrencilerinin çoğunlukla yeni medyada yer alan haber içeriklerine olumsuz tutuma sahip olduğunu ortaya koymaktadır. Demografik değişkenlere göre haber içeriklerine tutum değişimleri düşük seviyededir. Reklam içerikleri barındıran yeni medya platformlarındaki ve internet sitelerindeki haberler güven düşük seviyededir. Haberin şiddet ögeleri içermesi haberin yeni medyada paylaşımını düşürmektedir.

Araştırma katılımcılarının yeni medyada en çok güvenilen uygulamalar sorusuna en yüksek oranda hiçbiri cevabı vermeleri ile yeni medyadaki haber içeriklerinin lisansüstü öğrencileri için güveni düşük nitelik olduğu söylenebilir.

Kaynaklar

Çakır , H., & Tufan , S. (2016). Siyasal iletişim sürecinde sosyal medya:türkiye'de siyasi liderlerin ınstagram kullanım pratikleri üzerine bir inceleme. *Erciyes Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 8-28.

Dunning, D. (2011). The Dunning–Kruger Effect: On BeingIgnorant of One's Own Ignorance. *Advances in Experimental Social Psychology*, s. 249-286.

Güngör, N. (2011). *İletişim kuramlar yaklaşımlar.* Ankara : Siyasal.

https://istatistik.yok.gov.tr/. (2019, Temmuz 10). istatistik.yok.gov.tr: https://istatistik.yok.gov.tr/ adresinden alındı

Jaques, C., Islar, M., & Lorg, G. (2019, Nisan 10). Post-Truth: Hegemony on Social Media and.

Le bon, G. (2016). *Kitleler Psikolojisi.* İstanbul: Maviçatı Yayınları.

Lewandowsky, S., Ecker, U. K., & Cook, J. (2017). Beyond Misinformation: Understanding and Coping with the "Post-Truth" Era. *Journal of Applied Research in Memory and Cognition*.

Mcintyre, L. (2019). *Hakikat Sonrası.* İstanbul: Tellekt.

Oxford. (2019, 07 09). oxfordlearnersdictionaries: https://www.oxfordlearnersdictionaries.com/definition/english/post-truth adresinden alındı

Saruhan, Ş. C., & Özdemirci , A. (2016). *Bilim, Felsefe ve Metodoloji* (4.Baskı b.). İstanbul: Beta Yayıncılık.

Taş, O., & Taş, T. (2018). Post-Hakikat Çağında. *Ankara Üniversitesi İletişim Fakültesi Dergisi*.

Uluk, M. (2018). *Hakikat Sonrası Çağda Yeni Medya ve Yalan Haber.* Eskişehir: Dorlion.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

POST TRUTH ÇAĞDA LİSANS ÖĞRENCİLERİNİN SOSYAL MEDYA KULLANIMI

Arş. Gör. Dr, Eren DEMİRKIRAN
Bahçeşehir Üniversitesi, İletişim Fakültesi, Reklamcılık Bölümü
ORCID: 0000-0001-5537-5545

ÖZ

Bu çalışma, Türk üniversite öğrencilerinin post-truth kavramına ve sosyal medyada yanlış bilginin yayılmasına yönelik farkındalık ve tutumlarını inceliyor. Araştırma, farklı fakültelerden beş öğrenciyle yapılan derinlemesine görüşmeleri içeren nitel bir yaklaşım kullanmaktadır. Çalışma, bu öğrencilerin özellikle post-truth olgularının artan yaygınlığını göz önünde bulundurarak dijital çağda bilgiyi nasıl algıladıklarını ve nasıl gezindiklerini anlamak için tasarlanmıştır.

Çalışma, gerçeğin ve bilginin tarihsel bağlamını ele alarak, Endüstri Devrimi'nin ve kitle medyasının yükselişinin bilgi yayılımına etkisini vurguluyor. Duyguların ve kişisel inançların olgusal gerçeklerden önceliklendirildiği post-gerçek çağın ortaya çıkışı ele alınıyor. Çalışma, bu eğilimi güçlendirmede sosyal medyanın rolünü, yanlış bilginin hızla yayılmasına ve geleneksel bilgi kontrolörlerinin zayıflamasına olanak sağlamasını vurguluyor.

Daha sonra çalışma, araştırma metodolojisine, katılımcı seçimine, görüşme sorularına ve veri analiz sürecine değiniyor. Beş katılımcının yanıtları sunuluyor ve bunlar, post-gerçek ve sosyal medyaya yönelik farklı tutumları ortaya koyuyor. Tüm katılımcılar post-truth olgusunun farkında olduğunu ve bu konuda bilinçli olduklarını ifade ederken, buna yönelik katılımları farklıydı. Bir katılımcı, yüksek düzeyde eleştirel farkındalık göstererek aktif olarak bilgiyi inceliyor ve hiçbir şeye körü körüne inanmayı reddediyordu. Diğerleri daha pasif bir yaklaşım sergiliyor ve (genellikle aile veya arkadaşlardan gelen) güvenilir kaynaklardan gelen bilgilere, doğrulamadan emin olmadan inandıklarını belirtiyorlar.

Çalışma, bulguları analiz ederek araştırmanın sonuçlarını vurguluyor. Post-truth ortamda gezinmek için sosyal medya okuryazarlığının ve eleştirel düşünme becerilerinin önemini vurguluyor. Çalışma, öğrencilerin Post-truth kavramından haberdar olabildiklerini, ancak bununla gerçek etkileşimlerinin genellikle yetersiz olduğunu gösteriyor.

Araştırma, daha kapsamlı bir anlayışa ulaşmak için daha geniş bir örneklem büyüklüğü ve çeşitli metodolojileri içeren, özellikle öğrencilerin post-gerçek farkındalıkları ve tutumlarını inceleyen daha fazla araştırmanın gerekliliğini vurgulamaktadır.. Sonuç olarak, bu çalışma, yanlış bilgilendirmenin oluşturduğu zorlukları ele almak ve genç nesiller arasında medya okuryazarlığını teşvik etmek için değerli bir başlangıç noktası sağlamaktadır.

Anahtar Kelimeler: Sosyal Medya, Post Truth, Derinlemesine Görüşme

UNDERGRADUATE STUDENTS' USE OF SOCIAL MEDIA IN THE POST-TRUTH ERA

ABSTRACT

This study investigates the awareness and attitudes of Turkish university students towards the concept of post-truth and the spread of misinformation on social media. The research utilizes a qualitative approach, employing in-depth interviews with five students from various faculties. The study aims to understand how these students perceive and navigate information in the digital age, particularly considering the increasing prevalence of post-truth phenomena.

The study begins by outlining the historical context of truth and knowledge, highlighting the impact of the Industrial Revolution and the rise of mass media on the dissemination of information. The emergence of the post-truth era, characterized by a prioritization of emotion and personal beliefs over facts, is discussed. The study emphasizes the role of social media in amplifying this trend, allowing for the rapid spread of misinformation and the weakening of traditional gatekeepers. The study then delves into the research methodology, outlining the selection of participants, interview questions, and the data analysis process. The responses of the five participants are presented, revealing a range of attitudes towards post-truth and social media. While all participants expressed awareness of the post-truth phenomenon, their engagement with it varied. One participant demonstrated a high level of critical awareness, actively scrutinizing information and refusing to accept anything at face value. Others exhibited a more passive approach, trusting information from trusted sources (often family or friends) without necessarily verifying it.

The study concludes by analyzing the findings and highlighting the implications of the research. It underscores the significance of social media literacy and critical thinking skills for navigating the post-truth landscape. The study suggests that while students may be aware of the concept of post-truth, their actual engagement with it often falls short.

The research emphasizes the need for further investigation, particularly involving a broader sample size and diverse methodologies, to develop a more comprehensive understanding of students' post-truth awareness and attitudes. Ultimately, this study provides a valuable starting point for addressing the challenges posed by misinformation and promoting media literacy among the younger generation.

Keywords: Social Media, Post Truth, Depth Interview

GİRİŞ

Toplum içindeki bireylerin hayatlarının her anında aldıkları kararları sahip oldukları bilgi, düşünce ve hislere dayandırarak aldıkları bir yaşamda gerçek kavramının önemi bir kat daha artmaktadır. Gerçek kavramı yerleşik yaşam türlerinin ilk örneklerinden, özellikle Eski Yunan'dan, beri tartışılagelmektedir. Bilginin doğruluğu ve önemi bilgi felsefesinin ana konusunu oluşturmuştur. (Saruhan & Özdemirci , Bilim Felsefe ve Metodoloji, 2016, s. 120)

Bilginin önemi ve topluma iletimi, toplumun insan sayısı olarak büyüdüğü ve karmaşık bir yapıya dönüştüğü sanayi devrimi ile farklı bir boyuta dönüşerek kitle iletişimini ortaya çıkarmıştır. Topluma talep ettiği bilgileri vermek, toplumu yönetim tarafından istenen doğrultuda yönlendirmek ve kontrol etmek kitle iletişim araçlarını nitelik ve nicelik olarak önemli kılmıştır. Geleneksel kitle iletişim araçlarının tek kaynaklı ve iktidarın hegemonik ilişkileri ile sarılmış yapısı farklı bilgilerin yaygınlaşmasını ve etkin duruma gelmesini zorlaştırmaktaydı. Yeni medyanın yaygın ve farklı toplumsal sınıftaki kişiler tarafından erişilebilir hale gelmesiyle geleneksel medyanın gücü azalmaya ve sorgulanmaya başlanmıştır.

Geleneksel kitle iletişim araçlarındaki kontrol mekanizmaları ve egemen güçler tarafından insanları yanıltmak ve yönlendirmek amacıyla kullandıkları gerçekdışı bilgilerin kullanımı yeni medyanın kullanıcı temelli ve çok kaynaklı yapısıyla daha karmaşık ve yaygın hale gelmiştir. Gerçekdışı bilgilerin toplumda yaygın ve bireyler için daha önemli, anlamlı ve davranış, tutum değiştirmede yaygın hale geldiği bu dönem Post truth ya da hakikat sonrası çağ olarak adlandırılmaktadır.

POST TRUTH ÇAĞ

Post truth kavramı Oxford sözlüğü tarafından 2016'da yılın kelimesi seçilmiştir. Oxford sözlüğüne göre "*insanların duygu ve inançlara olgusal gerçeklerden daha fazla önem verdiği dönem*"dir. (Oxford., 2019) Post truth kişisel inanç ve görüşlerin kamuoyunu etkilemede olgulara dayalı gerçeklerden etkili olmasını ifade eder. Post truth ifadesi anlam olarak kavramın doğrudan çevirisi olan doğru sonrası, doğrudan sonra anlamlarına gelmez.

Post truth kavramının yaygın olarak ortaya çıkması ve tartışılmaya başlanması 2016'da Amerika Birleşik Devletlerindeki başkanlık seçimlerinde Donald Trumph ve yandaşları tarafından öne sürülen argümanlar ile oldu. Resmi kurumlar tarafından sunulan ve kanıta dayalı bilgileri içeren tüm argümanların yok sayıldığı ve kişisel inanışların egemen olduğu bu dönemde karar almak insanlar için akıldışı süreçler sonunda ortaya çıkan bir eyleme dönüştü. Post truth çağda gerçeklere dayanmayan yalan veya yanlı haberlerin yaygın olarak topluma iletilmesi ile toplumdaki gerçeğe ait kanılar buğulaşır. Toplumun düzenli işlemesi ve akılcı kararlar vermesi için gerekli olan gerçekliğin gerekliliğini savunmak ve bunu tartışmak elitist bir yaklaşım olarak nitelendirilip marjinal ve değersiz bir uğraş olarak gösterilir. (Lewandowsky, Ecker, & Cook, 2017) Post truth çağda bilgi sahip olmak için yetkinlik gerektirmeyen değersiz bir meta olarak değerlendirilir. Bilginin yerini kaynağı belirsiz, kanıtlanamayan, demagogların çok iyi kullandığı kişisel inançlar ve değerler alır. Toplum bilgi ve aklın ışığı yerine demagogların sözleri ile yönetilmeye başlanır. Özellikle son yıllarda sağlıkla ilgili aşı karşıtlığı gibi tehlikeli sonuçları olabilecek akımlar yaygınlaşmıştır.

Post truth çağda gerçek olmayan olguların gerçeklerden etkin ve etkileyici olmasının sebeplerinden biri de gerçek olmayan bilgilerin hızla yayılması ve popüler olmasıdır. Gerçek olmayan bilgiler özellikle kaynağı belirli olmadığı için sosyal medyada hızla yayılabilmektedir. Bu durum hegemonyayı güçlendirmektedir. (Jaques, Islar, & Lorg, 2019) Siyasal ve toplumsal sorunların yoğun olduğu dönemlerde gerçek dışı bilgilerin, komplo teorilerinin ve söylentilerin yayılma ve inanılması hızlı olur. Belirsizlikten korunma, gerçeklikten kaçış ve çoğunluğa uyma bu durumda etkilidir. (Le bon, 2016)

Cahil ve bilgisiz inşaların sahip oldukları özgüveni tanımlayan Dunning Kruger etkisi post truth çağda bilginin önemsiz ve değersiz sayılması ile ilgili bir diğer sebeptir. Dunning Kruger etkisi bir bireyin hakkında az bilgiye sahip olduğu bir konuda çok bilgili sanması ve yüksek özgüvene sahip olmasıdır. (Dunning, 2011) Toplumda fazla ilgi gören din, sağlık, hukuk gibi konularda gerekli eğitim ve bilgi birikimine sahip olmayan kişilerin kitle iletişim araçlarında boy göstererek insanları etkilemesi ve tahakküm altına alması ile birlikte gerçek bilginin geçerliliği ve değeri azalmaktadır.

Bilimsel geçerliliği olmayan ama kişisel duygu ve düşüncelere dayanan bilgiler kitlelerde pragmatizm ve tek sesli iletişim birlikte toplumlarda gerçeğe ulaşamayan ve ulaşmayı amaçlamayan bireylerin oluşmasına neden oldu. Gerçeklik ve olgusallık, popülizm ve bireyselliğin gerisinde kalarak post truth çağda ikinci plana itildiler.

SOSYAL MEDYA

Sosyal medya ilk ortaya çıktığı andan itibaren tanım ve etki olarak tartışmaları beraberinde getirmiştir. Sosyal medya geleneksel medyadan farklı olarak izleyiciyi aynı zamanda üretici ve yayıncı durumuna getirerek iletişimi tek yönlü bir monologdan çok yönlü bir diyaloga dönüştürmüştür. Artık her bireyin bir yayıncı olabildiği bir ortamda medya sahipliğinin ve yöneticiliğinin hegemonik yönü zayıflamaya başlamıştır. Sosyal medya geleneksel medyadan bağımsız olduğu halde geleneksel medyayı destekleyici rolde kullanılmıştır.

Sosyal medya , "kullanıcıların diğer kullanıcılarla çevrimiçi haber, fotoğraf, video, müzik gibi içerik paylaşımını sağlayan web sitelerine verilen ortak isim" olarak tanımlanmaktadır. (Çakır & Tufan , 2016, s. 9) Bu tanımın yanında bireysel mesajlaşmayı sağlayan uygulamalar da yeni medya içinde yer almaktadır.

Sosyal medya bireylerin toplumu ve kendi benliklerini algılama yönünden de önemli bir rol üstlenmektedir. Bireyler kendilerini ifade etme, fikirlerini paylaşma, sahip olduklarını gösterme hem de diğer bireylerin yaşamları ile ilgili bilgiler elde etmek için sosyal medyayı kullanmaktadırlar. Sosyal medya toplumsal açıdan sorunlu bir davranış olsa da bireyler gösteriş yapmak, sahip olduklarını sergilemek amacıyla sosyal medyayı kullanıyorlar. Diğer insanların özel hayatlarını takip etmek ve tartışmak için yeni medyanın kullanılması etik tartışmaları beraberinde getirmiştir. Bu tartışmalara karşıt bir görüş bu davranışların her zaman var olduğunu fakat sosyal medya ile daha yaygın ve aleni olduğudur.

Sosyal medya kullanımındaki endişelerden biri de kişisel bilgilerin kolayca erişilebilir olmasıdır. Yaşanılan yerleşim yeri, iş yeri, aile fertleri ve yaşam tarzı gibi bilgilerin erişime açık olması bireyin özel hayatına ve sahip olduklarına bir tehdit unsuru olabilmektedir. Güvenlik endişeleri sosyal medyayı eleştiren düşüncelerin en önemli dayanak noktalarındandır

AMAÇ VE YÖNTEM

Araştırmanın Problemi

Dünyada yaşanan teknolojik gelişmelerin siyasal olaylarla etkileşime girmesi teknolojinin kullanımını şekillendiren ve bu gelişmelerin anlamlandırılmasını sağlayan önemli bir durumdur. Bu çalışmanın problemini de günümüzde yaşanan siyasal ve toplumsal değişimlerin teknolojik gelişmelerle etkileşime girmesi sonucu ortaya çıkan post-truth kavramı ve bu kavrama yönelik olarak bireylerin tavırları ve bilinç düzeyleri oluşturmaktadır.

Sosyal medya kullanımının çok yaygın olduğu günlük internet kullanım sürelerinin eskisine göre daha uzun olduğu günümüzde, bu çalışmada lisans öğrencilerinin post-truth kavramı ve doğru olmayan bilginin sosyal medya aracılığıyla paylaşımları açısından bilinçleri ve tutumları incelenmiştir.

Araştırmanın Önemi

Post-truth döneminde doğru bilginin dağıtılması ile fikir, görüş ve aksiyonların doğru bilgiler doğrultusunda günümüzde en çok önem verilen konulardan biridir. Bu sebeple eğitimli nüfusu oluşturulacak ve internet kullanımının git gide arttığı yakın gelecekte karar verici olacak lisans öğrencilerinin bu konuya bakış açıları önem arz etmektedir.

Araştırmanın Amacı

Araştırma lisans öğrencilerinin post-truth dönemine ve gerçeklere dayanmayan bilginin dağılımının lisans öğrencileri tarafından nasıl değerlendirildiğini ortaya koymayı amaçlamaktadır.

Araştırmanın Sınırlılıkları

Hem sosyal medya kullanımı yüksek hem de eğitim seviyesi ile eğitimli sayılabilecek ve güncel konuları takip eden bir kitle oldukları için araştırma lisans öğrencileri ile gerçekleştirilmiştir. Bunun yanında araştırmaya seçilecek öğrenciler İletişim Fakültesi dışındaki fakülte ve bölümlerden seçilmiş olup toplamda beş öğrenci ile derinlemesine görüşme yapılmıştır. Araştırma kapsamında konuşulan öğrencilerden "Katılımcı 1", "Katılımcı 2"… Şeklinde bahsedilecektir.

Araştırmanın Yöntemi

Araştırma tekniği olarak nitel bir araştırma tekniği olan durum analizinden faydalanılırken veriler derinlemesine görüşme yöntemiyle toplanmıştır. Derinlemesine görüşme yöntemi araştırmacılara yüz yüze görüşme imkânı ile daha derinlemesine bir anlayış imkânı sunarken katılımcıların yarı yapılandırılmış bir akış içerisinde fikirlerini etraflıca ifade etmelerini sağlamaktadır.

Verilerin Analizi

Görüşmeler esnasında katılımcılara aşağıdaki sorular sorulmuştur;

Post-truth kavramını duyup duymadıkları ve kısaca tanımlayıp tanımlayamayacakları sorulmuştur.

Sosyal medyada gördükleri haber, bilgi ve yorumları nasıl değerlendirdikleri sorulmuştur.

Sosyal medyada gördüklerini teyit veya başka kaynaklar üzerinden kontrol etme ihtiyacı duyup duymadıkları sorulmuştur.

Sorgusuz sualsiz güvendikleri kaynaklar ve bu kaynakların ortak özellikleri sorulmuştur.

Kendilerine iletilen mesajları/haberleri/bilgileri doğrudan başkalarıyla paylaşıp paylaşmadıkları sorulmuştur.

Sosyal medya veya çeşitli site, blog ve sözlükler aracılığıyla paylaşım yapıp yapmadıkları ve bu paylaşımlarında kaynak gösterip göstermedikleri sorulmuştur.

Katılımcı 1, hukuk fakültesinde 3. Sınıfta eğitimini sürdürmektedir. Gün içerisinde akıllı telefonu ile sürekli sosyal medya, ekşi sözlük ve uygulamasını indirdiği gazeteler aracılığıyla içerik tükettiğini her an bakmasa da gelen tüm bildirimleri kontrol ettiğini belirtmiştir. Post-truth kavramını daha önce duyduğu ve bu konuda oluşan gündemden haberdar olduğunu söylemiştir. Günlük kullanımı sırasında sosyal medyada karşılaştığı içerik ve paylaşımları kesin doğru kabul etmediğini ancak kendisiyle ilgili gördüğü konularda ilginç veya şaşırtıcı bulduğu örnek olarak bedelli askerlikle ilgili içerikleri etrafıyla paylaştığını belirtmiştir. Bu paylaşımların doğrulamasını karşılığında bir eylem gerçekleştirecekse daha detaylı araştırdığını diğer durumlarda herhangi bir doğrulama ihtiyacı duymadığını ifade etmiştir. Bunun yanında katılımcının yakın çevresinden güvendiği kimselerden gelen mesajları hiçbir şekilde doğrulamadığını belirtmiştir. Bu durumun en belirgin olduğu örneklerde özellikle deprem, kaza gibi herkesi ilgilendiren konularda iletilen mesaj ses kaydı vb. içerikleri etrafındaki diğer tanıdıklarla paylaştığını söylemiştir. Buradaki amacının insanları haberdar etmek ve bilgi paylaşmak olduğunu belirtmiştir. Bu amacına uygun olarak çeşitli sitelerde ve kişisel sosyal medya hesaplarında da paylaşım yaptığı bu paylaşımlarını ilginç gördüğü bilgi ve haberlerin paylaşılması ve eğlence amaçlı yaptığını belirtmiştir. Fakat bu paylaşımlarında herhangi bir şekilde kaynak belirtmediğini ya da tekrar paylaştığı içerikleri kontrol etmediğini belirtmiştir.

Katılımcı 2, Mühendislik Fakültesi 4. Sınıfta eğitimini sürdürmektedir. Gün içerisinde akıllı telefonu ile sosyal medyaya sık sık girmese de gelen bildirimlere baktığını belirtmiştir. Post-truth kavramını duyduğunu ve çok önemli bir kavram olduğunu düşündüğünü ifade etmiştir. Sosyal medyada ve diğer uygulamalar aracılığıyla internetten karşılaştığı hiçbir içeriği doğru kabul etmediğini duyduğunda tepki göstermesi gereken içerikleri bile görmezden geldiğini ve bu içeriklere herhangi bir şekilde tepki göstermediğini ve yorum yapmadığını belirtmiştir. Ayrıca yakın çevresinden özellikle yaşça büyük olan akrabalarının bu konuda çok duyarsız olduklarını onların paylaşımlarını özellikle araştırıp onları bilinçlendirmeye çalıştığını söylemiştir. Bu durum haricinde birilerini bilinçlendirme amacı olmadığı zaman haberleri ve diğer içerikleri dikkate almadığını belirten katılımcı, kontrol etme gereği de duymadığını belirtmiştir.

Kullanıcı koşulsuz güvendiği bir kaynak olmadığını günümüzde fotoğraf manipülasyonu, sahte ses kayıtları ve deep-fake gibi uygulamaların her şeyi gerçek gibi gösterdiğini bu sebeple herhangi bir şeyi doğrudan kabul etmediğini belirtmiştir. Bu tavrının bir sonucu olarak herhangi bir içeriği doğrudan paylaşmadığını belirten katılımcı, kendi yaptığı paylaşımlarda ise herhangi bir kaynak göstermezken bunun kendi kişisel fikir ve görüşü olduğunu açıkça belirttiğini söylemiştir.

Katılımcı 3, İktisadi ve İdari Bilimler Fakültesi İşletme bölümünde 2. Sınıf öğrencisi olarak eğitimini sürdürmektedir. Sosyal medyaya yoğun bir şekilde kullandığını belirten kullanıcı kendisini 24 saat çevrimiçi olarak tanımlamaktadır. Post-truth kavramını bildiğini ancak kendisinin gündeminde yer almadığını daha ziyade akademik bir konu olduğunu düşündüğünü söylemiştir. Sosyal medya kullanımı esnasında karşılaştığı, bilgi haber ve diğer içerikleri doğru veya yanlış olarak değerlendirmediğini sadece ilgisini çekenlere baktığını belirtmiştir. Arkadaşları ve ailesi başta olmak üzere çeşitli mesaj grupları ve sosyal medya topluluklarına yönelik ekstra bir güven beslediğini buralarda paylaşılan şeylere ekstra ilgi gösterdiğini belirtmiştir. Özellikle hacklenme haberleri, okulla ilgili gelişmeler veya deprem vb. doğal afetlerle ilgili bu gruba iletilen ama kaynağını doğrudan tanımadığı içerikleri de ciddiye aldığını belirtmiştir. Ayrıca herhangi bir gruptan edindiği içeriği haberdar etme ve eğlendirme amacıyla diğer gruplar ile de paylaştığını belirtmiştir. Kendi sosyal medya hesaplarından eğlendirme ve bilgilendirme amaçlarıyla sık sık paylaşım yaptığını belirten katılımcı bu paylaşımların kendi fikirleri veya desteklediği şeyler olduğunu bu yüzden bunları kendi ismiyle paylaşıyor olmasının yeterli olduğunu herhangi bir kaynak göstermeye gerek duymadığını ifade etmiştir.

Katılımcı 4, İktisadi ve İdari Bilimler Fakültesi İşletme bölümünde 3. Sınıf öğrencisi olarak eğitimini sürdürmektedir. Gün içerisinde akıllı telefonu ile sosyal medyaya ortalama bir sıklık ile girdiğini ve gelen bildirimlere baktığını belirtmiştir Post-truth kavramını bildiğini ancak hakkındaki tartışmaların abartıldığını yalan ve çarpıtma haberlerin gerçeklere dayanmayan yorumların uzun süredir ortada olduğunu bunun neden bir anda yükselişe geçtiğini anlamadığını ifade etmiştir. Bu bakış açısıyla sosyal medyada karşısına çıkan içerikleri kaynakları bilindik gazeteler, gazeteciler veya başka güvenilir kaynaklar değilse doğru kabul etmediğini ama herhangi bir araştırma yapmadığını doğru olabileceğine ihtimal vermediği şeyler "yalan" olarak nitelendirdiğini söylemiştir. Dâhil olduğu mesaj grupları ve takip ettiği sayfalardan gelen bazı içerikleri muhakkak okuduğunu veya izlediğini belirten katılımcı buralara önem verdiğini ve bu içerikleri paylaşan kişileri ciddiye aldığını belirtmiştir. Özellikle herkesi ilgilendiren siyasi olaylarda buralarda paylaşılan her içeriği dinlediğini veya izlediğini belirtmiştir. Bunun yanında buralarda eğlence amaçlı da çok fazla paylaşım yapıldığını belirtmiştir. İlgili gördüğü içerikleri diğer gruplarla da paylaştığını belirtmiştir. Kendi sosyal medya hesaplarından yaptığı paylaşımlarda herhangi bir kaynak kullanmadığını belirten katılımcı paylaşımlarının kişisel olduğu ve fikirleri için kaynak gösterme zorunluluğunun gazeteciler veya akademisyenler, siyasetçiler için geçerli olduğunu düşündüğünü söylemiştir.

Katılımcı 5, Mühendislik Fakültesi, Endüstri Mühendisliği bölümü 2. Sınıfta eğitimini sürdürmektedir. Günlük olarak sosyal medyayı çok yoğun kullandığını kendisini neredeyse bir bağımlı olarak tanımlayabileceğini belirtmiştir. Post-truth kavramının önemli olduğunu ancak sadece politik konularda geçerli olduğunu düşündüğünü ifade etmiştir. Sosyal medyada karşısına çıkan içerikleri doğru veya yanlış olarak görmediğini bir şey yapmasını gerektirmiyorsa, planladığı tatil vb etkinliklerle çakışmıyorsa sosyal medyayı haber ve bilgi amacıyla kullanmadığını sadece eğlence amaçlı kullandığını belirtmiştir.

Bu sebeple herhangi bir içeriği doğrulama veya doğru/yanlış olarak değerlendirme ihtiyacı duymadığını belirtmiştir. Haber amaçlı içerikleri sadece yakın çevresinde ve görüşlerine önem verdiği insanlardan geldiği takdirde tükettiğini belirten katılımcı bu insanlara güvendiği için bu haberleri de eleştirel bir şekilde değerlendirmediğini belirtmiştir. Kendisinin sosyal medyayı sadece eğlence amaçlı kullandığını belirten katılımcı, paylaşımlarında herhangi bir kaynak belirtmediğini bunu gerektirecek hiçbir içeriği üretmediğini belirtmiştir.

Bulguların Değerlendirilmesi

Katılımcılarla yapılan görüşmeler sonucunda tüm öğrencilerin sosyal medyayı kullandığı ve akıllı telefonları aracılığıyla gün içinde sosyal medyada aktif oldukları, aktif olmadıkları zamanlarda ise gelen bildirimlere baktıkları ve bir şekilde erişilebilir oldukları sonucu ortaya çıkmıştır.

Tamamı post-truth kavramını duyduğunu ve bu konuda bilinçli olduğunu karşı önlemler aldığını belirtse de gerçek anlamda önlem alan, biraz daha ileri götürerek kesinlikle karşılaştığı içeriklere güvenmeyen bir öğrenci öne çıkmaktadır. Genel olarak öğrencilerin bilgileri belli bir seviyenin üstünde olsa da farkındalık seviyelerinin aynı derece yüksek olmadığı ileri sürülebilir.

Günlük kullanımları sırasında karşılaştıkları içeriklerin kontrolünü sağlamak noktasında ise katılımcıların temel motivasyonu bu bilgiye dayanarak eyleme geçmeleri durumu öne çıkmaktadır. Bunun haricinde fikir belirten, kanaat oluşturmaya yönelik haber veya paylaşımları katılımcıların birisi hariç diğerleri kontrol etme gereği duymamaktadır.

Katılımcıların tamamı yakın çevresi tarafından başka bir yerde görülen ve paylaşılan/iletilen içerikleri dikkate aldığını belirtirken sadece bir katılımcı bunları eleştirel bir şekilde sorguladığını belirtmiştir. Geriye kalan katılımcıların tamamının güvendiği kişiler bulunurken bunları sadece akraba veya tanıdık olarak değil düşüncelerine önem verdikleri birer kanaat önderi olarak tanımladıkları görülmüştür.

Katılımcıların tamamı kendi sosyal medya hesaplarında ve site üyeliklerinde paylaşım yaptığını ifade ederken, tüm kullanıcılar için öne çıkan sebepler eğlence ve belirli konulara dikkat çekmek ve çevresini haberdar etmektir.

SONUÇ

Yapılan görüşmelerde elde edilen çıktılar doğrulusunda, öğrenciler arasında sosyal medya kullanımının yaygın ve çevrimiçi olma durumunun akıllı telefonlar sayesinde tüm güne yayıldığı görülmektedir. Bu durumun post-truth bilinci ile şekillenen alışkanlıkları hakkında ise bu araştırma da kısıtlı bir sonuç elde edilmiştir. Katılan öğrencilerden sadece birisi bu durumun net olarak farkında olduğunu ifade ederken diğer öğrenciler kavramı bilmelerinin uygulamada bir karşılığı olmadığını ortaya koymuşlardır. Araştırmanın sadece beş öğrenci ile yapıldığı göz önünde bulundurularak kitlenin geliştirilmesi ve daha geniş bir katılım ve farklı teknikler ile araştırma yapılarak daha fazla veri elde edilebilir.

Sonuç olarak öğrencilerin çok fazla içeriğe maruz kalmaları kaçınılmaz bir noktada olup içinde bulunduğumuz dönemi açıklamak için en popüler ifadelerden biri olan post-truth kavramı hakkında bilgi sahibi olmaları bir gerekliliktir. Ancak yapılan görüşmelerde katılımcı öğrencilerin bu kavram karşısında bilgi sahibi olmalarına rağmen bu duruma karşı edindikleri tepki öğrenciler genelinde düşük bir seviyededir.

KAYNAKÇA

Çakır , H., & Tufan , S. (2016). Siyasal iletişim sürecinde sosyal medya:türkiye'de siyasi liderlerin ınstagram kullanım pratikleri üzerine bir inceleme. *Erciyes Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 8-28.

Dunning, D. (2011). The Dunning–Kruger Effect: On BeingIgnorant of One's Own Ignorance. *Advances in Experimental Social Psychology*, s. 249-286.

Jaques, C., Islar, M., & Lorg, G. (2019, Nisan 10). Post-Truth: Hegemony on Social Media and.

Le bon, G. (2016). *Kitleler Psikolojisi.* İstanbul: Maviçatı Yayınları.

Lewandowsky, S., Ecker, U. K., & Cook, J. (2017). Beyond Misinformation: Understanding and Coping with the "Post-Truth" Era. *Journal of Applied Research in Memory and Cognition*.

Oxford. (2019, 07 09). oxfordlearnersdictionaries: https://www.oxfordlearnersdictionaries.com/definition/english/post-truth adresinden alındı

Saruhan, Ş. C., & Özdemirci , A. (2016). *Bilim Felsefe ve Metodoloji.* İstanbul: Beta.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

REKLAMIN SEMİYOLOJİK ANALİZİ: ÖDÜLLÜ REKLAMLARDAN ÖRNEKLER

Arş Gör. Görkem BİR
Bahçeşehir Üniversitesi, İletişim Fakültesi, Reklamcılık Bölümü
ORCID: 0009-0006-7220-4805

ÖZET
Bu çalışma, semiyoloji ve reklam arasındaki iç içe geçen ilişkiyi incelemektedir. Semiyoloji veya göstergebilim, simgeler ve sembollerin kullanımıyla yorumlanmasını içeren bir çalışma alanıdır. Reklamlar, semiyoloji alanında önemli bir yer tutmaktadır. Reklamların, farklı anlam katmanları ile nasıl çalıştığını anlamamızı sağlayan çerçeveyi oluşturan en önemli kuramcılar arasında Roland Barthes, Charles Sanders Peirce ve Ferdinand de Saussure bulunmaktadır. Bu çalışmada öncelikle semiyolojinin temel ilkeleri ve teknikleri üzerinde durulacaktır. Ardından, Cannes Lions Uluslararası Yaratıcılık Festivali'nde ödül alan reklamların semiyolojik analizi yapılacak ve reklamlardaki görsel ve dilsel elementlerin stratejik kullanımıyla ilgili içgörüler sağlanmaya çalışılacaktır. Bunu yaparken, metinlerin ve görsellerin günlük hayattaki düz anlamları ile sahip oldukları çağrışımsal anlamlar göz önünde bulundurulacaktır. Reklamlarda hikaye anlatımının önemi giderek azalırken, izleyiciye reklamı yapılan ürünle ilgili duyguları ve tutkuları aktarmak giderek önemli hale gelmiştir. Bu aktarımın analizinde, semiyoloji disiplini, reklam için tartışılmaz bir öneme sahiptir. Her bir reklam analizi, ilgi çekici anlatılar ve marka kimlikleri oluşturmak için görsel ve dilsel işaretlerin stratejik kullanımını göstermektedir. Makale, bu reklamların kültürel mitleri ve ideolojileri kullanarak izleyicilerde nasıl derin bir bağlantı kurduğunu ve marka sadakatini nasıl artırdığını ortaya koyuyor. Teorik kavrayışları pratik örneklerle birleştiren bu çalışma, göstergebilimin reklamcılıktaki vazgeçilmez rolünü vurgulamakta ve günümüz medya ortamında etkili reklamların nasıl hazırlandığına ve algılandığına dair kapsamlı bir anlayış sunmaktadır.

SEMIOLOGICAL ANALYSIS OF ADVERTISING: EXAMPLES FROM AWARD-WINNING COMMERCIALS

ABSTRACT
This study examines the intertwined relationship between semiology and advertising. Semiology or semiotics is a field of study that involves the use and interpretation of signs and symbols. Advertisements have an important place in the field of semiology. Roland Barthes, Charles Sanders Peirce and Ferdinand de Saussure are among the most important theorists who form the framework that enables us to understand how advertisements work with different layers of meaning. This study will first focus on the basic principles and techniques of semiology. Then, a semiological analysis of the award-winning advertisements at the Cannes Lions International Festival of Creativity will be conducted to provide insights into the strategic use of visual and linguistic elements in advertisements. In doing so, the denotative meanings of texts and visuals in daily life and the connotative meanings they have will be taken into consideration. While the importance of storytelling in advertising is gradually decreasing, it has become increasingly important to convey emotions and passions about the advertised product to the audience. In analyzing this conveyance, the discipline of semiotics is of indisputable importance for advertising. The analysis of each advertisement demonstrates the strategic use of visual and textual signs to create compelling narratives and brand identities. The paper reveals how these ads use cultural myths and ideologies to create a deep connection with audiences and increase brand loyalty. Combining theoretical insights with practical examples, this study highlights the indispensable role of semiotics in advertising and provides a comprehensive understanding of how effective advertising is crafted and perceived in today's media landscape.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

IMPORTANCE OF HUMAN LIFE AND ITS PROTECTION: A JURISPRUDENTIAL PERSPECTIVE

Associate Professor Dr. Naseem Akhter
Department of Islamic Studies, Shaheed Benazir Bhutto Women University

Abstract
The importance of human life and its protection is a very important and sacred subject in Islamic jurisprudence. This paper presents a comprehensive analysis of the value and value of human life and the Islamic jurisprudential approach to its protection. In Islamic jurisprudence, human life has been given great importance and in the light of the Qur'an and Sunnah, its protection has been declared as the primary responsibility. In Shari'ah, various orders and principles have been laid down for the prohibition of unlawful killing and the protection of life.
In this paper, the ideas of various jurisprudential schools of thought that exist regarding the protection of human life have been examined. It includes an analysis of Islamic laws and principles that are designed to protect human life, such as the laws of Qisas, Dayat, and Haqqul-Ibad. Furthermore, the paper also analyses the challenges that hinder the protection of human life in the present era, such as terrorism, war, and social instability.
The purpose of the paper is to highlight the importance of human life from a jurisprudential point of view and to identify the principles and laws that are necessary to ensure its protection. This paper provides a comprehensive guide in the light of Islamic jurisprudence so that society can understand the value of human life and take effective measures to protect it.
Keywords: Qisas, Dayat, Haqqul-Ibad, Shari'ah, Qur'an

BALANCING WORK AND FAMILY LIFE

Associate Professor Dr. Naseem Akhter
Department of Islamic Studies, Shaheed Benazir Bhutto Women University

Abstract
A balance between work and family life is essential for a balanced and happy life. This study examines various aspects of work-family life balance, including work demands, family responsibilities, and aspects of personal life. In modern social and economic conditions, individuals face many challenges in balancing their professional and family life.
This paper analyzes various factors that help balance work and family life, such as flexible work hours, family support, and corporate policies. In addition, different models of work-family life balance have been studied in different countries and cultures.
The purpose of this study is to identify the best strategies and practices that can help individuals balance their professional and family life. In addition, the study also provides recommendations for institutions and government policy makers to formulate policies that improve work-family life balance.
Keywords: family life, Government policy, Modern social and economic conditions

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

THE AMAZING STORY OF MUSLIM AND AFRICAN SLAVE AYYUBA SULEIMAN DIALLO

Prof. Dr. Salim AYDUZ
Independent senior researcher

Abstract
In this presentation, I would like to mention the story of Ayuba Suleiman Diallo. His story is one of the most fascinating and unbelievable verified accounts of an African slave during the beginning of 18th Century. Diallo came from a noticeable Fulbe family of Muslim religious leaders in western Africa. In 1730, Ayuba became a victim of the slave exploitation of the Senegambia region. Ayuba were sold as a slave to figures associated with the Royal African Company. He was sent to America and put to work in the tobacco fields. While in captivity, Ayuba used to go into the woods to pray. and this led to an incident that was to again change his life.
James Oglethorpe, Director of the Royal African Company, purchased Ayuba, sent him to the London office of the Royal African Company in 1733 London, and during his voyage learned English.
After several months, Ayuba became a free man and started working at the British Museum. His service to Hans Sloane included organising the collection of Arabic Manuscripts there. Ayuba was in the company of many other prominent people, including the Royal family and John Montagu, 2nd Duke of Montagu and his wife Mary, the Duchess of Montagu, which lead him to being inducted into the Gentleman's Society of Spalding.
In July 1734, Ayuba freely returned to Gambia and later returned to his homeland. In this paper, I will mentions his full story and his portrait in National Portrait Gallery, London.

GLOCALISM AND HIBRIDITY OF INDIA'S POPULAR CULTURE IN ROMANIAN

Associate Professor Ramona MARINACHE
University of Bucharest, Faculty of Letters, Department of Sociology
ORCID: 0000-0002-4072-8253

Professor Valentina MARINESCU
University of Bucharest, Faculty of Sociology and Social Work, Department of Sociology
ORCID: 0000-0002-9882-5902

ABSTRACT

Our presentation starts from the assumption that the ingredients of success in the case of the Indian cultural products are based on their "cultural value". India's value of cultural products is multidimensional and it does not strictly reside at the language level known by the public or by just part of it (Cunningham and Sinclair, 2001).

The presentation seeks the answers at the following empirical research questions:

1. What are the levels at which the Indian cultural products are spreading in Romania (i.e. Eastern Europe)?
2. What are the main characteristics of the consumers (publics/audiences) of India's cultural products in Romania (i.e. Eastern Europe)?
3. What are the influences of this type of popular culture products on the Romanians' perceptions and representations about India's culture and society?
4. What are the factors that explain the increasing popularity of this type of cultural products among Romanian (i.e. Eastern European) audiences?

In order to answer at the above-mentioned questions we used a set of thirty-ywo interviews with Romanian women viewers of Indian TV series.

Our results showed that the success of India's popular culture is based on the perception of Romanian audiences of them as a cultural "mix" between the "local" (that is, Indian) elements and the appeal at a set of "global" (universal) values. More precisely, in the case of Romanian audiences for India's cultural products (TV series) there was a validation of theories regarding the cultural hybrid motivations involved in media consumption and theories emphasizing globalism and of these cultural products, making them desirable and wanted world-wide.

THE FASHION OF HEALTH DURING COVID19 PANDEMICS

Professor Valentina MARINESCU
University of Bucharest, Faculty of Sociology and Social Work, Department of Sociology
ORCID: 0000-0002-9882-5902

Associate Professor Ramona MARINACHE
University of Bucharest, Faculty of Letters, Department of Sociology
ORCID: 0000-0002-4072-8253

In May 2020, the Romanian Ministry of Health (MH) and Ministry of Internal Affairs (MIA) decided that one of the preventive measures regarding the transmission of COVID19 should be the obligation to wear a protective mask in closed public spaces, commercial spaces and at work (MIA, 2020). In a short time, the mask became mandatory in open and closed spaces in Romania, this obligation ending only on March 8, 2022 (MAI, 2022). Thus, face mask has become a part of everyday life, acquiring an independent life, which was highlighted by the way in which the online media presented the issue of masks in the last two years. Beyond the aspects related to medical prevention, the mask has become a part of everyday fashion in the years 2020-2022.
Based on mask photos found on social network sites and on online media, and on Choi's (2013) analysys of fashionable uses of facemasks, our study focused on face masks used as fashion items. The main result showed that during the COVID 19 pandemics a new technological and fashionable mask production/consumption emerged, which we placed into six categories: advertising, political, activism, look, playful and futuristic.

MAIN TYPES OF TOURISM IN SOUTHERN EUROPEAN COUNTRIES BASED ON NATURAL RECREATION RESOURCES AND ANTHROPOGENIC TOURISM RESOURCES

Associate Professor Doctor Polya Yordanova
University of Veliko Tarnovo "St. St. Cyril and Methodius", Faculty of History

Summary
The modern development of tourism makes many regions look for alternative models of tourism. The inevitable competition between tourist areas is expanding not only at the local or regional level, but also at the national and international levels. The tourism industry is one of the important sectors of the economy and for the regional development of countries. Its potential is demonstrated by its contribution to gross domestic product (GDP), exports and foreign exchange earnings, as well as job creation. Overall, the economic geographic analysis of Southern European tourism regions and destinations provides valuable insight into the challenges and opportunities facing the tourism industry in the region. Countries in the Southern European region have realized the importance of their natural recreational resources and are actively working to attract tourists who wish to enjoy their nature, culture and recreation. Diversification of tourism products: Southern European countries should focus on developing a range of tourism products that cater to different types of tourists. This can include cultural, gastronomic, rural and adventure tourism, among others. By diversifying tourism products, countries can attract a wider range of tourists and reduce their dependence on mass tourism.
Keywords: tourism, industry, economic, regional development, GDP, Southern Europe, destination, sectors.

Introduction

The tourism industry plays an important role in the economic development of many countries, especially in Southern Europe. With its rich history, cultural heritage and natural beauty, Southern Europe attracts millions of tourists every year, contributing significantly to the region's economy. The economic geography of Southern Europe is characterized by a diverse range of industries and natural resources that can have a significant impact on the development of tourist regions and destinations.

Southern European countries have developed different tourism models depending on their natural recreational resources and anthropogenic tourism resources.

Thesis statement:

In general, tourism patterns in Southern European countries are characterized by the use of both natural recreational and anthropogenic tourism resources, as well as a well-developed tourism infrastructure that supports the needs of travelers. Southern Europe offers a variety of tourism models ranging from natural recreational resources to anthropogenic tourism resources. The tourism industry in this region continues to evolve, adapting to changing market trends and customer demands.

Natural recreational resources refer to the natural attractions that attract tourists to a particular region, such as beaches, mountains, forests, lakes and rivers. Southern European countries have a diverse range of natural resources for recreation that are well suited for tourism.

For example, Spain is known for its beautiful beaches and sunny climate that attract millions of tourists every year. The country's mountain ranges, such as the Pyrenees and the Sierra Nevada, offer opportunities for skiing and outdoor activities.

Italy's natural recreational resources include famous destinations such as the Amalfi Coast and the Cinque Terre. The country's lakes, such as Lake Como and Lake Garda, also attract tourists, as do the many national parks, such as Gran Paradiso National Park.

Greece's natural recreational resources are centered on its islands, which are known for their beautiful beaches and crystal clear waters. The mountainous topography of the country also offers opportunities for hiking and other outdoor activities

Anthropogenic tourism resources refer to the man-made attractions that attract tourists to a particular region. Southern European countries have a rich history and culture and have developed many anthropogenic tourism resources that highlight their unique heritage.

For example, Spain is known for its historic cities, such as Madrid, Barcelona and Seville, which are home to beautiful architecture, museums and cultural attractions. Italy is known for its art, architecture and history, with cities such as Rome, Florence and Venice attracting millions of tourists each year.

Greece is known for its ancient civilization, with attractions such as the Acropolis in Athens and the ruins of the ancient city of Olympia attracting visitors from all over the world.

In addition to natural resources for recreation and anthropogenic tourism, Southern European countries also have well-developed tourism infrastructure, such as hotels, restaurants and transport networks, which make it easy for tourists to travel and explore the region.

In general, tourism patterns in Southern European countries are characterized by the use of both natural recreational and anthropogenic tourism resources, as well as a well-developed tourism infrastructure that supports the needs of travelers

Countries in the Southern European region have realized the importance of their natural recreational resources and are actively working to attract tourists who wish to enjoy their nature, culture and recreation.

Countries in the Southern European region, such as Spain, Portugal, Italy, Greece and others, have significant natural recreational resources and use their potential to develop tourism and recreation.

Some of the main models of tourism and what they are characterized by are:

Model 1 – Sun and beach tourism

This is the most dominant tourism model in Southern Europe, as the region has a long coastline with numerous beaches and warm, sunny weather. Countries such as Spain, Greece, Italy and Portugal have developed tourism industries that focus on attracting tourists to their coastal resorts, offering a wide range of leisure activities such as water sports, sunbathing and nightlife. Countries in the region are investing in the development of infrastructure, hotels and services near the beaches to attract tourists looking for seaside recreation.

Model 2 – Cultural and historical tourism

The countries in the Southern European region are proud of their rich cultural and historical heritage, with numerous historical sites, museums, galleries and cultural events. Countries such as Italy, Greece and Spain have developed their cultural tourism industry by promoting their cultural heritage to attract visitors interested in exploring ancient civilizations, art and architecture. On the other hand, cultural and historical tourism in has its economic impact as it stimulates the development of tourist services, hotels, restaurants and souvenir shops.

Portugal

Portugal is a country with a rich history, beautiful architecture and a variety of cultural attractions.

Cities such as Lisbon, Porto and Évora are known for their historical centres, monuments and museums. Lisbon, for example, offers a wealth of cultural attractions such as the Royal Palace of Ajuda, the Tower Palace and the Tower of Belem.

Porto is known for its beautiful streets and wineries, and Évora attracts with its preserved old town, included in the UNESCO World Heritage List.

Historic villages such as Sintra, Braga and Guimarães attract tourists with beautiful castles, churches and ancient streets. These destinations offer a unique experience where visitors can immerse themselves in the past and enjoy the unique atmosphere of antiquity.

Spain

Spain has a rich and varied centuries-old history and offers visitors the opportunity to travel back in time.

Cities such as Barcelona, Madrid, Granada and Seville offer a wide selection of historical attractions. Barcelona is famous for the unique architecture of Antonio Gaudi, including its most famous symbol - the Sagrada Familia. Madrid attracts tourists with its museums, squares and royal palaces. The most famous of them is the Palacio Reale. Granada features the Alhambra, which is one of Spain's most visited economic and cultural treasures. Seville, with its Gothic cathedral and Real Alcazar, offers an unforgettable glimpse into the past.

Spain also has other historical legacies, including old Roman amphitheatres, medieval castles and ancient cities such as Toledo and Salamanca.

Italy

Italy is undoubtedly one of the most desirable destinations in Southern Europe for cultural and historical tourism. With its wealth of historical sites, art, architecture and cultural heritage, it attracts millions of visitors every year who want to immerse themselves in the richness of the past and visit the unique attractions of the country.

Rome, as the capital of the Roman Empire, has a rich historical heritage. The Colosseum, Roman Forum and Pantheon are just some of the most famous sights there, attracting visitors from all over the world. The Vatican Museums and the Sistine Chapel with its ceiling painted by Michelangelo offer an enriching and enjoyable cultural experience for the curious.

Florence is known for its wealth of Renaissance architecture and art. The Uffizi Gallery and Palazzo Vecchio are just a few of the many museums and galleries where visitors can enjoy works by world-renowned artists such as Michelangelo, Botticelli and Leonardo da Vinci.

Venice, with its canals, gondolas and palaces, offers a unique cultural experience. St. Mark's Square, the Doge's Palace, and the Rialto Bridge are just some of the city's most famous landmarks.

Other Italian cities such as Rimini, Pompeii, Siena and Naples also attract tourists with rich history, architecture and culture.

Greece

Greece is distinguished by its wealth of ancient archaeological sites, mythology, temples and ancient cities that attract visitors from all over the world.

Athens, the capital of Greece, is known for its historical treasures such as the Acropolis, the Parthenon and the Ancient Agora, world-famous archaeological sites that tell the story of ancient Greek civilization.

Other famous Greek cultural and historical tourism destinations are Delphi, home to the sanctuary of Apollo and the magnificent Delphi Theater, and Olympia, home of the ancient Olympic Games.

Greek islands such as Crete, Rhodes and Santorini also possess a significant cultural heritage. On the island of Crete is the Palace of King Minos, with which the ancient myths of the Minotaur are connected. Rhodes is distinguished by its medieval urban structure in the form of the Garden of the Knights and the Medieval City Fortification. Santorini offers magnificent Greek architectural styles and views of the Aegean Sea.

Model 3 – Rural tourism (Agritourism)

Rural tourism also has positive effects on the development of rural communities. It can create new jobs, promote the preservation of traditions and cultural heritage, and improve infrastructure and services in rural areas. In addition, rural tourism can help the balanced development of the tourism industry by directing interest to less popular and underappreciated destinations.

This model focuses on promoting the rural areas of southern Europe with their natural beauty, landscapes and traditional way of life. Countries such as Portugal, Spain and Italy have developed their rural tourism industry, offering visitors the opportunity to stay on farms and engage in agricultural activities, tourism, wine tasting and local produce.

Model 4 – Sports tourism

Sports tourism is a form of tourism that focuses on participating or observing sports events and active sports activities in various destinations. This type of tourism attracts people who love sports and are interested in participating in sports events or practicing different sports during their trip.

In addition to watching sports events, the Southern European region has ideal conditions for sports tourism and offers a variety of opportunities for sports and adventure activities. This includes golf, water sports, skiing and snowboarding in the mountains, paragliding, jeep safaris and more. The region has significant natural attractions such as mountains, lakes, rivers and national parks. Tourists can enjoy mountain sports, mountain biking, rafting, hiking and other nature activities.

Model 5 – Health and wellness tourism

Southern Europe has a long tradition of spa and wellness treatments, thanks to its natural hot springs and healing mud. Countries such as Italy, Greece and Spain have developed their health and wellness tourism industry, offering visitors a variety of treatments and facilities that promote health, relaxation and rejuvenation.

Portugal

Portugal is an attractive destination for health and wellness tourism in southern Europe. An ideal environment for recreation, relaxation and health improvement can be found there.

Portugal boasts outstanding natural beauty, including beautiful beaches on the Atlantic Ocean, mountainous regions such as Serra da Estella and Serra da Estrela, and wonderful wine regions such as the Doro and Alentejo. These diverse natural resources offer excellent opportunities for health and wellness activities such as beach walks, mountain hikes, bike tours and wine tours.

Portugal is also known for its rich heritage of thermal springs and spa resorts. Towns such as Caldas da Rainha, Caldas da Felgás and Montforte de Rispaç offer a wide range of therapeutic treatments, hydrotherapy and relaxing spa services that help improve visitors' physical and mental well-being.

Health and wellness tourism in Portugal is complemented by the country's rich culinary tradition. Portuguese cuisine is known for its fresh seafood, delicious meat dishes and a variety of fruits and vegetables. Tourists have the opportunity to taste authentic Portuguese dishes rich in vitamins and minerals that contribute to a healthy lifestyle.

Health and wellness tourism in Portugal is important for the development of the tourism sector in the region. It highlights the country's potential to offer personalized health and wellness programs, attracting tourists from around the world looking to relax and improve their physical and mental health.

Spain

Spain is one of the leading destinations in Europe when it comes to health and wellness tourism. It has a rich variety of natural sources of health and well-being that attract thousands of tourists every year.

The southern European country boasts numerous warm mineral springs and thermal baths that are popular for spa and rehabilitation treatments. Destinations such as Badajoz, Caldes de Montbui and Las Caldes de Boeda offer a wide range of thermal complexes and wellness centers where visitors can relax and restore their physical and mental fitness.

In addition to the thermal springs, Spain also has beautiful natural landscapes that provide an ideal environment for relaxation and healthy recovery. As an example, we can mention the beautiful beaches of Costa del Sol and Costa Brava (Fig.9), as well as the mountainous areas of Sierra Nevada and Sierra de Guadarrama, where visitors can enjoy mountain climbing, yoga practices and other outdoor activities.

Health and wellness tourism has a significant economic impact in Spain. It creates new jobs in the field of hospitality, catering and spa services. In addition, tourists who choose Spain for their health and wellness stay tend to have a higher rate of spending, which benefits the local economy.

Spain continues to attract tourists with its health and wellness offerings and is establishing itself as a leading destination for people looking for a balance between relaxation, health and an outdoor experience. This form of tourism has great potential for the development and strengthening of the economy of the regions in southern Europe.

Italy

Italy is one of the most attractive destinations in Europe for health and wellness tourism. With its rich natural resources, traditions in spa treatments and healthy practices, it attracts thousands of tourists seeking relaxation, recovery and improvement of their health.

Italy is known for its many thermal springs and spa complexes located in different regions of the country. The hot mineral springs offer unique opportunities for hydrotherapy, balneotherapy and physiotherapy. Destinations such as Terme di Saturnia, Terme di San Filippo and Terme di Monte Catini are famous for their thermal baths, pools and specialized treatments that help to rehabilitate and relieve tension.

In addition to thermal springs, Italy also offers beautiful nature that is ideal for wellness and sports activities. Regions like Tuscany, the Amalfi Coast, and the Mediterranean islands offer opportunities for yoga, meditation, mountain biking, beach workouts, and other forms of outdoor activity.

Greece is known for its wealth of health and wellness resources and ranks among the leading destinations in Southern Europe for health and wellness tourism. It attracts visitors from all over the world who are looking for stress relief, relaxation and improvement of their physical and mental well-being.

The country abounds in natural mineral springs and thermal baths, which are at the center of health and wellness tourism. Destinations such as Loutra Aydipsos, Edipsos, Kamena Vourla and Loutra Pozar offer unique thermal spa complexes where the warm mineral springs known for their therapeutic properties are used for spa treatments and to treat various health problems.

The beautiful beaches and resorts offer an ideal setting for wellness and sports activities. Visitors can enjoy yoga sessions on the beach, meditation, swimming and beach sports. Islands such as Crete, Rhodes and Corfu are particularly popular with tourists looking for a combination of wellness and nature experiences.

Conclusions and generalizations

Based on the economic geographical analysis of the Southern European tourist regions and destinations, the following recommendations can be made:

Diversification of tourism products: Southern European countries should focus on developing a range of tourism products that cater to different types of tourists. This can include cultural, gastronomic, rural and adventure tourism, among others. By diversifying tourism products, countries can attract a wider range of tourists and reduce their dependence on mass tourism.

Promote sustainable tourism practices: Governments should promote sustainable tourism practices that minimize the negative impact of tourism on the environment and local communities. This can include measures such as reducing energy consumption, managing waste, promoting responsible tourism and investing in sustainable tourism infrastructure.

Regulating tourist flow: To avoid problems related to overtourism, governments should regulate tourist flow by limiting the number of tourists to certain areas during peak seasons. They could also encourage tourists to visit alternative destinations and encourage off-season tourism.

Cooperation between stakeholders: The sustainable development of tourism in Southern Europe requires cooperation between different stakeholders, including governments, local communities, tourism operators and NGOs. By working together, stakeholders can ensure that tourism development is sustainable and beneficial to all involved.

Investment in tourism infrastructure: Southern European countries should invest in tourism infrastructure, including transport, accommodation and tourism services, to improve the quality of tourism experiences and attract higher-spending tourists.

Overall, the recommendations aim to promote the sustainable development of tourism in Southern Europe, which will benefit the environment, local communities and the tourism industry in the long term.

Sources of information

https://www.statista.com/; (20.06.2024, 22.24)
https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf; (14.05.2024, 23.30)
https://www.ine.es/; (09.06.2024, 06.10)
https://ec.europa.eu; (09.06.2024, 06.40)
https://www.istat.it/; (09.06.2024, 06.30)
https://stats.oecd.org/; (04.04.2024, 23.34)
https://saveti.bg/trips/europe/italy/; (06.05.2024, 23.10)
https://www.portugal.com/portugal/nature; (06.05.2024, 23.20)
https://www.nationalgeographic.com/; (06.04.2024, 23.34)
https://www.visitgreece.gr/; (24.04.2024, 22.40)
https://www.lonelyplanet.com/; (24.04.2024, 23.00)
http://www2.unwto.org; (04.04.2024, 22.05)
https://digitallibrary.un.org/record/139811 ; (04.04.2024, 13.35)
https://www.visitportugal.com ; (17.04.2024, 21.15)
https://yourearticles.wixsite.com/yourearticles/post; (04.04.2024, 23.34)

THE POPULATION OF THE TOWN OF VUSHTRRI IN THE MID-19th CENTURY

Zekirja Shabani
Istanbul University, İstanbul. Researcher at the Institute of Albanology
ORCID: 0000-0002-9481-2098

ABSTRACT
Vushtrri was one of the most important centers and sanjaks of the Ottoman Empire in the Balkans between the 15th and 18th centuries. In the subsequent centuries, it was administratively designated as a kaza. This study examines the population structure and demographic characteristics of the town of Vushtrri in the mid-19th century. The focus of the research will be on the main neighborhoods of Vushtrri, namely Gazi Ali Bey, Hurrem Çavuş, and İkram neighborhoods. The study analyzes the ethnic, social, and economic conditions of the town based on Ottoman archival documents and population data from the period. Vushtrri became a settlement where various ethnic groups lived together due to its strategic location and significant role in trade routes. The study aims to reveal the town's population size, number of households, and social structure. In this context, understanding the population dynamics of Vushtrri in the mid-19th century is of great importance for shedding light on the historical development of the region.
Keywords: Vushtrri, Ottoman Empire, Balkans, Gazi Ali Bey Neighborhood, Hurrem Çavuş Neighborhood, İkram Neighborhood, etc.

VULÇITRIN KASABASI'NIN XIX. YÜZYIL ORTASI NÜFUSU

ÖZET
Vulçıtrın, XV ve XVIII. yüzyıllar arasında Osmanlı İmparatorluğu'nun Balkanlar'daki en önemli merkezlerinden ve sancaklarından biriydi. Daha sonraki yüzyıllarda, idari açıdan kaza olarak yer almıştır. Bu çalışma, XIX. yüzyılın ortasında Vulçıtrın kasabasının nüfus yapısını ve demografik özelliklerini incelemektedir. Araştırmanın odak noktası, Vulçıtrın şehrinin başlıca mahalleleri olan Gazi Ali Bey, Hurrem Çavuş ve İkram mahalleleri olacaktır. Araştırmada, dönemin Osmanlı arşiv belgelerine ve nüfus verilerine dayanarak şehrin etnik, sosyal ve ekonomik durumu analiz edilmiştir. Vulçıtrın, stratejik konumu ve ticaret yollarındaki önemli rolü nedeniyle çeşitli etnik grupların bir arada yaşadığı bir yerleşim yeri olmuştur. Çalışma, şehrin nüfus büyüklüğünü, hane sayısını ve sosyal yapısını ortaya çıkarmayı amaçlamaktadır. Bu bağlamda, XIX. yüzyılın ortasında Vulçıtrın'ın nüfus dinamiklerini anlamak, bölgenin tarihsel gelişimine ışık tutmak açısından büyük önem taşımaktadır.
Anahtar kelimeler: Vulçıtrın, Osmanlı Devleti, Balkan, Gazi Ali Bey Mahallesi, Hurrem Çavuş Mahallesi, İkram Mahallesi, vd.

THOUGHTS ABOUT AMARNA LETTERS ON THE WEBSITE OF THE METROPOLITAN MUSEUM IN THE USA

Dr. Natela Borisovna POPKHADZE
Member of the Academy of Phasis, Head of its Scholarly Information Center in Tbilisi and Batumi
ORCID: 0000-000 3 - 1552-7860

ABSTRACT
I read recently the news of the Metropolitan Museum and learned that there is an interesting new exhibition about the clothes using new technologies to convey smell of perfumes used centuries ago on clothes exhibited there. I read also updated information about Amarna Letters on the website of that museum. This topic is always very enchanting with important information. I have learned the ancient writing Sumerian, Akkadian, Urartian and Kimetian at Tiflis University while working in Patents and technologies in Electrochemistryat the research institute officially. It was a difficult initiative and my aim was and is to see if geographical names of places are correctly copied in modern translations of ancient writings. I used the method of choosing the material, digging information, comparison of geographical names and making results to spread to people at large. I learned during this research that there are several Amarna Letters at the Metropolitan Museum, I learned also that the person that wrote explanatory information at that museum's website is a learned researcher with published books on ancient history. One point to be clarified is that Kimet was the name of the land ruled by pharaohs and Egyptus is a later name . In my opinion, we must call Kimet the area ruled by Pharaoh Akhenaten; he did not call it Egyptus, therefore we readers must insist that scholars, including translators always translate the word Kimet written in ancient texts by the word Kimet and never by the word Egypt. Another geographical name improperly translated and improperly used at the website of the Metropolitan Museum is the word Babylonia instead of the use of the original word of the ancient texts – Kardunia//Kardu. I always remember the text from a small book published in Moskow in 1967 entitled "On Diplomatic Practice" authored by a former foreign minister of the Great Britain – that several instances were known when the name of a town was the same in two republics and the army of one went to the wrong place before war..
Keywords: preservation; geographical names; translations; Kimet; Egypt; Kardunia//Kardu.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

PORTRAYAL OF MALE IMPOTENCE AND STERILITY IN SELECTED NIGERIAN CONTEMPORARY FEMALE NOVELS

Akinola Monday ALLAGBE
Département d'Anglais, Faculté des Lettres, Langues, Arts et Communication (FLLAC), Université d'Abomey-Calavi (UAC

Ayodele Adebayo ALLAGBE
Département d'Anglais, Faculté des Lettres et Sciences Humaines (FLSH), Université André Salifou (UAS) de Zinder, République du Niger, Laboratoire Lettres, Education et Communication (LaboLEC)

Théophile HOUNDJO
Département d'Anglais, Faculté des Lettres, Langues, Arts et Communication (FLLAC), Université d'Abomey-Calavi (UAC), République du Benin

Abstract
This paper examines how two contemporary female writers, Lola Shoneyi and Ayobami Adebayo portray the social phenomenon of male sexual impotence and sterility in their novels entitled respectively *The Secret Lives of Baba Segi's Wives* (2010) and *Stay With Me* (2017). Drawing its theoretical insights from womanism, the Hallidayan Transitivity theory and the descriptive qualitative research design, the study specifically intends to unravel the Yoruba worldview with regard to male impotence and sterility; i.e. how the Yoruba society apprehends and treats male impotence and sterility. It also foregrounds the female writers' perception of this phenomenon, which is considered as a male secret or taboo and their attitudes towards it. The analysis reveals, for instance, that the Yoruba society depicted in the fictional texts does not consider male sexual problem as a major problem in a marital home but it ontologically encourages men and women to find a solution to it. In fact, the two literary pieces under study have captured some approaches of solution to male impotence and sterility. These approaches are secret keeping, dialoguing, deconstructing some Yoruba beliefs concerning women, complementarity and the gregarious way of life of the Yoruba people, as cornerstones, to the interaction between married men and women in the society.
Keywords: Female writers; male impotence and sterility; womanism; Transitivity theory; Yoruba ideologies.

1. Introduction

We live in an era where what used to be kept as a secret or taboo in traditional Africa is now gradually being exposed under the sun; such is the case of men's impotence and sterility, for instance. Impotence and sterility, as Sampson and Watson (2018) observe, are both problems that can affect a man's sexual health and ability to have children, but in different ways. However, there is a slight difference between impotence and sterility. According to *The BBC Dictionary,* the term 'impotence' is a man's inability to perform a sexual act because he cannot have an erection (HarperCollins, 1992, p. 582). Concurring with the foregoing, Sampson and Watson (ibid.) submit that impotence occurs when one is unable to achieve an erection, maintain an erection or ejaculate on a consistent basis. Impotence is used interchangeably with erectile dysfunction (ED). Likewise, sterility is another term used interchangeably with impotence. But, Sampson and Watson (ibid.) employ 'sterility', also called infertility, to refer to an inability to produce or release sperm.

In this study, the terms "impotence" and "sterility" are simply used to imply a man's inability to impregnate a woman.

It is well known that, in traditional African patriarchal societies, a married man is not held responsible for any problem of barrenness or infertility in a couple. The woman alone, on the contrary, is held responsible for any trouble related to barrenness or infertility in the family. In fact, the belief that it is a woman who is the cause of barrenness or infertility is made possible due to some social roles and attributes ascribed to men and women in African patriarchal societies. As a matter of fact, it is commonly believed that men are strong, intelligent, creative, brave, etc., while women are weak, stupid, annihilative, coward, etc., in traditional African patriarchal societies (Allagbe and Allagbe, 2015, Ankrah and Kwasi, 2017). Such patriarchal belief has paved the way for the intensification of women's marginalisation, subordination and suppression as documented in several scholarly works. Nyanta, Ankrah and Kwasi (2017, p. 11), for example, observe that the daunting reality in Africa is that women are subordinated and suppressed because of the influence of the ideologies undergirding a male-dominated society- patriarchal society. The continuous subordination and suppression of women is further aggravated by traditions, cultural beliefs and religions of most societies which favour patriarchy. Houndjo and Allagbe (2018, p. 18) define patriarchy as "a system where most societal powers and considerations are vested on men at the expense of women". Given the foregoing, feminist theory has identified patriarchy as one of the oppressing forces that hinder gender equality in social life.

However, in traditional African patriarchal societies, men are sometimes confronted with some situations which make them vulnerable. As Stratton (1994, p. 17) rightly states, "[…] patriarchal situation also creates difficulties for men- reconciling the fact of women's participation in the liberation struggle with that of their exclusion from national politics, and of accommodating the notions of freedom and equality upheld by the liberation movements with the actual subjugation of women in 'post-colonial' nations. It is possible indeed for men to have difficult situations but gender attributions assigned to them in patriarchal settings conceal their difficulties." For instance, it is hardly declared in public, especially in traditional African patriarchal societies, that a married male is sterile or impotent. If ever this is known to the public, not only will that man be mocked, but his entire family will also become a laughing stock to friends and neighbours.

Though men are in power channelling the course of the patriarchal societies they live in, they find it difficult to expose their problem of impotence and sterility to the society due to the fear of mockery. For example, a great number of African male writers prefer to depict the weak side of women and the problems they face but they fail to expose those of their gender. However, with the rise of feminist movements in Africa, some African female writers have ventured into the representation of the problems men face in patriarchal societies. The upsurge of feminist movements has given birth to different female authors who have come up with diversified views regarding how to solve the problems women face, on the one hand, in patriarchal settings. On the other hand, it has given rise to a group of female authors who have addressed the problems the male gender faces in patriarchal settings. But the effects of patriarchy and gender, and indeed the contributions of African women, have, up until now, been largely ignored by critics (Stratton, 1994, p. i).

In point of fact, the contributions of African women writers concerning the depiction of men are negatively perceived by some African critics due to their focus on some absurdities carried out by the male characters represented in the African female novels. The critics see the women writers as people whose mission is blackmailing, demeaning and demonising their male counterparts.

Several studies on female authors' works have proven the foregoing observation. For instance, Allagbe (2016) explores how Amma Darko, a Ghanaian female writer, names or labels her male characters in four of her fictional works, viz. *Beyond the Horizon* (1995), *The Housemaid* (1998), *Faceless* (2003) and *Not Without Flowers* (2007). This scholar reveals that Darko demeans the male image via the narrative technique of character naming in that the male characters are literally or/and rhetorically depicted through names and naming labels as well as roles, attributes and traits that denote or/and connote negative semantic imports or onomastic implications.

Likewise, in Adjei's article (2009), Darko is claimed to differ in her approach to social, political and cultural issues. Her first three novels, *Beyond the Horizon* (1995), *The Housemaid* (1998) and *Faceless* (2003), all present and contest the culture of patriarchy. In her works, as observed, women are represented as victims of rape, battery, betrayal, abandonment, economic exploitation and obnoxious cultural practices. This perpetrator-victim relationship leaves women consigned to fear, trauma, suffering and death. All the three novels thus adopt rhetorical violence and narrative subjectivity as a way of confronting and demolishing male dominance and exploitation.

In line with Allagbe's and Mawuli Adjei's research on men's depiction in Darko's novels, this article examines how two contemporary female writers, Lola Shoneyi and Ayobami Adebayo portray the social phenomenon of male sexual impotence and sterility in their novels entitled respectively *The Secret Lives of Baba Segi's Wives* (2010) and *Stay With Me* (2017). Drawing its theoretical insights from womanism, the Hallidayan Transitivity theory and the descriptive qualitative research design, the study specifically intends to unravel the Yoruba worldview with regard to male impotence and sterility; i.e. how the Yoruba society apprehends and treats male impotence and sterility. It also foregrounds the female writers' perception of this phenomenon, which is considered as a male secret or taboo and their attitudes towards it. The next section outlines the theoretical and methodological framework the study applies.

2. Theoretical Framework and Methodology

As stated earlier, this paper draws its theoretical insights from womanism and the Hallidayan Transitivity theory. Womanism is one of the feminist theories that address not only women's problems but also those of men, children and the environment. In fact, it encourages women's emotional or cognitive flexibility when addressing social problems in social life. In this sense, Walker (1983, p. xi) postulates that it is committed to the "survival and wholeness of entire people, male and female". It is considered as an inclusive or accommodative theory in that it places in its heart the concern for women and their role in their immediate surroundings (be it family, local community or work place) and more global environment **(**Aleksandra and Slobodanka, 2012, p. 305). This theory is very useful for the ongoing scrutiny in that it will help unearth how the Yoruba society depicted in Shoneyin's and Adebayo's fictional texts under study treats the social phenomenon of male sexual impotence and sterility. To objectively capture how these female writers represent the social phenomenon of male impotence and sterility in their texts, the study employs the Hallidayan Transitivity theory.

Transitivity can be simply glossed as the grammar of experiential meaning. Concurring with the foregoing, Halliday (1976, p. 30) (quoted in Fontaine, 2013, p. 73) claims that 'transitivity is the grammar of processes ... and the participants in these processes, and the attendant circumstances'. As it appears in the foregoing, Transitivity comprises three constituents: process; participant and circumstance. Bloor and Bloor (2004, p. 109) submit that "the process centres on that part of the clause that is realized by the verbal group, but it can also be regarded as what 'goings-on' are represented in the whole clause."

According to systemic linguists, there are six types of process, namely: material, mental, behavioural, verbal, existential and relational. Again, Bloor and Bloor posit that "the participants are the entities involved in the process." (2004, p. 109). Each process type actually has its own participants labelled specifically (see Eggins, 2004, Bloor & Bloor, 2004 or Fontaine, 2013, for more details). Bloor and Bloor further claim that "Circumstance, as the name suggests, is more peripheral than participants, being concerned with such matters as the settings, temporal and physical, the manner in which the process is implemented, and the people or other entities accompanying the process rather than directly engaged in it" (p. 131). The Hallidayan Transitivity theory is relevant for this study in that its application will clearly reveal the linguistic resources the two female writers deploy to represent the social phenomenon of male impotence and sterility in their fictional texts.

Methodologically, this paper employs the descriptive qualitative research design. It specifically draws on textual analysis and descriptive linguistics. The study selects some texts in the novels and describes the linguistic features deployed therein to encode the social phenomenon of male impotence and sterility. In the subsequent paragraph, a few words are said about the women writers and their origin.

The two female writers under scrutiny share in common the same origin. In point of fact, they are from Nigeria and belong to one of the three leading tribes or ethnic groups: the Yoruba tribe or ethnic group. According to Olaniyan (2016, p. 28), the Yoruba people are largely found in the western part of Nigeria being one of the three tribes that have the largest population in the country; others are the Hausa-Fulani and the Igbo. They could also be found in West African Countries like – Togo, Benin Republic, Ivory Coast, Ghana and Liberia. We have chosen to work on the two women writers' novels because they are from the same ethnic group. As such, we assume that they have been shaped by the ideologies upheld by (all the members of) the group. We also imply that they will not only represent the phenomenon of male impotence and sterility in their novels, but they will also encode their attitudes and ideologies therein.

3. Portrayal of Male Impotence and Sterility in the Selected Novels

West African women writers, especially Nigerian women writers, have started proving to the world that feminist problems or gender issues vary from one society to another. They have not only served as advocates for women's issues but they have also served as spokepersons of their male counterparts by pinpointing the difficult situations that men face in social life. One of the difficult situations men face is impotence or/and sterility. It is a well-known fact that women are barren in African patriarchal societies, but men's impotence and sterility is never heard of. It is usually considered as a shame to hear that a man is impotent or sterile due to patriarchal attributions of men as superpowers. The worst part of the matter is that men hardly accept that they are impotent or sterile and this makes women suffer in African patriarchal societies wherein much concern is given to childbearing. Therefore, some female writers, like Shoneyin and Adebayo, in their novels deconstruct patriarchy by representing what constitutes a taboo for the male gender.

Before analysing the problems of male impotence or sterility in the women novels under study, it is important to recall that the two female writers belong to the Yoruba society. Some Nigerian sociologists argue that sexual impotence or sterility cannot be a cause of divorce in the Yoruba society. For instance, Fadipe (1970, p. 65) (cited in Adekile 2018, p. 15) maintains that due to the fact that it is against societal mores for a Yoruba man or woman to remain unmarried on attaining the age of marriage, men get married even when they are sexually impotent in order to save their own faces or the faces of their immediate relatives, as well as

get someone to look after the domestic environment. The barrenness of a woman may also not necessarily resort in the end of the marriage due to the practice of polygyny. He further points out that impotence was usually not a cause of divorce, a contention ascribed to the fact that custom forbade the remarriage of a woman (ibid.). So, the above belief of/about the Yoruba speech community will be examined in the portrayal of male impotence or sterility in the two selected Nigerian female novels under study.

In Shoneyin's *The Secret Lives of Baba Segi's Wives* (2010), Alao (also named Baba Segi) is depicted as sterile though he marries four wives and fathers seven children: Iya Segi, the first and she has two children, Segi (a girl) and Akin (a boy); Iya Tope, the second and she has three children, Tope (a girl), Afolake (a girl) and Motun (a boy); Iya Femi, the third and she has two children, Femi (a boy) and Kole (a boy) and Bolanle, the fourth and she does not have a child. As the depiction indicates, Alao usually has sexual intercourse with his wives. So he does not have an erectile dysfunction. One can notice this in Iya Femi's discussion wherein she attempts to compare Baba Segi's penis with that of her lover, Tunde:

> It was good to have him [Tunde] back between my thighs, especially after two nights with *Baba Segi, whose penis was so big that two men could share it and still be endowed. Where he used his gbam-gbam-gbam, like a hammer* (italics ours), Tunde used his like a forefinger; he bent and turned until it stroke all the right places (Shoneyin, 2010, p. 152).

As it appears above, Iya Femi employs nine processes in her representation: "was"; "was"; "could share"; "(could) still be endowed"; "used"; "used"; "bent"; "turned" and "stroke". Surprisingly, she uses only two of the processes ("was" and "used") to describe Baba Segi. In fact, while "was", a relational process, is employed to define Baba Segi's penis, "used", material process, is used to encode action. Unlike Baba Segi, Tunde, the representation unveils, is ascribed three material processes consecutively: "used"; "bent" and "stroke". This clearly exudes that he is more active and more sexually skilful than Baba Segi. In addition, Iya Femi's use of the similative structure "X is like Y" (repeated twice) establishes that she truly compares both men. As it is obvious, her comparison displays, Baba Segi is sterile, not impotent. His sterility is articulated even more in the following text:

> One night when Baba Segi was busy pummelling Iya Tope, Iya Segi came to my room [the third wife's room] and told me how children were born in Baba Segi's household. She said it as if the solution wasn't out of choice but necessity. When she left my room, I smile to myself. I was already pregnant. Six months later, Baba Segi and I brought Femi home from hospital…his first wife sneered. I told her the ways of God were mysterious and snatched my new born baby from her arms (Shoneyin, 2010, p. 132).

The text above is narrated by Iya Femi. Here, her use of the material process "pummelling" attributed to Baba Segi plainly shows that he is not impotent or cannot inseminate a woman. In the text still, we are let in into the secret of procreation in Baba Segi's household. Iya Segi, the first wife, knows very well that her husband is sterile given the fact that she herself has been unable to conceive for some time after their marriage, and has been finally able to give birth to her two children only when she makes love to Taju, Baba Segi's driver. Given this experience, Iya Segi stands in a better position to advise all her younger rivals, including Iya Femi whom she urges to date another man outside the wedlock in order to become pregnant. Unknown to Iya Segi is the fact that Iya Femi is already pregnant for another man before she marries Baba Segi.

In the subsequent text, Taju narrates his secret love affairs with Iya Segi:

> Anyway, one day, my boss sent me home to collect a parcel he had left in her care…Next thing I knew, she was sitting on top of me, riding me like a horse. I cannot say I resisted, but remember, my boss's [sic] wife not a woman of modest proportions. She pinned me down with the strength of three men. I thought I should tell her to stop but she covered my mouth…(Shoneyin, 2010, pp. 222-223).

In a nut shell, Shoneyin depicts Baba Segi's sterility and how his wife, Iya Segi, copes with this. As it appears, she does not do this with the intention to demean or bash the male image. In fact, she does so to save him from societal mockery. Imagine a situation whereby Iya Segi discloses her husband's sterility to her entourage, how would Baba Segi be perceived? Again, imagine a situation whereby the woman folds her arms in a context where womanhood equates motherhood, or where children are highly cherished more than any other thing else, what would have happened to her marriage? We know from your answers to the preceding questions that the only available option that Iya Segi has is to seek a seed outside her marital home. This is meant to perpetuate her husband's name by helping him to have a progeny, and save herself from sadness (engineered certainly by societal pressure and trauma) and her home. An adage from the novel emphasises the importance of children. This adage actually translates a Yoruba belief: "A million slaves and a thousand servants cannot equal the value of a child. When a man dies, only his true children can truly mourn him'' (Shoneyin, 2010, p. 203). When Iya Segi's secret is revealed after which, Bolanle, has been medically examined, this is how she justifies her act, which she rightly terms "a sinful idea":

> My husband and I tried everything. He did not let my thighs rest but leapt between them every time dusk descended upon us. Then, I had an idea. It was a sinful idea but I knew it would bring my sadness to an end. In fact, it was more than an idea; it promised to be a solution. If my husband did not have a seed then what could it do to seek a seed elsewhere?' she shrugged her shoulder. So, I found a seed and planted it in my belly (Shoneyin, 2010, p. 215).

In the passage above, Iya Segi deploys fifteen processes "tried"; "did not let rest"; "leapt"; "descended"; "had"; "was"; "knew"; "would bring"; "was"; "promised to be"; "did not have"; "could…do to seek"; "shrugged"; "found" and planted" to encode her message. The verb "tried" in the first sentence is a material process and indicates that the narrator and her husband have done everything humanly possible in order for her to fall pregnant, but all this amounts to no avail. Likewise, her use of the second sentence; a causative sentence (Agent + Causative verb + Actor + Material process + Conj. + (Actor)+ Material process + Circumstance) unveils that her husband has had countless sexual rapports with her with a view to getting her pregnant too. The most important part of her narration commences with the relational process "had", in the third sentence, associated with the possessor "I" and the possessed "an idea". The next relational process "did not have", in the fifth sentence, associated with the possessor "my husband" and the possessed "a seed" clearly exudes Baba Segi's sterility. The remaining processes are material processes and are deployed to express a point of view that Iya Segi is left with no other choice; i.e. she is only left with looking elsewhere for a seed that her husband does not have. Indeed, this depiction shows that a Yoruba couple is not socioculturally expected to divorce each other just because of the problem of impotence or sterility and barrenness. The foregoing confirms the Yoruba belief that a couple cannot get divorced because of the problem of impotence or sterility (Fadipe, 1970 cited in Adekile 2018, p. 15).

In addition, Shoneyin represents Iya Segi as someone who keeps her husband's secrets. This reveals that she is a womanist in that she cogently believes in the survival of men, women, children and the environment in a patriarchal setting.

Given her womanist orientation, this female writer intentionally makes Iya Segi bear the blames of her younger rivals after the exposure of the secret:

> I [Iya Segi] misled them. Perhaps if I had not shown the second one my way, this shame would have come out sooner. But you see they were so desperate to be fruitful. They knew that my husband valued children above all things so when I saw their desperation, I took pity on them and shared my secret. They also followed the same path (Shoneyin, 2010, p. 216).

In fact, Iya Segi has shared her secret with other wives because she believes in collectivity or community life, suggesting thus another Yoruba belief. A Yoruba adage better translates that belief:

> *Ka rin ka po*
> *Yiye nii yeni.*
> *(*To go together in life befits humans as creatures)
> (Alaba, 2004, p. 3).

Therefore, Iya Segi is described as the pillar of her marital home. That is the reason why, she fiercely declares that she knows the cause of Bolanle's not conceiving:

> 'I [Iya Segi] know the reason why Bolanle has not conceived' she continued, 'and it is not one that a thousand doctors can cure. Yam cannot cook itself. It needs a careful hand that will slice it and expose it to raging heat (Shoneyin, 2010, p. 215).

When it is finally discovered that Baba Segi is not the father of his wives' children and decides to send them away, Iya Segi handles the situation in a pacific way by pleading him with other wives in these terms:

> My lord, she [Iya Segi] whispered, let us not allow the world to see our shame. Let us keep our secrets from those who may seek to mock us.'…the other wives join her supplication (Shoneyin, 2010, p. 242).

In the same token, in Adebayo's *Stay With Me* (2017), male sterility or impotence is depicted. It concerns a male character named Akin. His wife is Yejide. Akin has a younger brother called Dotun. After many years of a marital life without procreation, Akin makes an arrangement with his younger brother to seduce his wife so as to impregnate her. The arrangement is made without Yejide's consent. One can notice this in the question Yejide asks her husband when the secret spills out of Dotun's mouth: " So, Akin, is it true that you can't… that you can't… Are you impotent?''(Adebayo, 2017, p. 264). In the foregoing, Yejide employs the following processes: "is"; "can't"; "can't" and "Are". We are only interested in the last process "Are". This process is a relational process and defines or ascribes the value "impotent" to the Carrier "you"; Akin. From this, we can infer that Adebayo uses a dialogue between the two characters. This suggests the womanist ideology. Another inference from the dialogue concerns her intention in depicting male sterility via Akin. This is meant to prove to the world that it is not easy for men to reveal their sterility. The foregoing observation is disclosed, in the way Akin, tries to answer Yejide's question. As a matter of fact, Akin preferably decides not to answer her question directly by saying yes or no, but he keeps silent. Consider Yejide's use of the following processes "respected"; "to answer"; "confronted"; "smiled"; "leaned back"; "was staring" and "did not say" in the text below. She actually uses them to describe her husband's hesitant behaviour:

> […] he respected me enough to answer my question directly when I finally confronted him. He smiled and leaned back in his chair until he was staring at the ceiling. He did not say anything for a long time (2017, p. 264).

In the above citation, one can notice Yejide's question to Akin who is pensive. When he finally decides to answer Yejide's question, he does so by asking her two consecutive questions. Consider his deployment of the verbal process "did… tell" in the first sentence below, it indicates an act of saying. Consider also his use of the material process "are… going to do" in the second sentence, it encodes action. By using this material process, Akin wants to know what Yejide would do after finding out his secret:

> When did Dotun tell you? Akin finally asked […].
> […] Akin pinched his nose. What are you going to do now?
> (Adebayo, 2017, p. 264).

With the above-raised questions from Akin, Adebayo deconstructs some Yoruba social beliefs. For instance, in the Yoruba society, men are believed to be good at keeping secrets. But this is not the case with Dotun who reveals the secret between his elder brother and himself to his wife. In representing Dotun in this way, the writer deconstructs that Yoruba social belief. In the same token, what makes Akin raise the second question is the fact that he believes, like several people in the Yoruba society, that women cannot keep secrets. But that reality is deconstructed through the way Yejide keeps the secret of her marital home despite her temporary separation from her husband. The reason why she leaves Akin, in the first place, is the fact that she believes Rotimi/Timi will die like her children because of her sickle cell disease.

Rotimi (Timi) is the only surviving child among all the children that Yejide has for Dotun, her brother in-law. Surprisingly, Akin succeeds in raising Rotimi, to the extent, that when Yejide later reappears during the burial ceremony of Akin's father, she is surprised to hear that Rotimi does not die. So, when Akin presents Yejide to Rotimi as her mother, she becomes anxious, thinking that her husband has revealed their secret to her. Notice her deployment of the verbal verb "Did… tell" in the text below, it shows her worry or anxiety. Notice also Akin's use of the mental process "Does… need to know", it encodes meaning about cognition. On the surface, one might interpret Akin's verbal behaviour as vague or implicit, but Yejide truly gets the meaning in context. After this question, Akin keeps silent:

> Did you tell her about us and Dotun?'' About-?
> Does she need to know? (Adebayo, 2017, p. 292).

In short, what bothers Akin is how to keep his marital home by making Yejide stay with him so as to keep his problem of sterility secret. As one can remark in his words to Yejide in the following, "I want you to live with me. We can be companions. If you want to keep lovers, just be discreet about it. We can start again, on new terms'' (Adebayo, 2017, p. 293).

4. Conclusion

This study has examined how two contemporary female writers, Lola Shoneyi and Ayobami Adebayo, portray the social phenomenon of male sexual impotence and sterility in their novels entitled respectively *The Secret Lives of Baba Segi's Wives* (2010) and *Stay With Me* (2017). It has drawn its theoretical insights from womanism, the Hallidayan Transitivity theory and the descriptive qualitative research design. With this, it has unraveled the Yoruba worldview with regard to male impotence and sterility; i.e. how the Yoruba society apprehends and treats male impotence and sterility. It has also foregrounded the female writers' perception of this phenomenon, which is considered as a male secret or taboo and their attitudes towards it. The analysis has yielded some important findings.

The findings have revealed, for instance, that the Yoruba society does not consider male sexual problem as a major problem in a marital home but it ontologically encourages men and women to find a solution to it.

In fact, as this analysis indicates, the two female writers' fictional texts under study here have captured some approaches of solution to male impotence and sterility. These approaches are secret keeping, deconstructing some Yoruba beliefs concerning women, dialoguing and complementarity or the gregarious way of life of the Yoruba people, as cornerstones, to the interaction between married men and women in the society. The study concludes that the two female writers have made a substantial contribution to gender representation in contemporary African literature as they depict a male issue (male impotence and sterility) and capture the world-view of their society. Future research can explore how readers receive and respond to this social reality in social life.

References

Adebayo, A. (2017). *Stay With Me*. Great Britain: Canongate Books Ltd.

Adekile, O. M. (2018). Mental and physical incapacity as issues affecting the legality of marriage in Nigeria: A critical examination,(1-21). Retrieved in August 10th 2023 from https://papers.ssm.com/sols3/Delivery.cfm/SSRN.abstractid=3111166&type=2.

Adjei, M. (2009). Male-bashing and narrative subjectivity in Amma Darko's first three novels. *SKASE Journal of Literary Studies*, 1(1): 47-61.

Alaba, O. (2004). Understanding sexuality in Yoruba culture. *African Regional Sexuality Resource Centre* (ARSRC), 1(1): 1-13.

Allagbe, A. A. (2016). Character naming and authorial attitudes in contemporary African literature. *Research on Humanities and Social Sciences*. 6(4): 20-28.

Allagbe, A. A. and Allagbe, A. M. (2015). A Cross-Examination of Female Masculinities and Male Femininities in *Mema* by Daniel Mengara. *Studies in English Language Teaching*, 3(4), 384-394.

Aleksandra, I. and Slobodanka, M. (2012). Alice Walker's Womanism: Perspectives past and present. *Gender Studies*.Versita, 304-315.

Bloor, T., and Bloor, M (2004). *The functional analysis of English: A Hallidayan approach*. Second Edition. London: Arnold.

Eggins, S. (2004). *An introduction to systemic functional linguistics*. Second Edition. London: Continuum International Publishing Group.

Fadipe, N. A. (1970). *The Sociology of the Yoruba*. In Adekile, O.M. (2018). Mental and physical incapacity as issues affecting the legality of marriage in Nigeria: A critical examination, (1-21). Retrieved on August 10th 2023 from https://papers.ssm.com/sols3/Delivery.cfm/SSRN.abstractid=3111166&type=2.

Fontaine, L. (2013). Analysing *english grammar: A Systemic Functional Introduction*. First Edition. New-York: Cambridge University Press.

Frank, K. (1987). Women without men: The feminist novel in Africa. In DUROSIMI, E. et al. (ed.). *Women in African Literature Today*. Trenton, NJ: African World Press, 14-34.

Houndjo, T. and Allagbe, A. M. (2018). Women's reactions to men's patriarchal oppressions in selected Ghanaian male and female novels. *European Scientific Journal*, 14(35):18-32.

Nyanta, D., Ankrah, G. K., and Kwasi, O. (2017). Culture: A vessel for female subordination in three African novels. *European Journal of Social Sciences Studies*, (2)3: 10-26.

Olaniyan, G. (2016). Spiritual content of Yoruba concept of sexuality and sustenance of family values through Eko - Ile (Home Training). *Journal of Education and Practice*. 7(24): 27-32.

Sampson, S. and Watson, S. (2018). Impotence vs. Sterility: What is the Difference? Retrieved on August 10th 2023 from https://www.healthline.com/health/mens-health/impotence-vs-sterility. June 1

Shoneyin, L. (2010). *The secret lives of baba Segi's wives*. First Edition: United Kingdom: Serpent's Tail.

Stratton, F. (1994). *Contemporary African Literature and the Politics of Gender*. London and New York: Routledge.

Walker, A. (1983). *In Search of Our Mothers' Gardens. Womanist Prose*. New York: Harcourt Brace Jovanovic.

COVID-19 SIRASINDA HEMŞİRELERDE STRES VE KAYGI: KOSOVA'DA BİR VAKA ÇALIŞMASI

MSc.Marigonë Rizani-Shabani
UBT - İşletme ve Teknoloji Üniversitesi, Hemşirelik Fakültesi'nde Öğretim Asistanı

ÖZET
COVID-19 pandemisi, dünya çapında ön saflarda çalışan sağlık çalışanlarının ruh sağlığı üzerinde önemli etkiler yaratmıştır. Bu vaka çalışması, pandeminin Kosova'daki hemşireler üzerindeki stres ve kaygı seviyelerini araştırmaktadır. Araştırma, anketler ve derinlemesine mülakatlar gibi nitel ve nicel yöntemler kullanarak, başlıca stres etmenlerini tanımlar, psikolojik etkileri değerlendirir ve başa çıkma stratejilerini inceler. Bulgular, hemşirelerin artan iş yükü, yetersiz kişisel koruyucu ekipman (PPE) ve sürekli enfeksiyon riskleri nedeniyle şiddetli stres ve kaygı yaşadıklarını göstermektedir. Ayrıca, hasta acısından ve yüksek mortalite oranlarından kaynaklanan duygusal yük de etkili olmuştur. Etkili başa çıkma mekanizmaları arasında akran desteği, kurumsal müdahaleler ve kişisel dayanıklılık bulunmaktadır. Çalışma, sağlık çalışanları için özellikle acil durumlarda hedeflenmiş ruh sağlığı desteği ve stres yönetimi ihtiyacını vurgulamaktadır. Kosova'daki hemşirelerin karşılaştığı zorluklara dair içgörüler sunarak, benzer bağlamlarda sağlık profesyonellerinin refahını artırmak için ruh sağlığı destek sistemlerinin geliştirilmesine yönelik önerilerde bulunmaktadır.
Anahtar Kelimeler: COVID-19, stres, kaygı, hemşireler, Kosova, ruh sağlığı vd.

STRESS, ANXIETY IN NURSES DURING THE COVID-19: A CASE STUDY IN KOSOVO

ABSTRACT
The COVID-19 pandemic has significantly impacted the mental health of frontline healthcare workers worldwide. This case study investigates stress and anxiety levels among nurses in Kosovo during the pandemic. Utilizing qualitative and quantitative methods, including surveys and in-depth interviews, the research identifies key stressors, assesses psychological impacts, and explores coping strategies. Findings indicate that nurses experienced severe stress and anxiety due to increased workload, insufficient personal protective equipment (PPE), and constant infection risks. Emotional strain from patient suffering and high mortality rates also contributed. Effective coping mechanisms included peer support, institutional interventions, and personal resilience. The study highlights the urgent need for targeted mental health support and stress management for healthcare workers, particularly in emergencies. It provides insights into the challenges faced by Kosovo's nurses and offers recommendations for enhancing mental health support systems.This case study provides valuable insights into the specific challenges faced by nurses in Kosovo and offers recommendations for improving mental health support systems to enhance the well-being of healthcare professionals in similar contexts.
Keywords: COVID-19, stress, anxiety, nurses, Kosovo, mental health etc.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

MEASUREMENT OF HCMV-MIR-UL36-5P GENE EXPRESSION IN ABORTED WOMEN IN BABYLON

Khikani, A.N.S.
Instuute Of Scince-Cankiri Karaktein Univesity- Turkey, Univesity Of Babylon

Firat,M.
Instuute Of Scince-Cankiri Karaktein Univesity- Turkey, Univesity Of Babylon

Zaytoon Abdulrida Ighewish Al-Khafaji
Instuute Of Scince-Cankiri Karaktein Univesity- Turkey, Univesity Of Babylon

ABSTRACT

Background: HCMV, also known as Human Cytomegalovirus, is a prevalent virus that affects a significant section of the human population, often without manifesting any discernible symptoms. Nevertheless, it may induce severe illness in persons with weakened immune systems, such as those who have had organ transplantation or patients with HIV/AIDS and Pregnant women with a low level of immunity affects the fetus. hcmv-miR-UL36-5P is a microRNA (miRNA) produced by the human cytomegalovirus (HCMV), which is sometimes referred to as human herpesvirus 5 (HHV-5). Viruses, such as HCMV, have the ability to generate their own miRNAs, which are tiny RNA molecules that do not code for proteins and have significant functions in controlling gene expression. This study was conducted to identify gene expression (hcmv-miR-UL36-5P), where 50 women with aborted due to cytomegalovirus were included. Fold change was measured by comparing it with the control group.

Material and Methods:A case-control study were designed to include (140) women who had aborted at random, where (50) samples were taken from the total number of women had aborted with a high viral load (aborted women group). The Research were conducted between February 2023 and August 2023 in the Obstetrics and Gynecology Departments of Babylon Maternity and Children's Teaching Hospital and Al-Hashimiya General Hospital in addition, a control group consisting of (50) a healthy-pregnant woman who had not previously experienced abortion were included. After diagnosis of HCMV IgM and IgG via using the VIDAS assay and CMV viral load determine by RT-PCR. RNAs was extracted from a blood samples to measure the hcmv-miR- UL36-5P gene expression by RT-qPCR technique.

Results: This study revealed that out of (140) patients with abortion, 50(35.7%) were seropositive for CMV, while 90(64.3%) had were seronegative for CMV and show that only 3(6.0%) samples were seropositive to CMV IgM, 8(16.0%) samples were seropositive for both CMV IgM and IgG, and 39(78.0%) samples were seropositive for CMV IgG. The concentration of Viral load CMV in the aborted women group, which were mean (5431.92), while in the control group, it were mean (0.00). The expression of hcmv-miR-UL36-5P in aborted women were (3.11) fold change and control group (1±0.0).

Conclusion: The results in this current study showed the presence of reactivation of the virus in women with high antibodies (CMV IgG) in Babil Province. According to the results of this study, the hcmv-miR-UL36-5P were up-regulated expression in women aborted with CMV infection which may be involved in pregnancy complications.

Ethical Approval Verbal consent were taken from each aborted women before sampling. This study were approved by the Publication Ethics Committee of the Babylon Health Directorate, Ministry of Health-Iraqi under the reference No. 01 at 17-01-2023.

Keywords: CMV, hcmv-miR-UL36-5P, Gene expression.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

MICROBIAL CONTAMINATION AND AFLATOXIN B_1 LEVEL OF PALM WINE IN KADUNA SOUTH AND CHIKUN LOCAL GOVERNMENT OF KADUNA STATE, NIGERIA

Shitu, S.
Department of Applied Biology, School of Applied Sciences, College of Science and Technology, Kaduna Polytechnic
ORCID: 0000-0003-3467-3046

Musa, M. O.
Department of Applied Biology, School of Applied Sciences, College of Science and Technology, Kaduna Polytechnic

Aliyu, M. Y.
Department of Applied Biology, School of Applied Sciences, College of Science and Technology, Kaduna Polytechnic

ABSTRACT
The present study aims to conduct a microbiological quality assessment and aflatoxin B_1 levels of palm wine that is commercially available in the Kaduna South and Chikun Local Government Area of Kaduna state. A total of ten composite samples of palm wine were gathered from various palm wine establishments and locations within the Kaduna South and Chikun Local Government Area, spanning a duration of two months. Standard microbiological analysis was conducted on all the samples in order to ascertain the presence and quantities of total viable count (TVC), as well as the colony count of fungi, yeast, and gram-negative bacteria. Aflatoxin B_1 was detected and quantify using Enzyme Link Immunosorbent Assay techniques. The findings indicated that the Total viable count of the palm wine samples varied between 1.15 and 7.2 x 10^5CFU/ml, whereas the colony count of fungi, yeasts, and bacteria ranged from 1.13 - 3.65 x 10^5 CFU/ml. The average values of total viable count (TVC) and colony count were 6.6 x 10^5 colony-forming units per milliliter (CFU/ml) and 4.6 x 10^5 CFU/ml, respectively. Bacterial identified include Staphylococcus aureus, Streptococcus sp., Bacillus sp. and Escherichia coli. While fungi contaminants include Saccharomyces sp, Fusarium sp, Aspergillus niger, Penicillium sp and Aspergillus flavus. The mean aflatoxin B_1 levels in the samples across the two local government were in the range of 5.3 ppm – 15.7 ppm. The results of the analyses were of the two local governments were statically significant P value ≤ 0.05. The results of this study indicate that the microbial characteristics of the palm wine available for purchase in the KSLGA of Kaduna State are generally substandard, necessitating immediate attention. Hence, it is imperative to establish and enforce suitable and efficient measures for food safety and hygiene control to safeguard the well-being of consumers.
Keywords: aflatoxin B_1, palm wine, microbial contamination, Saccharomyces sp., Bacillus sp.

BACTERIAL PRODUCING BIOSURFACTANTS FROM SPENT LUBRICATING OIL POLLUTED SOIL

Shitu, S.
Department of Applied Biology, School of Applied Sciences, College of Science and Technology, Kaduna Polytechnic
ORCID: 0000-0003-3467-3046

Gambo, J. B.
Department of Applied Biology, School of Applied Sciences, College of Science and Technology, Kaduna Polytechnic

Musa, M. O.
Department of Applied Biology, School of Applied Sciences, College of Science and Technology, Kaduna Polytechnic

ABSTRACT
The aim of this research work is to isolate and identify biosurfactants producing bacteria from spent lubricating oil polluted soil. Biosurfactants are microbial amphiphilic compounds which can reduce surface tension between aqueous and hydrocarbon mixtures. Bacteria isolated from spent lubricating oil polluted surface were characterized morphologically and biochemically. The result for physicochemical parameters of contaminated soil sample with a pH of 6.97, moisture content 3.7%, electrical conductivity 1.22µm/cm, temperature 26.2^{o}C, organic matter 1.2, soil texture; clay 2.46%, silt 7.7% and 89.78%, textural class; sandy loam and heavy metals include Pb 5.2 (ppm), Zn 3.6 (ppm), Fe 250.5 (ppm), Ni 0.6 (ppm). The result for the bacteria count of contaminated soil sample revealed that the crude oil bacteria count of spent lubricating soil ranges from 1.38 x 10^6, 1.02 x 10^6, 1.9 x 10^6 and total aerobic aerobic count of spent lubricating soil ranges from 1.18 x 10^4 – 2.0 x 10^4cfu/g, the occurrence of pseudomonas 40%, staphylococcus aureus 30% and E. coli 30% respectively. Biosurfactants are the main microbial surface active compounds used in environmental pollution. They can improve soil fertility, protect plant under stress condition and acts as natural biocides. More research needs to be done to optimize this potential.
Keywords: Biosurfactants, spent lubricating oil, polluted soil and bacteria

IMPACT OF ENVIRONMENTAL STRESS ON REPRODUCTIVE BIOMARKERS IN BIVALVES DONAX TRUNCULUS

LADOUALI Zeyneb
Laboratory of Animal Ecophysiology, Department of Biology, Faculty of Sciences, University Badji Mokhtar-Annaba

ABDENNOUR Cherif
Laboratory of Animal Ecophysiology, Department of Biology, Faculty of Sciences, University Badji Mokhtar-Annaba

ABSTRACT
The aim of this work is to investigate the effects of environmental stressors on male reproductive biomarkers of two sentinel mussels along Annaba Bay, considered to be reservoirs receiving industrial, agricultural, and domestic discharges. Males Donax trunculus were collected from reference sites (S1) and from locations exposed to untreated sewage (S2) and a mixture of pollutants (S3) during four seasons. Testicular sperm concentration, motility, velocity, the amplitude of lateral head displacement (ALH), the beat cross frequency (BCF), were realized. Individuals from contaminated sites have diminished sperm concentration, motility, velocity, ALH, and BCF. In conclusion, reproductive biomarkers of male of these two species were changed in place and time, which is likely correlated to pollution types and the changing seasonal stressors.
Keywords: Mussels, reproduction, sperm, pollution.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

EFFECT OF THERMAL TREATMENTS ON PHYSICOCHEMICAL PROPERTIES AND HEAVY METAL CONCENTRATION IN GARDEN AND LEAD POLLUTED SOIL OF MADAKKA

SALIHU IBRAHIM ALHASSAN
Federal University of Technology, School of Life Science, Department of Plant Biology

WISDOM S. JAPHET
Ahmadu Bello University, Faculty of Life Science, Department of Botany

MATHIAS A. CHIA
Ahmadu Bello University, Faculty of Life Science, Department of Botany

INUWA S. USMAN
Ahmadu Bello University, Faculty of Agriculture, Department of Plant Science

ABSRACT
The study investigated the differences between sterilized and non-sterilized garden soil and mine tailing across chemical and physical properties. Garden soil and mine tailing were sterilized at 82^0C for 30min using laboratory autoclave each with non-sterilized form as control totaling four samples. The soil physico-chemical parameters and heavy metals were determined using standard scientific procedure for some parameters and Microwave Plasma Atomic Emission Spectroscopy (MPAES) for the minerals and heavy metals. The sterilized and non-sterilized garden Soil and mine tailing significant ($p<0.05$) differ in Org. C%, Org. M,P, Mg, Ca, K, Na, EC, sand, silt, and clay within the following ranged values Org. C% (1.47±0.58—4.49±1.00) from MTUS and GUS, %Org. M (1.61±0.62—8.10±0.57) from MTUS and GUS, P (0.53±0.07—0.9±40.12) from GST and MTUS, Mg (8.96±0.74—24.80—0.60) from MTST and GS, Ca (197.02±5.54—436.58±38.58) from MTUS and GST, K (9.07±2.07—35.27±1.88) from MTUS and GST, Na (0.18±0.11—2.03±0.05) from MTUS and GST, EC (185.10±1.00—626.00±0.00) from MTUS and GST, sandy (74.20±0.61—85.95—0.55) from GST and MTUS, silt (5.50±0.61—14.10±0.52) from MTUS and MTST, clay (2.83±0.67—15.17±1.27) from MTST and GST. In As, Cr, Fe, and Pb with their values ranged from; As (0.00±0.00—2.00±0.00) from GUS, MTST, and MTUS, Cr (0.00±0.00—1.33±0.58) from GST and MTSU, Fe (0.00±0.00—88.67±1.15) from GUS and MTST, Pb (0.00±0.00—582.00±23.81) from GUS and MU TUS. Significant ($p<0.05$) differences were found in organic carbon (Org. C%), organic matter (%Org. M), phosphorus (P), magnesium (Mg), calcium (Ca), potassium (K), sodium (Na), electrical conductivity (EC), sand, silt, and clay. However concentrations of arsenic (As), chromium (Cr), iron (Fe), and lead (Pb) in garden soil and mine tailing statistically differ.
Keywords: Garden Soil, Mine Tailing, Sterilized, Non-sterilized and Heavy Metals.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

INTEGRATING META-HEURISTIC ALGORITHMS FOR ENHANCED STREAMFLOW PREDICTION USING TIME LAG EFFECTS ON CLIMATE DATA

Al-Amin Danladi Bello
Department of Water Resources & Environmental Engineering, Faculty of Engineering, Ahmadu Bello University, Zaria-Nigeria

Aliyu Usman Bamaiyi
Department of Water Resources & Environmental Engineering, Faculty of Engineering, Ahmadu Bello University, Zaria-Nigeria
Central South University

Abdulrazaq Salaudeen
Department of Civil Engineering, Faculty of Engineering, Abubakar Tafawa Balewa University

Bashir Tanimu
Department of Water Resources & Environmental Engineering, Faculty of Engineering, Ahmadu Bello University, Zaria-Nigeria

Khalid Sulaiman
Department of Water Resources & Environmental Engineering, Faculty of Engineering, Ahmadu Bello University, Zaria-Nigeria

Aliyu Ishaq
Department of Water Resources & Environmental Engineering, Faculty of Engineering, Ahmadu Bello University

Abstract
In water-scarce areas, hydropower, irrigation, and resource planning benefit immensely from accurate streamflow predictions. Proper prediction reduces the impact of water scarcity and guarantees long-term viability. This study focuses on optimizing Support Vector Machine (SVM-regressor) hyperparameters in long-term daily streamflow prediction, taking time lag effects on climate data into account. The paper employs two metaheuristic algorithms in the optimization process: the African Vulture Optimization Algorithm (AVOA) and the Archery Algorithm (AA). Using eight different performance criteria, the two hybrid models (AVOA-SVM and AA-SVM) were evaluated for reliability, with particular attention to how the hyperparameters (C, epsilon, and gamma) of the SVM regressor changed across scenarios. The results show that AA consistently outperforms AVOA, with NSE values ranging from 0.986 to 0.999, compared to AVOA's NSE range of 0.524 to 0.999. This underscores the importance of selecting the appropriate method given the complexity of optimization and prediction tasks. AA demonstrates superior performance across multiple metrics, suggesting its potential utility for optimizing complex machine learning models for long-term time series prediction.
Keywords: West Africa, streamflow prediction, Machine learning, Support vector machine, regional river flow

1.0 Introduction

Several indicators have shown that there is poor water resource management in terms of its availability and distribution in West African countries (Papa et al. 2023). Despite its paramount importance and crucial role in supporting livelihoods, agriculture, and ecosystems. This condition is expected to worsen with increasing pressures from population growth, urbanization, and climate change (Tarpanelli et al. 2023). Though effective management of the water resources, including accurate streamflow forecasting, is essential for sustainable water resource development and resilience under various stressors in the region (Nkiaka et al. 2020). The prediction of water flow in rivers and streams under the current identified stressors is critical for informed decisions related to various sectors of the economy, such as agriculture (Awotwi et al. 2021, Larbi et al. 2022), water supply (Namugize et al. 2018, Djan'na Koubodana et al. 2023), hydropower generation (Obahoundje et al. 2022), and disaster risk reduction (Chun et al. 2021). In terms of agriculture, accurate streamflow forecasts are critical for planning irrigation schedules, managing water resources, and mitigating the impacts of droughts and floods on crops. A lot of farmers depend on timely and reliable information to make informed decisions about planting periods, irrigation water demand, and harvesting patterns. (Bjornlund et al. 2020). If this is achieved, it will improve agricultural productivity while minimizing risks. Furthermore, many water resource management authorities in the region require streamflow forecasts to allocate water resources efficiently by balancing competing water demands and guaranteeing sustainable water supply for domestic, industrial, and environmental purposes (Huang et al. 2021). Another significant sector in which the application of streamflow forecasting is seriously required is hydropower generation, as many countries in the region rely on it as a primary source of electricity. It enables hydropower operators to optimise reservoir operations, manage water releases, and plan the quantity of electricity generation (Arsenault and Côté 2019). Thereby maximising energy production and minimising disruptions, as noticed in many countries in the region. Accurate forecasts are essential for balancing energy supply and demand, particularly during periods of peak consumption or low water availability(Zhang et al. 2019).

In addition to supporting socio-economic activities, streamflow forecasting plays an important role in disaster risk reduction and climate resilience efforts in West Africa (Bjornlund et al. 2020). Appropriate and accurate forecasts can help decision-makers anticipate and respond to hydrological related hazards, such as floods and droughts (Ward et al. 2020). It further guides the implementation of the early warning systems, prevention of disaster by evacuating at-risk communities, and implementing measures to protect infrastructure and livelihoods (Fahad et al. 2023). Additionally, integrating streamflow forecasts into disaster risk management strategies in West African countries can enhance their resilience to climate-related hazards and reduce the socio-economic impacts of extreme events (Nouaceur and Murarescu 2020).

Over the past few years, progresses in optimization techniques have contributed to substantial advances in streamflow forecasting accuracy and reliability(Adnan et al. 2021). These techniques include machine learning models and hybrid optimisation algorithms, which have shown the potential of hydrological prediction. Although several optimisation algorithms are evolving and many are yet to be utilised for streamflow prediction. According to Rajwar et al. (2023), there are more than 500 nature-inspired optimisation algorithms known as meta-heuristic algorithms (MA) in existence, but only a few are utilised for streamflow prediction (Ibrahim et al. 2022). For example, machine learning models such as adaptive neuro-fuzzy inference system (ANFIS), artificial neural networks (ANNs), multilayer perceptron (MLP), random forest (RF), support vector regression (SVR), and long short-term memory (LSTM)

networks have shown promise in capturing complex relationships and patterns in streamflow data (Ferreira et al. 2021, Khosravi et al. 2022, Kumar et al. 2023). However, the performance of machine learning models relies on the optimisation of model parameters and hyperparameters, which can be challenging due to the high-dimensional and nonlinear nature of the optimisation problem (Gharib and Davies 2021).

On the other hand, hybrid optimisation algorithms, which combine elements of different optimisation techniques, offer a powerful approach to streamflow forecasting optimization. These algorithms integrate machine learning models with metaheuristic optimisation algorithms, such as grey wolf optimisation (GWO), particle swarm optimisation (PSO), genetic algorithm (GA), simulated annealing (SA), differential evolution (DE), particle swarm optimisation (PSO), and other MA's, to achieve superior performance and robustness (Janga Reddy and Nagesh Kumar 2020). By leveraging the strengths of hybrid algorithms, the limitations of individual methods can be overcome, while accurate and reliable streamflow forecasts can be produced. Currently, there has been growing interest in optimisation algorithms inspired by natural phenomena, such as those based on MA's principles, to enhance streamflow forecasting. These optimization algorithms mimic the behavior of natural processes to efficiently solve complex optimization problems, offering the potential to improve the accuracy and reliability of streamflow predictions. Additionally, advancements in related optimisation techniques, such as the Chaotic Grey Wolf Optimisation (CGWO) algorithm, immune-inspired algorithms, the Adaptive Fast Orthogonal Search (FOS) algorithm, the Butterfly optimisation algorithm and many more, have provided further opportunities for streamflow forecasting (Tao et al. 2024). Since there are many meta-heuristic algorithms (MA) yet to be tested for streamflow prediction, in this study, five MA's hybrid in support vector machine (SVM) are employed in the prediction of streamflow.

Meanwhile, the ultimate goal of applying hybrid optimisation techniques to streamflow predictions is to efficiently utilise well-trained MA algorithms to forecast streamflow in real-world scenarios, enhancing the efficiency of hydrologists and water resource engineers. However, conventional MAs often lack explicit equations that can be directly utilised by experts. As a substitute, researchers naturally need to check the algorithms that can be restructured or modified to meet desired needs, which can be difficult due to the requirement for programming skills. Not only that, the computational time and parameter adjustments for optimal output and precision in most machine learning models make them weak at providing the desired results (Rahimzad et al. 2021). To address this challenge, coupling ML and MAs to overcome the intricateness of the ML model and, at the same time, open the capabilities of several MA's will continue to open ways for reliable prediction in water sciences (Adnan et al. 2023). Therefore, in West Africa, where hydrological variability is high and data availability is often limited, these approaches may offer valuable insight for enhancing streamflow prediction capabilities in the region.

However, there has not been a report on the application of many MA in the prediction of streamflows and the assessment of their capabilities in dealing with hydrological issues. To this end, this study utilises the Support Vector Machine (SVM)(Katipoğlu et al. 2023), embedded with four MA algorithms: the archery algorithm (AA)(Leiva and Dhiman 2022), and African vulture optimisation algorithm (AVOA)(Liu et al. 2022a, Sasmal et al. 2023). as optimization models to realise streamflow prediction in the biggest river of West African region. The main contribution of this study is the integration of the two MAs into the SVM models and evaluating their performance in predicting streamflow based on seven different statistical metrics. The study utilises some input combinations of scenarios using the time lag method, including daily streamflows, rainfall, and minimum and maximum temperature.

For clear comprehension, these approaches cover the simple SVM and hybrid integrative (SVM -AA and SVM -AVOA) models. In each case, the results obtained from the models are compared to check their effect and influence on enhancing the accuracy of the results. This research seeks to contribute to the advancement of streamflow forecasting techniques and provide valuable insights into the optimization of machine learning models for hydrological prediction. The findings of this study are expected to provide insight into decision-making processes in water resource management for agriculture, energy production, and disaster risk reduction purposes in the region.

2.0 Material and Methods

2.1 Machine Learning (ML) and Meta-heuristic Models (MA)

This section describes the methodology for developing hybrid forecast models and introduces the performance evaluation criteria. The study considered SVM (Support Vector Machine) model, enhanced with a meta-heuristic algorithm (Fig. 1), including AA (Archery Algorithms), and AVOA (African Vulture Optimization Algorithm). The hybrid models were developed exclusively for simulation purposes, aimed at predicting streamflow under historical time steps. For this purpose, SVM hybrid-based models similar to *Bahramifar et al. (2023)* were adopted. Due to the increase in data mining and the capability to utilize large amounts of data for scientific inferences, ML methods have become useful tools for analyzing data for future reference. Combining ML and MA algorithms is helpful when you have a lot of complex scenarios representing the natural sequences of the climate data and it's hard to figure out what the relationships are. These methods are mostly based on data-driven processes and involve using data science to understand possible future occurrences. How well combining an ML method and MA works depends on the quality of the training data and how well it can find the relationships and information underneath. ML algorithms are different from traditional models because they don't use predetermined mathematical equations to find patterns in data. Instead, they use computer techniques and sequences. The MA is often used when the search space for hyperparameters in machine learning (ML) algorithms is large, complex and traditional optimization methods are inadequate. In this study, two MLs (SVM) are selected and combined with two meta-heuristic algorithms that are used to optimize the hyperparameters of SVM to enhance the performance and prediction of the streamflow.

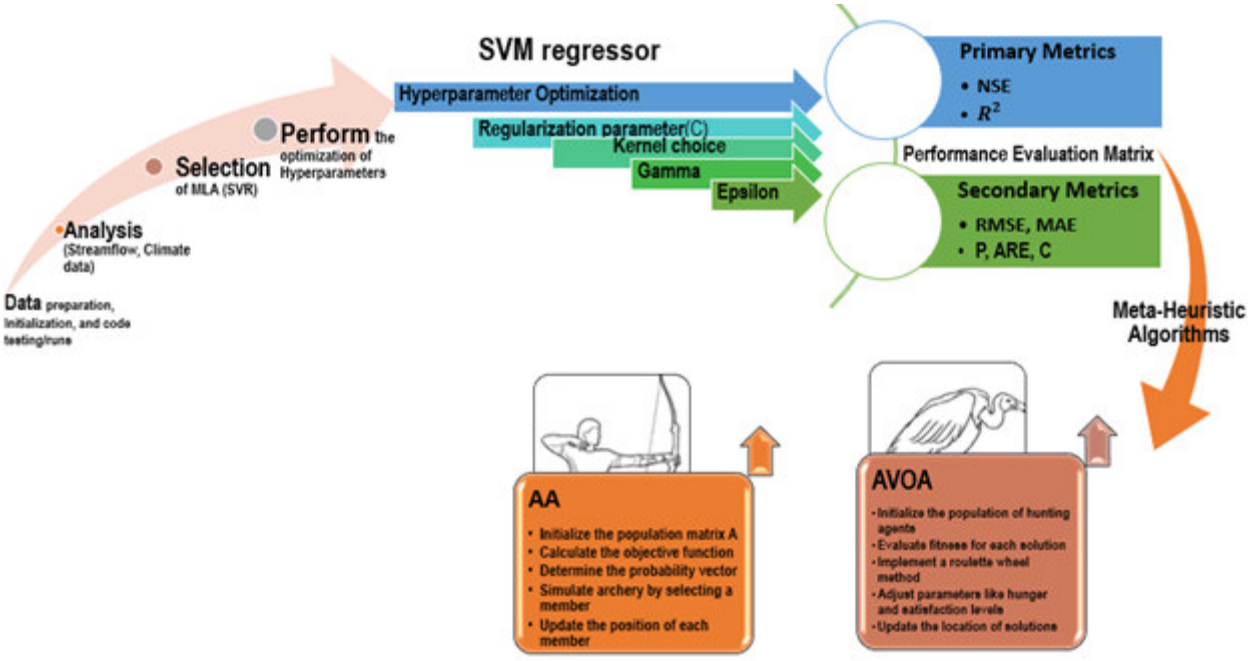


Fig. 1: Simplify concept of the Methodology used in this study

2.1.1 Support Vector Machine (SVM)

SVM's purpose is to find the optimum hyperplane that splits classes in feature space (Xu et al. 2006). It is considered the most rigorous parameter-tuning ML model and tends to have a larger number of hyperparameters that require more careful tuning to achieve optimal performance. To tune these parameters like kernel choice and the regularization parameter (C) are critical for realizing the right equilibrium between model complexity and generalization. Although the SVMs can handle high-dimensional data efficiently, but the choice of kernel and other hyperparameters becomes more critical as the dimensionality increases (Rieck et al. 2012). In a linear SVM, the aim is to find the optimal hyperplane that separates the data into different classes. This hyperplane is defined as;

$$w^T x + b = 0 \quad (1)$$

where w is the weight vector perpendicular to the hyperplane and b is the bias term. In this case, the weight vector w determines the orientation of the hyperplane in the feature space. When an input data x is given, its class label is determined by which side of the hyperplane it falls on after computing $w^T x + b$. The SVM algorithm learns the optimal values for w during the training process.

Afterward the **Primal Formulation** (for separable data) is determined as;

Objective function $= \underset{w,\, b}{min} \frac{1}{2}\|w\|^2$, under the constraint $y_i(w^T x_i + b) \geq 1 \quad for\ i = 1, \ldots \ldots, M$

Where w = weight vector, b = bias term, x_i = input vector, y_i = class label and M = number of training samples

In cases where the input data is not linearly separable, or when outliers are present, a soft margin SVM can be used by introducing a slack variable ζ_i to allow for some misclassification and the optimization problem becomes:

$$min_{w,b,\zeta} \frac{1}{2}\|w\|^2 + C \sum_{i=1}^{n} \zeta_i \quad (2)$$

Subject to constraint $y_i(w^T x_i + b) \geq 1 - \zeta_i$ and $\zeta_i \geq 0$
Consequently, the equation can be deployed to solve non-linearly separable data by mapping the input features into a higher-dimensional space using a kernel function $K(x, x')$ and the decision function is defined as:

$$f(x) = \sum_{i=1}^{n} \alpha_i \, y_i K(x, x') + b \quad (3)$$

where α_i is term as the Lagrange multipliers derived by solving the dual optimization problem.
For **Dual Formulation** (for separable data) also known as the dual optimization problem for kernelized SVM is defined as;

$$\max_{\alpha} \sum_{i=1}^{M} \alpha_i - \frac{1}{2} \sum_{i=1}^{M} \sum_{j=1}^{M} \alpha_i \alpha_j y_i y_j K(x_i^T \, x_j) \quad (4)$$

Under the constraint $0 \leq \alpha_i, \; for \; i = 1, \ldots \ldots, M \; , \; \sum_{i=1}^{n} \alpha_i y_i = 0$
Both classification (SVC) and regression (SVR) applications can use the versatile Support Vector Machine (SVM) (Montesinos López et al. 2022). The selection of the kernel and other hyperparameters plays an integral part in attaining the best possible performance, particularly in cases involving spaces with multiple dimensions or dynamically distinct data. In this study, the regression SVM (*known as SVR*) was used for the analysis of the hybrid ML model.

2.1.2 Archery Algorithm (AA)

The Archery Algorithm (AA) imitates an archer's behavior during chaos situation, by guiding each member of the population to a target boundary in the search space (Musa et al. 2019). In population-based algorithms like AA, individual member represents a possible solution to the optimization problem, defined by problem variables specified from the input domain. Hence, each member can be represented as a vector, forming the population matrix as mathematically represented as;

$$A = \begin{bmatrix} A_1 \\ \vdots \\ A_i \\ \vdots \\ A_N \end{bmatrix}_{N \times m} = \begin{bmatrix} a_{1,1} \ldots a_{1,d} \ldots a_{1,m} \\ \vdots \; \ddots \; \vdots \; \ddots \; \vdots \\ a_{i,1} \cdots a_{i,d} \cdots a_{i,m} \\ \vdots \; \ddots \; \vdots \; \ddots \; \vdots \\ a_{N,1} \cdots a_{N,d} \cdots a_{N,m} \end{bmatrix}_{N \times m} \quad (5)$$

Where m is the number of problem variables, N denotes the number of population member, and the matrix A represents the population of AA. The vector a_i is the member of AA's population, and $a_{1,d}$ is the dimension of that member.
In this case, = the objective function of an optimisation problem can be judged using each member of the population. The objective function is thus specified as a vector using the matrix below.

$$P = \begin{bmatrix} P_1 \\ \vdots \\ P_i \\ \vdots \\ P_N \end{bmatrix}_{N \times 1} = \begin{bmatrix} P(A_1) \\ \vdots \\ P(A_i) \\ \vdots \\ P(A_N) \end{bmatrix}_{N \times 1} \quad (6)$$

where P is a vector of different objective function values gathered from individuals in the population and P_i is the objective function value gathered from the *i-th* population member.
The target panel can be divided into sections with "width" equal to the number of population members and "length" equal to the number of problem variables in AA. In an event that when you look at the different parts, the difference in their width is equal to the disparity in the values of their objective functions. In most cases, the probability function is normally used to find the width that is directly related to the value of the objective function.

$$P_v = \frac{P - P_w}{\sum_{i=1}^{n}(P_i - P_w)} \quad (7)$$

Given that P_w is the objective function value of the worst population member and P_v is the probability vector. . This is to ensure that there is a greater probability function and a better likelihood of being chosen as the archery simulation member who performed better on the objective function value. In order to simulate archery and pick a member at random, cumulative probability has been used. An alternative way to model this process is by utilising the expression;

$$h = \begin{cases} 1, \ 0 \le r_{h,d}^{i} \le C_1 \\ \vdots \\ i, \ C_{i-1} \le r_{h,d}^{i} \le C_i \\ \vdots \\ N, \ C_{N-1} \le r_{h,d}^{i} \le C_N \end{cases} \quad (8)$$

In this equation, h represents the row number of the member chosen by Archer, C_i is the cumulative probability of that member, and $r_{h,d}^{i}$ denotes a random number between 0 and 1 that represents how the *hth* member was chosen to lead the *ith* member in the *dth* dimension. Subsequently the position of the population members is updated based on the equation below;

$$a_{i,d}^{new} \begin{cases} a_{i,d} + r \times (a_{i,d} - S \times a_{i,d}), & P_k < P_i \\ a_{i,d} + r \times (a_{i,d} - S \times a_{i,d}), & else \end{cases} \quad (9)$$

$$S = round(1 + rand) \quad (10)$$

$$A_i \begin{cases} A_i^{new}, & P_i^{new} < P_i \\ A_i, & else \end{cases} \quad (11)$$

where A_i^{new} is the new status of the *ith* member, $a_{i,d}^{new}$ is its *dth* dimension, P_i^{new} is its objective function value, r is a random number with a normal distribution that falls within the closed interval [0, 1], P_k is its objective function value, and $a_{i,d}$ is the *dth* dimension of the member chosen by Archer. The suggested AA works like other population-based algorithms because it uses iterations, and once everyone in the population has been updated, the algorithm moves on to the next iteration. This time, the different stages of the AA algorithm based on Equations (7) to (11) are done again and again until a stop condition is reached. The algorithm gives the best possible answer to the problem once it is fully implemented

2.1.3 African Vulture Optimization Algorithm (AVOA)

AVOA is a metaheuristic algorithm based on African vulture foraging behaviour as they regularly gather in large groups to scavenge carcasses, often competing for the best food. According to Sasmal et al. (2023), AVOA simulates interactions of vulture on carcasses by utilising a population of hunting agents competing for optimal optimisation solutions. The AVOA overview comprises all pertinent criteria and features described in each step, based on basic vulture principles as outlined by Abdollahzadeh et al. (2021).

The fitness of each solution of AVOA is verified after the initial population has been arranged starting from the first and second group, the best vulture is the solution with the highest fitness and ability to hunt. Afterward, the solutions that are still open move closer to the best ones in the first and second groups as define from the expression;

$$R(i) = \begin{cases} B_{v1}, \ \text{if } p_i = L_1 \\ B_{v2}, \ \text{if } p_i = L_2 \end{cases} \quad (12)$$

It is a systematic approach to picking the selected vultures to lead the other vultures to one of the most promising solutions in each group, where L1 and L2 are the outcomes as the parameter values that need to be checked prior to the search operation lie within the range of 0 and 1, while the algebraic sum of the two parameters is 1. On the whole, the choice of the optimal solution is determined through the roulette wheel method to calculates the probability of selecting each vulture based on its fitness, as defined below.

$$P_i = \frac{F_i}{\sum_{i=1}^{n} F_i} \quad (13)$$

To determine the hunger and satisfaction levels of vultures to transition between exploration and exploitation phases;

$$t = h \times \left(sin^w \left(\frac{\pi}{2} \times \frac{iteration}{Maxiteration} \right) + \cos \left(\frac{\pi}{2} \times \frac{iteration}{Maxiteration} \right) - 1 \right) \quad (14)$$

$$F = (2 \times rand_1 + 1) \times \mathrm{Z} \times \left(1 - \frac{iteration}{Maxiteration} \right) + t \quad (15)$$

Where *F* is the vultures' level of happiness that is iterated on, *i* is the current iteration number, and *maxiterations* is the total number of iterations. Also, the value of the variable *z* is random and can be within a range from -1 to 1 as it varies with each iteration. For the variable *h*, a random value between -2 and 2 is assigned with a random value between 0 and 1 given to the variable rand_1. If the z value drops below 0, it means the vulture is starving, but if it rises to 0, it means the vulture is full.

In the AVOA, vultures have the ability to strategically look into a number of different areas, looking for carcasses. The outcome of this process depends on using two different methods. The choice of which method to use is determined by a parameter named P_1, and it is necessary to give the parameter a value before the search operation starts with a number between 0 and 1, as it is a key factor in determining which of the two techniques to use.

$$P(i+1) = R(i) - D(i) \times F \quad (16)$$

$$D(i) = |X \times R(i) - P(i)| \quad (17)$$

$$P(i+1) = R(i) - F + rand_2 \times ((ub - lb) \times \mathrm{rand}_{\ 3} + lb) \quad (18)$$

$$P(i+1) = \begin{cases} \text{Equation(22)if } P_1 \geq \mathrm{rand}_{P1} \\ \text{Equation(24)if } P_1 < \mathrm{rand}_{P1} \end{cases} \quad (19)$$

According to Eqn. (16), vultures search for food in the hunting area at random, up to a distance chosen by the better-developed culture from each group as per the value of $P(i+1)$ to show the vulture's position vector in the next iteration, and *F* to show the rate at which it attains fullness. Utilizing Eqn. (15), the value of *F* in this case can be determined. In Eqn (17), the variable *R(i)* stands for a very skilled vulture that was picked using Equation (12) for this round.

The exploitation ability of the vulture can be determined using the expression below;

$$P(i+1) = D(i) \times (F + \mathrm{rand}_{\ 4}) - d(t) \quad (20)$$

$$d(t) = R(i) - P(i) \quad (21)$$

$$S_1 = R(i) \times \left(\frac{\mathrm{rand}_5 \times P(i)}{2\pi} \right) \times \cos(P(i)) \quad (22)$$

$$S_2 = R(i) \times \left(\frac{\mathrm{rand}_6 \times P(i)}{2\pi} \right) \times \sin(P(i)) \quad (23)$$

$$P(i+1) = R(i) - (S_1 - S_2) \quad (24)$$

$$P(i+1) = \begin{cases} Equation(26) if\ P_2 \geq rand_{p2} \\ Equation(30) if\ P_2 \geq rand_{p2} \end{cases} \quad (25)$$

This equation guides vultures in exploiting promising regions, $D(i)$ represents the distance between vultures, *F* is the degree of vulture satisfaction, $rand_2$ is a random number, and $d(t)$ represents the distance to the optimal solution.

In the second stage of operation, the organised hunting of the two vultures gives rise to the accretion of diverse vulture classes around the food supply, resulting to powerful rivalry and aggressive behaviours in their quest for food.

$$A_1 = \text{BestVulture}_1(i) - \frac{\text{BestVulture}_1(i) \times P(i)}{\text{BestVulture}_1(i) - P(i)^2} \times F \quad (26)$$

$$A_2 = \text{BestVulture}_2(i) - \frac{\text{BestVulture}_2(i) \times P(i)}{\text{BestVulture}_2(i) - P(i)^2} \times F \quad (27)$$

$$P(i+1) = \frac{A_1 + A_2}{2} \quad (28)$$

To track all vultures to the food source, the group of vulture species congregate at a food site during food scarcity due to strong battle for resources. The vulture motion model as expressed in Equations 26, 27, and 28.

If |F| is less than 0.5, the following process is carried out on this stage (Eqn. 28 and 29).

$$P(i+1) = R(i) - |d(t)| \times F \times \text{LF(x)} \quad (29)$$

LF(x) is define using Eqn. (30), where d represents the issue's dimensions, u and v are random variables with values varying between 0 and 1; whilethe parameter β has a default value of 1.5 (Abdollahzadeh et al. 2021).

$$LF(x) = 0.01 \times \frac{u \times \sigma}{|v|^{\frac{1}{\beta}}}, \sigma = \left(\frac{\Gamma(1+\beta) \times \sin\left(\frac{\pi\beta}{2}\right)}{\Gamma(1+\beta 2) \times \beta \times 2^{\left(\frac{\beta-1}{2}\right)}} \right)^{\frac{1}{\beta}} \quad (30)$$

An undetermined number, called rand_{P3}, is created in the first part of this stage (Eqn. 31). This number was chosen at random from 0 to 1. Finding different kinds of vultures near a food source is suggested if the value of rand_{P3} is higher than or the same as the value of P_3. In the other case, the pugnacious siege-fight strategy is deployed if the generated value is less than parameter P_3.

$$P(i+1) = \begin{cases} \text{Equation(34)if } P_3 \geq \text{rand}_{P3} \\ \text{Equation (35)if } P_3 < \text{rand}_{P3} \end{cases} \quad (31)$$

The AVOA algorithm has a computational complexity which relies on three key procedures: initialization, fitness evaluation, and vulture updates. For an N vulture, the initialization process has O(N) computational complexity and it is updated by the location vector of all formed vultures due to searching for the most rightful location and is define as;

$$O(N) = O(T \times N) + O(T \times N \times D) \quad (32)$$

A maximum iteration and problem dimension (D) are considered, and AVOA employs a problem-solving paradigm similar to other metaheuristics methods. The optimisation process begins with a random solution set, and then improvements are made to the population until an end condition is met during implementation process.

2.2 Performance Evaluation

This section provides details on the performance evaluation and the prediction model's accuracy using various metrics and approaches. The Small Error Probability and Posterior Error Ratio assessments are two additional approaches that complement the Average Relative Error (ARE) and Correlation Degree methods. Afterwards, the overall accuracy is then divided into distinct categories using predetermined criteria. The Average Relative Error (ARE) is a metric used to assess the accuracy of a prediction model (Farnum 1990). It measures the average relative deviation between the simulated and observed values. The equation for Average Relative Error is given by:

$$\bar{e}_x = \frac{1}{n} \sum_{k=1}^{n} \left| \frac{e^{(0)}(k)}{x^{(0)}(k)} \right| \quad (44)$$

Where n depicts the sample size, $e^{(0)}(k)$ represents the difference between what was observed and what was simlated at time k, and $x^{(0)}(k)$ is what was observed at time k.
The Correlation Degree method finds the correlation between two or more patterns and provides a measure of the association between the observed and the simulated values (Liu et al. 2022b). Here are the basic numbers and steps required to use the Correlation Degree method:
Absolute Correlation Degree (ε_jd)

$$\varepsilon_{jd} = \frac{1+|s_0|+|s_i|}{1+|s_0|+|s_i|+|s_i-s_0|} \quad (45)$$

S_i is the cumulative deviation times $x_{i0}(k)$, where s_0 is the initialization (a variable or parameter) to zero sequence of the original sequence and s_i is the relative cumulative deviation between the fitting and original sequences.
Comprehensive Correlation Degree (ε_zh):

$$\varepsilon_{zh} = \alpha\varepsilon_{jd} + (1-\alpha)\varepsilon_{xd} \quad (46)$$

Let α be the distribution coefficient (often 0.5).
Posterior Error Ratio (C) and Small Error Probability (P):

$$C = \frac{s_2}{s_1} \quad (47)$$

$$P = P\{|e(k) - \bar{e}| < 0.6745s_1\} \quad (48)$$

The Model's accuracy can be assessed using the, Correlation Degree, Average Relative Error, Posterior Error Ratio, and Small Error Probability. This stage includes grading each of the accuracy test results to assess model accuracy.
Other performance metrics used include Nash-Sutcliffe Efficiency (NSE), Coefficient of Determination (R^2), Mean Absolute Error (MAE), and Root Mean Square Error (RMSE). Their mathematical equations are defined as:

$$NSE = 1 - \frac{\sum(S_i-O_i)^2}{\sum(O_i-\hat{O}_i)^2} \quad (49)$$

$$R^2 = \left\{\frac{\sum(O_i-\hat{O}_i)(S_i-\hat{S}_i)}{\sqrt{\sum(S_i-\hat{S}_i)^2}\sqrt{\sum(O_i-\hat{O}_i)^2}}\right\}^2 \quad (50)$$

$$MAE = \frac{1}{n}\sum_{i=1}^{n}|O_i - S_i| \quad (51)$$

$$RMSE = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(O_i - S_i)^2} \quad (52)$$

where N is the total quantity of data, O_i and S_i are the measured and simulated values, respectively, and $\hat{O}_i$ and $\hat{S}_i$ are the means of the measured and simulated values.

2.6 Case Study: The Niger River Basin

The Niger River Watershed, located in West Africa between latitudes 4°10′ N and 23°57′ N, and longitudes 11°50′ W and 15°48′ E, encompasses a vast catchment area of approximately 2.156 million km^2, making it the ninth largest in the world., The River is the third longest river in Africa, spanning a distance of 4,200 km, coursing through over 10 countries including Benin, Algeria, Burkina Faso, Chad, Cameroon, Côte d'Ivoire, Mali, Guinea, Niger, and Nigeria (***see Fig. 2***). The climate within the Niger River Watershed is characterized by its complexity, with distinct variations in precipitation patterns along a north-south axis.

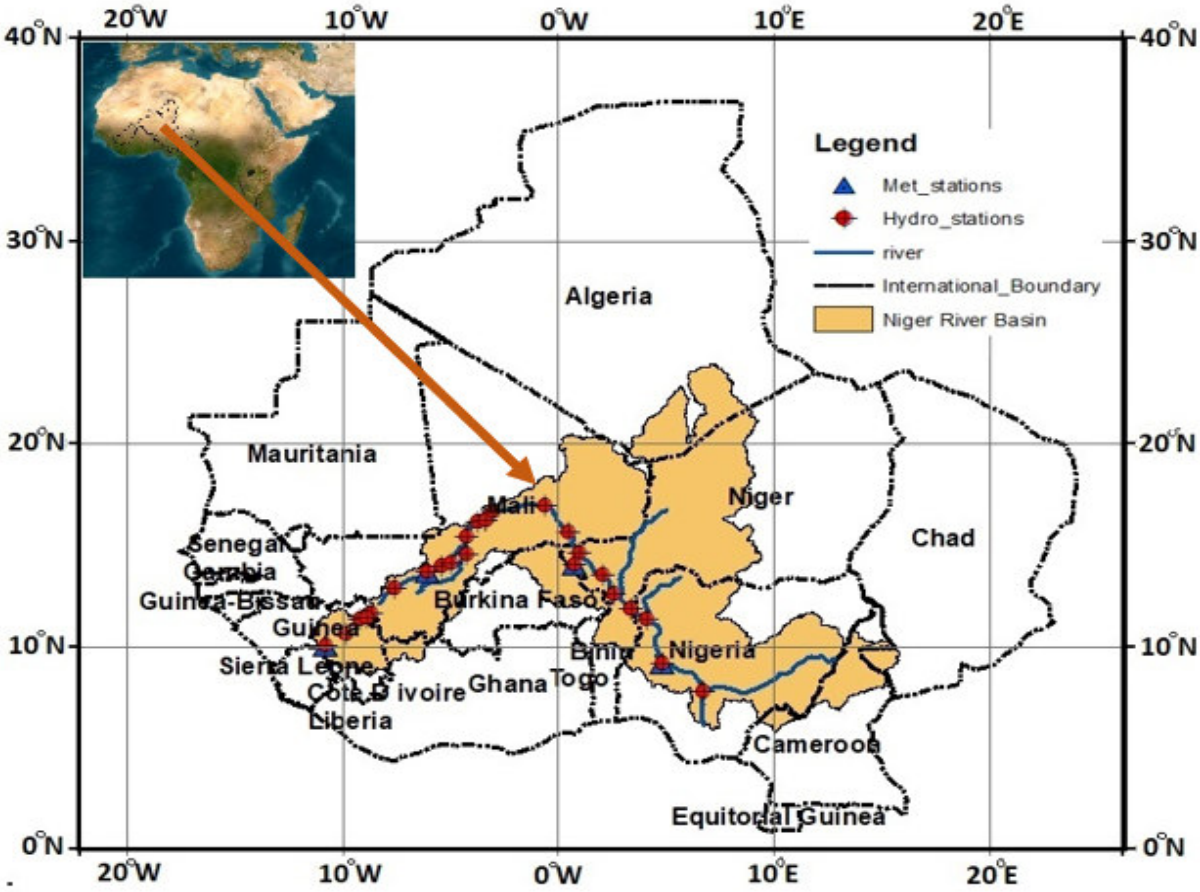


Fig 2: *Niger River Basin, with its distribution of the climatic and hydrological stations*

This region is influenced by the tropical convergence zone, resulting in well-defined dry (October to June) and wet seasons (July to September). According to (Bank 2019)West Africa (WA) is experiencing rapid growth in comparison to other regions on the African continent. This growth may be ascribed to the creation and growth of the Economic Community of West African States, which has resulted in an increase in the population of the region (with a mean annual growth rate of 7%) and a rising level of urbanization. Despite this, agriculture continues to dominate the region's industrial sector. The agricultural production, mainly focusing on grains, livestock, and grazing (Zhou et al. 2023), contributes to 40% of the NRW's GDP. However, due to the expanding human presence, the water security of the watershed is facing significant challenges (Dos Santos 2023).

2.7 Time Lag scenarios on Climate Data

This study evaluated model sensitivity using three input scenarios (***Fig. 3***). The default inputs, referred to as S1, were daily mean precipitation, maximum temperature (*max_temp*), and minimum temperature (*min_temp*) from the selected hydrological station and appropriately capture the average climatic conditions of the study area. We use these inputs to drive the hybrid models of the MLs. In the next input scenario S2, focused on integrating lagged rainfall, *min_temp*, and streamflow data. The lagging of the input data is based on the cross-correlation and partial autocorrelation function (PACF) analyses utilised by Weiß et al. (2023) and defined, respectively, as follows:

$$CCF\ (X,Y,k) = \frac{\sum_{t=1}^{n-k}(X_{t+k}-\bar{X})(Y_t-\bar{Y})}{\sqrt{\sum_{t=1}^{n-k}(X_{t+k}-\bar{X})^2 \sum_{t=1}^{n-k}(Y_t-\bar{Y})^2}} \quad (54)$$

where n is the number of data points, X_t and Y_t are the values of X and Y at time t, $\bar{X}$ and $\bar{Y}$ are the means of X and Y, respectively.

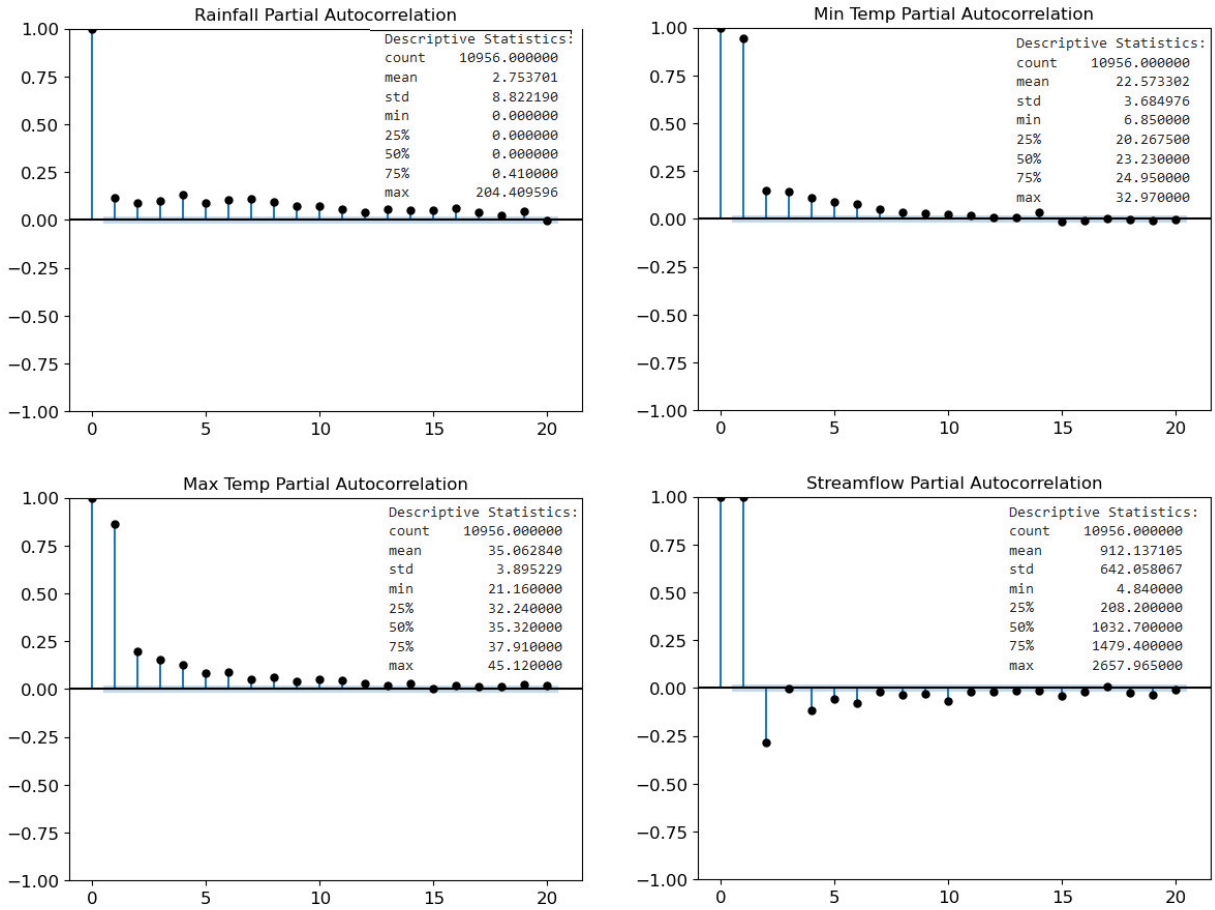


***Fig 4**: A statistical description of the climate data and their Partial Autocorrelation plots*

The PACF of a time series X at *lag k*, denoted as ϕ_{kk}, is the correlation between X_t and X_{t-k} that is not accounted for by *lags 1* through *k−1*. It can be calculated using the Yule-Walker equations for an autoregressive (AR) process of order k:

$$\emptyset_{kk} = \frac{\gamma(k)}{\gamma(o)} \quad (55)$$

where $\gamma(k)$ is the autocovariance at lag kk and $\gamma(0)$ is the variance of the time series. Using this method, further scenarios were created and referred to as forcing data. This data aids in accurately representing the hydrological response of the watershed and the direction of streamflow during model training. At hydrological stations, the measured rainfall, min_temp, and max_temp are represented by S1. Table 1 summarises the S3 and S4 scenarios that arise from the inclusion of the lagged rainfall, min_temp, and streamflow in S2.

Table 1: Input Scenarios for the Prediction of Streamflow using SVM hybrid models

Daily Lags	Significant Cross-Correlation Coefficients from PACF			Scenarios	Scenarios Description	Additional Features	Rational
	Mali Station	Niger station	Lokoja station				
1	1.00	1.00	1.00	S1	Rainfall, Min_Temp, Max_temp, streamflow		Basic setup with daily mean rainfall, maximum temperature and minimum temperature and stemflows
2	-0.72	-0.84	-0.90	S2	Rainfall, Min_temp, Max_temp, Lagged Rainfall, Lagged Min_temp+ Streamflow	Lagged rainfall (*one-day lag*), Lagged Min_temp (*one-day lag*), Lagged streamflow	Builds upon *S1* by Adding Lagged rainfall, minimum temperature, and streamflow based on significant lags
3	0.30	-0.36	-0.57	S3	Rainfall, Min_temp, Max_temp, Lagged Rainfall, Lagged Min_temp, Lagged streamflow	Lagged rainfall (two-day lag), Lagged Min_temp (two-day lag), Lagged streamflow	Extends *S2* by adding lagged streamflow based on significant lags observed in partial autocorrelation analysis
4	-0.13	-0.16	-0.88	S4	Rainfall, Min_temp, Max_temp, Lagged Rainfall, Lagged Min_temp, Lagged streamflow	Lagged rainfall (three-day lag), Lagged Min_temp (three-day lag), Lagged streamflow	Extends *S3* by adding lagged streamflow based on significant lags observed in partial autocorrelation analysis

The adoption of a differencing standardisation approach was employed in order to achieve meaningful comparison, enhance model performance, and reduce outliers in the time series data. This approach makes data stationary and simpler to analyse since statistical features like mean and variance do not vary.

Further, this type of evaluation becomes useful in the context of streamflow forecasting. The standardisation process of differencing comprises the calculation of the divergence between successive observations within the time series. Mathematically, differencing can be expressed as:

$$\Delta X_t = X_t - X_{t-1} \quad (53)$$

Where ΔX_t is the differenced value at time t, X_t is the original value at time t, and X_{t-1} is the original value at time $t-1$.

In this study, to ensure effective computation, the data is split from January 1, 1993 to December 31, 2011 for model training and data from January 1, 2012 to December 30, 2022 for testing considering threefold Cross-validation (CV) (k = 3).

3.0 Results and discussion

3.1 Optimis ed Hyperparameters for SVM models

Table 2 provides a detailed analysis of the distribution of the Support Vector Regression (SVR) model's hyperparameters when utilising various metaheuristic methods for prediction. We looked at three hyperparameters—Regularisation Parameter (C), Tube Radius (epsilon), and Kernel Coefficient (gamma)—that have a significant effect on how well the SVR model predicts streamflow. When compared to other algorithms, AVOA tends to pick higher values for parameter C and smaller values for parameter Epsilon. When it comes to S1, AVOA optimised the C value at 16.66, Epsilon to be 0.01, and Gamma as 0.1, which is similar to S2, except for the C value, which is 15.4. For S3, AVOA chooses C = 57.71 with the same Epsilon and Gamma values, whereas for S4, the C value is 65.27, Epsilon is 0.5, and Gamma is 0.0001. As you can see from these numbers (Table 3), AVOA tends to support higher levels of regularisation (C) and lower levels of margin error (Epsilon). This lets the model fit the training data more closely, which could lead to overfitting. On the other hand, this can make the decision boundary smooth. In each case, AA always picks high numbers for C (*C = 1000*), as shown in S1, S2, S3, and S4, while also varying Epsilon and Gamma from 0.01 to 0.199 and 0.00091 to 0.1, respectively. The results show that AA has a strong tendency towards high regularisation (C), which allows it to control the trade-off between achieving a low error on the training data and minimising the complexity of the decision function. Generally, large C values (e.g., C > 100) indicate a more complex model; small epsilon values (e.g., Epsilon < 0.1) increase sensitivity to errors; and small gamma values (e.g., Gamma < 0.01) lead to smoother decision boundaries. Because of this, each metaheuristic algorithm has a unique tendency towards certain hyperparameter values, which shows how they optimise problems. For the SVR model to work at its best, it is important to pick the right hyperparameters. The results show how important it is to look into different metaheuristic algorithms to find the ones with the best choices for a certain prediction case.

Table 2: Hyperparameter distribution of SVR model determine under each Meta-heuristic Algorithms

Prediction Scenarios	AVOA			AA		
	C	***Epsilon***	***Gamma***	***C***	***Epsilon***	***Gamma***
S1	16.66	0.01	0.1	1000	0.01	0.00091
S2	15.4	0.01	0.1	1000	0.132	0.1
S3	57.71	0.01	0.1	1000	0.185	0.1
S4	65.27	0.5	0.0001	1000	0.199	0.1

3.2 Results of all the cases considered in streamflow time series predictions

In scenario-S1, the SVM-AA model, with an NSE of 0.999, provides accurate streamflow predictions in S1, similar to the SVM-AVOA model. In Scenario-S1, the SVM-AA has a NSE of 0.985, which is lower than the SVM-AVOA hybrid models. With an NSE of 0.971, SVM-AVOA does a good job in this case. The model's cumulative probability curve is very close to the 1:1 line, which means that predicted and observed values are very close to each other. With an NSE value of 0.986, the SVM-AA model also does well in Scenario 2; this is because its cumulative probability curve crosses the 1:1 line, which means that expected and observed streamflows are very similar. In S2, the SVM-AVOA model performs well, with an NSE of 0.973, and it matches the forecast and observed streamflows, though less than SVM-AA.

In scenario S3, the SVM-AA works well with an NSE of 0.9119, and the cumulative probability curve's departure from the 1:1 line shows that the expected and observed streamflows are not the same. But the SVM-AVOA model performs well, with an NSE of 0.942 and good fits between projected and actual streamflows. However, SVM-AA shows excellent performance, with an NSE score of 0.999 and close to a 1:1 line, indicating exceptional performance.

In Scenario-S4, the SVM-AA does pretty well, with an NSE value of 0.8634. This is different from the 1:1 line in the cumulative probability curve, which means that the predicted and observed streamflows don't match up. SVM-AVOA does not do well in S4 (NSE score of 0.524), and the cumulative probability curve is very far from the 1:1 line, showing a big difference between what was predicted and what was observed in terms of streamflows.

3.3 Comparison of Hybrid SVM models performance

Metaheuristic algorithms, inspired by natural processes, solve many complex optimisation issues (Sharma and Raju 2024). But in order to optimise the target parameter and guarantee reliable prediction, every method has a distinct impact. Therefore, we created standard criteria for the target hyperparameters, performance assessment, and computational procedure. We subjected all hybrid models to a maximum of 100 iterations throughout the computational process, and used an 8-performance matrix to assess their influence on improving the SVR model for accurate daily streamflow prediction. Table 3 provides a comprehensive analysis of the hybrid models' performance in various scenarios. Every scenario denotes a distinct combination of parameters or degrees of intricacy for the optimisation problem. These measures aid in gauging the performance of the algorithms in terms of accuracy, convergence speed, and data fit. The SVM-AVOA model has strong performance in S1, achieving an ARE of 1.662 and a P of 0.999. In Scenario-S4, however, SVM-AVOA's performance drops a lot, as shown by an ARE of 12.253 and a P of 0.848. This suggests that SVM-AVOA may encounter difficulties when dealing with intricate or noisy data (Pham et al. 2024). SVM-AVOA exhibits varying performance in different settings, demonstrating satisfactory accuracy in simpler situations but inadequate performance in more intricate ones. In all cases, SVM-AA's performance is consistently subpar for ARE values ranging from 3.032 to 4.420 and an extremely low small error probability (P) of less than 0.1. Other tests (RMSE, NSE, MAE, and R^2), on the other hand, have shown that SVM-AA has done really well.

Table 3: Performance evaluation across meta-heuristic algorithms for each scenario

Scenarios	Meta-heuristic Algorithms	Performance Matric						
		ARE	**C**	**P**	**RMSE**	**NSE**	**MAE**	**R^2**
S1	**AVOA**	1.662	0.999	0.863	0.736	0.999	6.911	0.987
S2		1.696	0.975	0.855	0.9	0.971	7.878	0.981
S3		3.38	0.942	0.775	1.265	0.942	12.537	0.962
S4		12.253	0.848	0.479	2.599	0.524	44.847	0.839
S1	**AA**	4.42	0.051	0.041	0.01	0.999	0.199	0.995
S2		3.562	0.044	0.031	0.01	0.986	0.199	0.996
S3		3.217	0.043	0.029	0.01	0.999	0.199	0.996
S4		3.032	0.012	0.017	0.01	0.988	0.199	0.996

3.4 Analysis of the results

Particularly in dynamic and complicated contexts like time series prediction, metaheuristic algorithms are potent tools for optimising hyperparameters in machine learning models (Bennis and Bhattacharjya 2020). Using a variety of performance metrics, we compare four different metaheuristic algorithms— AVOA, and AA—across four different scenarios to find the optimal method for choosing metaheuristic algorithms to optimise the hyperparameters of machine learning models used in time series prediction. One way to learn about the optimisation tendencies of different algorithms is to look at their hyperparameter distributions (Gaspar et al. 2021).

AVOA has a tendency to pick lower Epsilon values and larger C values, which might bring the model closer to the training data but also raise the possibility of overfitting. The fact that AA always goes with large values for C suggests that it prefers to manage the trade-off between a small decision function and no training mistake(Apriyadi and Rini 2023). The fact that AA outperformed some other algorithms shows that it is well-suited to the optimisation tasks under consideration. Since AA consistently performs well in all of the tested circumstances, it stands out as a potential choice in our research. Nevertheless, meticulous assessment of the algorithms employing a mix of performance indicators and sophisticated selection criteria should underpin the selection process(Ali et al. 2023). Model complexity, generalisability, and computing efficiency are all trade-offs that should be considered while choosing the optimal metaheuristic method for hyperparameter optimisation(Hutter et al. 2015, Bischl et al. 2023). Still, for optimising hyperparameters in machine learning models for time series prediction, the study sheds light on how metaheuristic algorithms fare. In order to choose the best algorithm for a certain problem, it is crucial to take into account both basic selection criteria and performance measures (Pham et al. 2024). The consistency of performance across circumstances makes AVOA a potential candidate, followed by AA. Nevertheless, meticulous assessment of the algorithms employing a mix of performance indicators and sophisticated selection criteria should underpin the selection process (Rhein et al. 2024).

However, streamflows are complex natural phenomena that change as environmental factors vary (Salaudeen et al. 2023), but the ability of the MLs to capture this uniqueness required several amalgamations of the MAs to adequately capture this complex behaviour, which this study intends to showcase. In West Africa, we expect streamflow in large rivers such as the Niger River Basin, spanning several thousand kilometres, to traverse diverse climate zones, each contributing differently to the streamflow behaviour.

These hybrid models' ability to capture this complexity with such accuracy is a testament to their reliability in mimicking natural processes.

4.0 Conclusion

For the purpose of optimising the hyperparameters of support vector machine (regressor) used to forecast streamflow in hydrology, this study compared the efficiency of four metaheuristic algorithms: the African Vulture Optimisation Algorithm (AVOA), and the Archery Algorithm (AA). The study's findings shed light on the optimisation approaches and generalisability of each algorithm. The findings show that different algorithms have different preferences when it comes to the values of the hyperparameters, which can have a major effect on how well the SVM model works. Overall, the results show that:

i. AVOA preferred closer fits to training data; AA preferred controlling the complexity-error trade-off.

ii. Both AVOA and AA consistently outperformed the other algorithms across different scenarios, proving their effectiveness in optimising hyperparameters for SVR models in time series prediction.

iii. Hybrid techniques integrating several metaheuristic algorithms could be the subject of future research if we want to improve optimisation performance even further in complicated machine learning problems.

References

Abdollahzadeh, B., F. S. Gharehchopogh, and S. Mirjalili. 2021. African vultures optimization algorithm: A new nature-inspired metaheuristic algorithm for global optimization problems. Computers & Industrial Engineering **158**:107408.

Adnan, R. M., A. Mirboluki, M. Mehraein, A. Malik, S. Heddam, and O. Kisi. 2023. Improved prediction of monthly streamflow in a mountainous region by Metaheuristic-Enhanced deep learning and machine learning models using hydroclimatic data. Theoretical and applied climatology:1-24.

Adnan, R. M., R. R. Mostafa, O. Kisi, Z. M. Yaseen, S. Shahid, and M. Zounemat-Kermani. 2021. Improving streamflow prediction using a new hybrid ELM model combined with hybrid particle swarm optimization and grey wolf optimization. Knowledge-Based Systems **230**:107379.

Ali, Y. A., E. M. Awwad, M. Al-Razgan, and A. Maarouf. 2023. Hyperparameter search for machine learning algorithms for optimizing the computational complexity. Processes **11**:349.

Apriyadi, M. R., and D. P. Rini. 2023. Hyperparameter Optimization of Support Vector Regression Algorithm using Metaheuristic Algorithm for Student Performance Prediction. International Journal of Advanced Computer Science and Applications **14**.

Arsenault, R., and P. Côté. 2019. Analysis of the effects of biases in ensemble streamflow prediction (ESP) forecasts on electricity production in hydropower reservoir management. Hydrology and Earth System Sciences **23**:2735-2750.

Awotwi, A., T. Annor, G. K. Anornu, J. A. Quaye-Ballard, J. Agyekum, B. Ampadu, I. K. Nti, M. A. Gyampo, and E. Boakye. 2021. Climate change impact on streamflow in a tropical basin of Ghana, West Africa. Journal of Hydrology: Regional Studies **34**:100805.

Bahramifar, A., H. Afshin, and M. Emami Tabrizi. 2023. Optimized simulation of river flow rate using regression-based models. Acta Geophysica:1-16.

Bank, W. 2019. Global economic prospects, June 2019: Heightened tensions, subdued investment. The World Bank.

Bennis, F., and R. K. Bhattacharjya. 2020. Nature-Inspired Methods for Metaheuristics Optimization: Algorithms and Applications in Science and Engineering. Springer.

Bischl, B., M. Binder, M. Lang, T. Pielok, J. Richter, S. Coors, J. Thomas, T. Ullmann, M. Becker, and A. L. Boulesteix. 2023. Hyperparameter optimization: Foundations, algorithms, best practices, and open challenges. Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery **13**:e1484.

Bjornlund, V., H. Bjornlund, and A. F. Van Rooyen. 2020. Why agricultural production in sub-Saharan Africa remains low compared to the rest of the world–a historical perspective. International Journal of Water Resources Development **36**:S20-S53.

Chun, K. P., B. Dieppois, Q. He, M. Sidibe, J. Eden, J.-E. Paturel, G. Mahé, N. Rouché, J. Klaus, and D. Conway. 2021. Identifying drivers of streamflow extremes in West Africa to inform a nonstationary prediction model. Weather and Climate Extremes **33**:100346.

Djan'na Koubodana, H., J. G. Adounkpe, K. Atchonouglo, K. Djaman, I. Larbi, Y. Lombo, and K. E. Kpemoua. 2023. Modelling of streamflow before and after dam construction in the Mono River Basin in Togo-Benin, West Africa. International Journal of River Basin Management **21**:265-281.

Dos Santos, M. R. W. 2023. Water cooperation within West Africa's major transboundary river basins. Regions and Cohesion **13**:25-52.

Fahad, S., H. Nguyen-Thi-Lan, D. Nguyen-Manh, H. Tran-Duc, and N. To-The. 2023. Analyzing the status of multidimensional poverty of rural households by using sustainable livelihood framework: Policy implications for economic growth. Environmental Science and Pollution Research **30**:16106-16119.

Farnum, N. R. 1990. Improving the relative error of estimation. The American Statistician **44**:288-289.

Ferreira, R. G., D. D. da Silva, A. A. A. Elesbon, E. I. Fernandes-Filho, G. V. Veloso, M. de Souza Fraga, and L. B. Ferreira. 2021. Machine learning models for streamflow regionalization in a tropical watershed. Journal of environmental management **280**:111713.

Gaspar, A., D. Oliva, E. Cuevas, D. Zaldívar, M. Pérez, and G. Pajares. 2021. Hyperparameter optimization in a convolutional neural network using metaheuristic algorithms. Pages 37-59 Metaheuristics in machine learning: Theory and applications. Springer.

Gharib, A., and E. G. Davies. 2021. A workflow to address pitfalls and challenges in applying machine learning models to hydrology. Advances in Water Resources **152**:103920.

Huang, Z., X. Liu, S. Sun, Y. Tang, X. Yuan, and Q. Tang. 2021. Global assessment of future sectoral water scarcity under adaptive inner-basin water allocation measures. Science of the total environment **783**:146973.

Hutter, F., J. Lücke, and L. Schmidt-Thieme. 2015. Beyond manual tuning of hyperparameters. KI-Künstliche Intelligenz **29**:329-337.

Ibrahim, K. S. M. H., Y. F. Huang, A. N. Ahmed, C. H. Koo, and A. El-Shafie. 2022. A review of the hybrid artificial intelligence and optimization modelling of hydrological streamflow forecasting. Alexandria Engineering Journal **61**:279-303.

Janga Reddy, M., and D. Nagesh Kumar. 2020. Evolutionary algorithms, swarm intelligence methods, and their applications in water resources engineering: a state-of-the-art review. h2oj **3**:135-188.

Katipoğlu, O. M., S. N. Yeşilyurt, H. Y. Dalkılıç, and F. Akar. 2023. Application of empirical mode decomposition, particle swarm optimization, and support vector machine methods to predict stream flows. Environmental monitoring and assessment **195**:1108.

Khosravi, K., A. Golkarian, and J. P. Tiefenbacher. 2022. Using optimized deep learning to predict daily streamflow: a comparison to common machine learning algorithms. Water Resources Management **36**:699-716.

Kumar, V., N. Kedam, K. V. Sharma, D. J. Mehta, and T. Caloiero. 2023. Advanced machine learning techniques to improve hydrological prediction: a comparative analysis of streamflow prediction models. Water **15**:2572.

Larbi, I., C. Nyamekye, S.-Q. Dotse, D. K. Danso, T. Annor, E. Bessah, A. M. Limantol, T. Attah-Darkwa, D. Kwawuvi, and M. Yomo. 2022. Rainfall and temperature projections and the implications on streamflow and evapotranspiration in the near future at the Tano River Basin of Ghana. Scientific African **15**:e01071.

Leiva, V., and G. Dhiman. 2022. Archery algorithm: A novel stochastic optimization algorithm for solving optimization problems. energy **19**:22.

Liu, R., T. Wang, J. Zhou, X. Hao, Y. Xu, and J. Qiu. 2022a. Improved African vulture optimization algorithm based on quasi-oppositional differential evolution operator. IEEE Access **10**:95197-95218.

Liu, X., H. Liu, X. Zhao, Z. Han, Y. Cui, and M. Yu. 2022b. A novel neural network and grey correlation analysis method for computation of the heat transfer limit of a loop heat pipe (LHP). energy **259**:124830.

Montesinos López, O. A., A. Montesinos López, and J. Crossa. 2022. Support vector machines and support vector regression. Pages 337-378 Multivariate Statistical Machine Learning Methods for Genomic Prediction. Springer.

Musa, R. M., Z. Taha, A. P. A. Majeed, and M. R. Abdullah. 2019. Machine learning in sports: identifying potential archers. Springer.

Namugize, J. N., G. Jewitt, and M. Graham. 2018. Effects of land use and land cover changes on water quality in the uMngeni river catchment, South Africa. Physics and Chemistry of the Earth, Parts a/b/c **105**:247-264.

Nkiaka, E., A. Taylor, A. J. Dougill, P. Antwi-Agyei, E. A. Adefisan, M. A. Ahiataku, F. Baffour-Ata, N. Fournier, V. S. Indasi, and O. Konte. 2020. Exploring the need for developing impact-based forecasting in West Africa. Frontiers in Climate **2**:565500.

Nouaceur, Z., and O. Murarescu. 2020. Rainfall variability and trend analysis of rainfall in West Africa (Senegal, Mauritania, Burkina Faso). Water **12**:1754.

Obahoundje, S., A. Diedhiou, K. L. Kouassi, M. Y. Ta, E. M. Mortey, P. Roudier, and D. G. M. Kouame. 2022. Analysis of hydroclimatic trends and variability and their impacts on hydropower generation in two river basins in Côte d'Ivoire (West Africa) during 1981–2017. Environmental Research Communications **4**:065001.

Papa, F., J.-F. Crétaux, M. Grippa, E. Robert, M. Trigg, R. M. Tshimanga, B. Kitambo, A. Paris, A. Carr, and A. S. Fleischmann. 2023. Water resources in Africa under global change: monitoring surface waters from space. Surveys in geophysics **44**:43-93.

Pham, B. T., K.-T. T. Bui, I. Prakash, and H.-B. Ly. 2024. Hybrid artificial intelligence models based on adaptive neuro fuzzy inference system and metaheuristic optimization algorithms for prediction of daily rainfall. Physics and Chemistry of the Earth, Parts a/b/c **134**:103563.

Rahimzad, M., A. Moghaddam Nia, H. Zolfonoon, J. Soltani, A. Danandeh Mehr, and H.-H. Kwon. 2021. Performance comparison of an LSTM-based deep learning model versus conventional machine learning algorithms for streamflow forecasting. Water Resources Management **35**:4167-4187.

Rajwar, K., K. Deep, and S. Das. 2023. An exhaustive review of the metaheuristic algorithms for search and optimization: taxonomy, applications, and open challenges. Artificial Intelligence Review:1-71.

Rhein, F., L. Hibbe, and H. Nirschl. 2024. Hybrid modeling of hetero-agglomeration processes: a framework for model selection and arrangement. Engineering with Computers **40**:583-604.

Rieck, K., S. Sonnenburg, S. Mika, C. Schäfer, P. Laskov, D. Tax, and K.-R. Müller. 2012. Support vector machines. Handbook of Computational Statistics: Concepts and Methods:883-926.

Salaudeen, A., S. Shahid, A. Ismail, B. K. Adeogun, M. A. Ajibike, A.-A. D. Bello, and O. B. Salau. 2023. Adaptation measures under the impacts of climate and land-use/land-cover changes using HSPF model simulation: Application to Gongola river basin, Nigeria. Science of the total environment **858**:159874.

Sasmal, B., A. Das, K. G. Dhal, and R. Saha. 2023. A Comprehensive Survey on African Vulture Optimization Algorithm. Archives of Computational Methods in Engineering:1-42.

Sharma, P., and S. Raju. 2024. Metaheuristic optimization algorithms: A comprehensive overview and classification of benchmark test functions. Soft Computing **28**:3123-3186.

Tao, H., S. I. Abba, A. M. Al-Areeq, F. Tangang, S. Samantaray, A. Sahoo, H. V. Siqueira, S. Maroufpoor, V. Demir, and N. D. Bokde. 2024. Hybridized artificial intelligence models with nature-inspired algorithms for river flow modeling: A comprehensive review, assessment, and possible future research directions. Engineering Applications of Artificial Intelligence **129**:107559.

Tarpanelli, A., A. Paris, A. W. Sichangi, F. OLoughlin, and F. Papa. 2023. Water resources in Africa: the role of earth observation data and hydrodynamic modeling to derive river discharge. Surveys in geophysics **44**:97-122.

Ward, P. J., M. C. de Ruiter, J. Mård, K. Schröter, A. Van Loon, T. Veldkamp, N. von Uexkull, N. Wanders, A. AghaKouchak, and K. Arnbjerg-Nielsen. 2020. The need to integrate flood and drought disaster risk reduction strategies. Water Security **11**:100070.

Weiß, C. H., B. Aleksandrov, M. Faymonville, and C. Jentsch. 2023. Partial autocorrelation diagnostics for count time series. Entropy **25**:105.

Xu, Y., S. Zomer, and R. G. Brereton. 2006. Support vector machines: a recent method for classification in chemometrics. Critical Reviews in Analytical Chemistry **36**:177-188.

Zhang, X., Y. Peng, W. Xu, and B. Wang. 2019. An optimal operation model for hydropower stations considering inflow forecasts with different lead-times. Water Resources Management **33**:173-188.

Zhou, L., T. Wu, L. Pu, M. Meadows, G. Jiang, J. Zhang, and X. Xie. 2023. Spatially heterogeneous relationships of PM2. 5 concentrations with natural and land use factors in the Niger River Watershed, West Africa. Journal of Cleaner Production **394**:136406.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

COUPLED NUMERICAL ANALYSIS OF GROUNDWATER AND TRAIN LOAD-INDUCED CAVITY COLLAPSE

Bamaiyi Usman Aliyu
Department of Water Resources & Environmental Engineering, Ahmadu Bello University

Al-Amin Danladi Bello
Department of Water Resources & Environmental Engineering, Ahmadu Bello University

Abdulaziz Ahmad
Department of Civil Engineering, Ahmadu Bello University

Inusa Musa
Department of Geography, Federal College of Education

Bashir Tanimu
Department of Water Resources & Environmental Engineering, Ahmadu Bello University

Khalid Sulaiman
Department of Water Resources & Environmental Engineering, Ahmadu Bello University

Abstract
This study investigates the influence of groundwater levels and train loads on cavity collapse mechanisms in karst locations. The highest shear stresses occur at the boundaries of soil voids and propagate vertically, causing the failure zone at ground level to grow to twice the void's radius. Declining groundwater levels cause a more significant vertical displacement of 1.87 m, whereas high groundwater levels cause a displacement of 0.43 m. This emphasises the crucial impact of groundwater on soil stability. Deeper displacement at lower groundwater levels indicates higher soil movement and structural vulnerability in the displacement profiles, which exhibit a V-shaped pattern. The analysis of strain distribution reveals a significant propagation of strain from the borders of the cavity, particularly noticeable when groundwater conditions are poor. This highlights the importance of buoyancy in reducing stress. When groundwater extraction occurs, the crucial cavity's radius increases, increasing the risk of collapse due to reduced buoyant support. The study highlights the significance of efficient groundwater management in reducing stress and preserving the structural integrity of karst terrains. These findings enhance our comprehension of the durability and security of railway lines, particularly in areas with varying groundwater levels.
Keywords: Groundwater levels, Cavity collapse, Shear stresses, Displacement profiles, Strain distribution

1.0 Introduction

In recent years, ground depressions and railroad cave-in collapse incidents have been frequently reported worldwide, leading to fatalities, economic losses, and significant distortions in urban environments. The stability of roadbeds in karst terrains presents a significant geotechnical challenge due to the presence of soluble rock formations that can form cavities and sinkholes(Shamet & Nam, 2020).

These subsurface voids, primarily formed through the dissolution of limestone or other soluble rocks by groundwater, pose a continuous threat to infrastructure. When subjected to dynamic loads, such as those from train operations, the risk of cavity collapse is exacerbated, leading to potential catastrophic failures. Understanding the coupled effects of groundwater fluctuations and dynamic train loads on the stability of these karst cavities is crucial for designing and maintaining safe and reliable transportation infrastructure. Groundwater plays a pivotal role in maintaining the stability of karst cavities(Peng et al., 2020). High groundwater levels provide buoyant support to the cavity roofs and walls, mitigating the risk of collapse. However, fluctuations in groundwater levels, often driven by seasonal changes, anthropogenic activities, or climatic variations, can significantly alter the stress distribution within the subsurface. A drop in groundwater level increases the effective stress on the structure, potentially triggering plastic deformation and collapse(Linrong et al., 2023). Dynamic loads from trains impose additional cyclic stresses on the ground, which can propagate through the subsurface and impact the stability of karst formations. The repetitive nature of these loads can induce fatigue in the rock and soil matrix, leading to the accumulation of plastic strains. Over time, these strains can weaken the structural integrity of the cavity, making it more susceptible to collapse.

Previous studies have evaluated the formation mechanisms of cavity collapse through laboratory and field investigations, validating their accuracy through both short-term and long-term monitoring and various targeted treatments. These studies have noted that the cover-collapse mechanism in karst regions, caused by groundwater exploitation, mining, construction works, rainfall (Tan & Long, 2021), train loads(Xu et al., 2018), and other factors, is largely attributed to train vibrations and erosion due to the decline in groundwater levels. Additionally, the rate of groundwater level decline and changes in the hydraulic gradient, which control the seepage field, significantly encourage collapse(Xin et al., 2021). Although the cavity collapse caused by the natural decrease in groundwater is lower compared to karst collapse caused by the artificial extraction of groundwater(Nerantzaki & Nikolaidis, 2020), several scholars believe that artificial extraction creates internal high negative pressure regions that increase the loss of soil and rock particles. This concept led to the evolution of the vacuum suction concept(Xin et al., 2021). Karst cavity collapse is primarily caused by the interaction between water, rock, and soil(Zhao et al., 2016). In addition to water-related and aerodynamic factors, anthropogenic activities, such as train vibrations, also contribute to karst cavity collapse. With the advancement of various testing and numerical analysis techniques, the mechanisms of karst cavity collapse caused by natural phenomena and anthropogenic activities have been evaluated through chemical analyses, model tests, and mathematical models. Consequently, karst collapse theories, such as disintegration, dissolution(Latypov et al., 2018; Wang & Xu, 2022), CO vibration theory, seepage pressure effect, and vibration liquefaction, have been proposed and continuously improved(Xin et al., 2021).

This chapter presents a detailed coupled numerical analysis of groundwater and train load-induced cavity collapse using PLAXIS 2D, a finite element software widely used in geotechnical engineering(Aliyu et al., 2024). The study aims to elucidate the complex interactions between groundwater level changes and dynamic train loads, and their combined impact on the stability of karst cavities using Beijing-Guangzhou railway line's north segment as a case.

2.0 Overview of the case study

The research area experiences a subtropical monsoon climate with high humidity and abundant rainfall, averaging around 1500-2100mmmm per year, particularly between April and September, which accounts for a significant portion of the annual precipitation (Fig. 1). The region exhibits an annual temperature ranging from 21.4 to 22.8°C, with seasonal variations. The groundwater in the study area undergoes significant fluctuations driven by climate dynamics, promoting the development of karst sinkholes. The Baiyun section of the Beijing-Guangzhou Railway is complicated due to its geological, hydrological, and climatic features.

The railway runs through Quaternary, Permian, and Carboniferous layers. Quaternary strata range in thickness from 10m to 40m, whereas Permian carbonaceous limestone, shale, and sandstone dominate Baiyun. With a thickness of 175m, carboniferous strata like the Lower Datangjie-Shidengzi Formation show moderate to intense karst development, forming large soluble rock layers. The area's karst development is affected by cryptocrystalline-microcrystalline limestone, dolomitic limestone mixed with marl, and shallow marine carbonate formations.

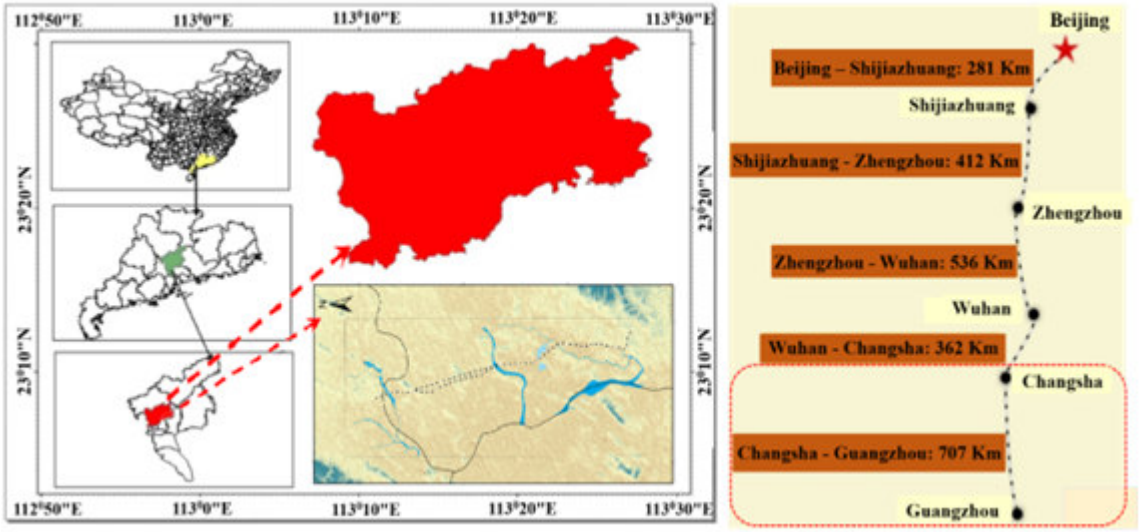


Fig 1: Detail of the Study area

This study examined the north segment of the Beijing-Guangzhou railway line (Fig. 1), which crosses soluble rock terrain in the alluvial plain of the Pearl River Delta(Long et al., 2021). Specifically, the railway crosses Baiyun in Guangzhou, Guangdong Province. Recently, there have been several instances of karst-related failures along the Beijing-Guangzhou railway roadbed. Notably, in October 2020, a collapse occurred at the K2258+015 section of the Rongxi River Steel Bridge, resulting in a 20m x 10m x 3m sinkhole. Additionally, on May 8, 2022, a section at the Tangxi North Yard collapsed, forming a 1.5m x 1.7m x 2.3m sinkhole at the center of Track 3, among others.

3.0 Materials and Methods

In this study, our focus is to determine the displacement, stress and strain state of the railway substructure, a two-dimensional (2D) finite element analysis was conducted using the PLAXIS-2D 2024 version of the software(Plaxis, 2018). The analysis was carried out considering the plane strain conditions.

Fig. 2 represents the cross-section of the multiple track railway embankment. The width of the base of the embankment is 29.5m, the subgrade height is 1.2m. The laying of slopes is 1:1.5. The embankment is made of three layers laying on calcareous limestone bed. The silt soil base of the embankment consists of a soft soil cave which extend to the next medium sand soil layer, follow by silty clay which is laying the calcareous limestone of 14m thickness with two karst cavities. The total depth from the top of the subgrade to base of the limestone is approximately 34.7m taken into account in the geometrical model (see Fig. 2). These characteristics presented in Fig. 2 were used in analysis of the displacement field, the stress, and strain state of the embankment track.

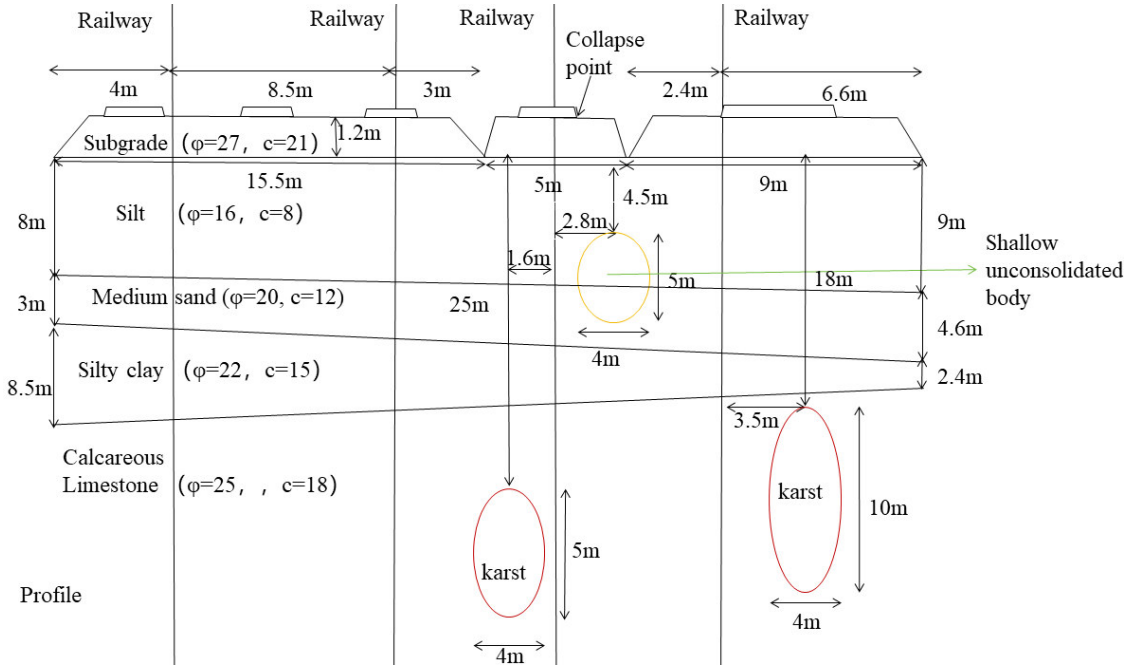


Fig. 2. Schematic diagram for the railway tracks

3.1 **Mechanical parameters and constitutive model**

The Constitutive soil parameter values of the railway embankment substructure were determined using based on the analysis of historical data, the results of MFDSWM geological investigations and laboratory experiment to study the drilling cores at various depth, carried out by the research group. The characteristics of the soils materials under consideration used for the FEM analysis are presented in Table 1.

Table 1: Physical and mechanical parameters of the embankment layers

layer	Thickness (m)	Density (g/cm^3)	Elastic Modulus(Mpa)	Poisson's ratio	Cohesion (Kpa)	friction angle (°)	Permeability coefficient(m/d)
subgrade	1.2	1.85	200	0.28	21	27	0.108
Silt	8	1.76	38	0.32	8	16	0.0011
Medium sand	3	1.7	40	0.32	12	20	50.0
Silty clay	8.5	1.65	45	0.32	15	22	0.006
Calcareous limestone		2.3	20,000	0.32	18	25	0.0000010

To simulate the behavior of the soil layers the Hardening Soil (HS) Model criteria was used. This is a modified elastoplastic type of hyperbolic model, which account the plastic condition in compression, as well as the shear hardening resulting from the deviator stress. The model involves a nonlinear stress-dependent stress–strain relationship for stress fields below yield (Park et al., 2024). The model differentiates between the unloading or reloading and the loading mechanisms and integrates three major stiffness input parameters: the triaxial unloading–reloading stiffness E_{ur}, triaxial loading stiffness E_{50}, and the oedometer loading modulus E_{oed}.

$$E_{50} = E_{50}^{ref}\left(\frac{c * \cos\phi + \sigma_3 * \sin\phi}{c * cos\,\phi + p_{ref} * sin\,\phi}\right)^{m} \quad (1)$$

$$E_{ur} = E_{ur}^{ref}\left(\frac{c * \cos\phi + \sigma_3 * \sin\phi}{c * cos\,\phi + p_{ref} * sin\,\phi}\right)^{m} \quad (2)$$

where σ_3 is the triaxial confining pressure, and pref is the reference stress (default value: p_{ref}=100kPa), m is the power for the stress degree dependency of stiffness. The oedometer stiffness (E_{oed}) and the unloading/reloading modulus (E_{ur}) were set equal to E and 3 * E, respectively, as recommended by PLAXIS manual (Plaxis, 2018). The ultimate deviatoric stress (q_f)of the HS as deduced from Mohr- Coulomb failure criterion in terms of the strength parameters: cohesion c and internal friction angle ϕ, and written as:

$$q_f = (c * \cot\phi + \sigma_3) * \frac{2\sin\phi}{1-\sin\phi} \quad (3)$$

$$q_a = \frac{q_f}{R_f} \quad (4)$$

where q_a is the asymptote of the deviatoric stress, and R_f is the failure ratio (default value: R_f=0.9). The initial stresses were generated in the models using the K_0-procedure(Plaxis, 2018), where K_0 is the lateral earth pressure coefficient. This model has been successfully applied in the field geotechnical engineering practice by several researchers to analyse the stress-strain field of soil massifs including both strong and weak soils(Park et al., 2024).

3.2 Simulation boundary and loading conditions

The effect on the stress-strain condition of the structure under train load is taken into account in the form of an additional static vertical load. The load model was adopted in accordance with Eurocode EN 1991-2 (2003)(Verdenius et al., 2023) in the form of a Load Model 71. The first section is of triple tracks and other two are single track system. The load of 250 kN/axle corresponds to the normal railway traffic on the main railways (as in LM 71) was used.

The main assumption made are that: (1), with sufficient number of sinkhole cases, a general trend of stability criteria (safe vs. unsafe) is statistically determined in spite of varied sites' subsurface condition and (2) the partially circle of cavity with low strength well represents the stability of sinkhole. The research analysis was conducted based on these two assumptions. The research consists of three basic steps.

Step 1 **-** for the selected sites geotechnical condition, the multi-source frequency domain seismic wave method and drilling tests were performed. The multi-source frequency domain seismic wave method data indicate the size of subsurface cavity and condition of the overburden soil.

Step 2 - The multi-source frequency domain seismic wave method and drilling cores data verified in laboratory are correlated to soil layer parameters using the published literatures as guide.
Step 3 - the identified cavity dimension and soil parameters are input to the numerical model. In this step, a number of scenario-based FE simulations (two groundwater levels (high, 4.5m and low, 10.5m deep) are performed to determine the displacement and plastic strain for each scenario. In the FE analysis, the soil strength was observed to reduce in the numerical boundary until the collapse took place using the finite-element software PLAXIS 2D (Plaxis, 2018).

3.3 Pressure Arch Pattern of Stratum Karst Cavity Collapse

the collapse mechanism of the soil layer has been evaluated in the laboratory, a pressure effect arch pattern was obtained, as presented in Fig. 3. Setting the arch span to be 2l, the arch depth is h, and the vertical uniform load is q or could be point load acting on a surface. Under the impact of this load, only normal pressure act on the soil arch(Chen et al., 2024), so every point on the cross section is subjected to compression state. The left half of the arch is in balance. Mathematical details can be found in previous studies(Chen et al., 2024).

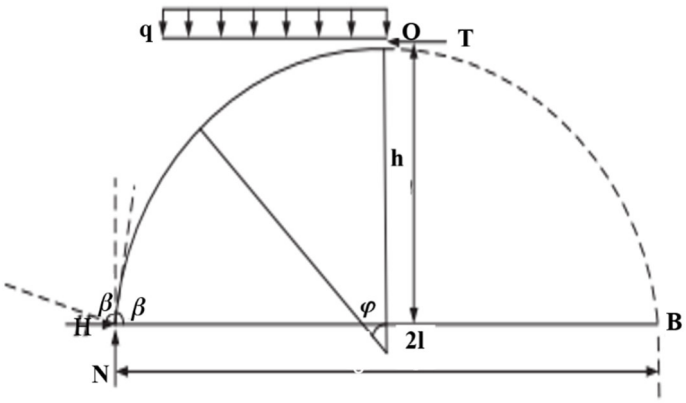


Figure 3. Mechanical model used for the soil layers

The arch stress at any point is evaluated according to the static equilibrium conditions, as

$$\begin{cases} \sigma_h = \sigma_1 cos^2\varphi + \sigma_3 sin^2\varphi \\ \sigma_v = \sigma_1 sin^2\varphi + \sigma_3 cos^2\varphi \\ \tau = (\sigma_h - \sigma_3)\, tan\,\varphi \end{cases} \quad (5)$$

where σ_1 is the maximum principal stress, σ_3 represents minimum principal stress, σ_h denote lateral stress, τ is shear stress, σ_v is vertical stress, and φ is deflection angle of main stress.
The unified soil strength theory has been popularly used in geotechnical engineering application since its emergence; it could be utilized with flexibility in different construction materials. The relationship between various linear failure criteria, such as the Mohr–Coulomb strength criterion, Tresca yield criterion, von Mises yield criterion, and Drucker–Prager criterion(Xiong et al., 2023), has also been proven(Deng et al., 2020).

The unified strength theory represented by normal stress, cohesion, and friction is

$$\begin{cases} F = \dfrac{1}{1+b}(\sigma_1 + b\sigma_2) - \dfrac{1-\sin\varphi_0}{1+sin\,\varphi_0}\sigma_3 \dfrac{2c_0\cos\varphi_0}{1+sin\,\varphi_0} \\ \sigma_2 \geq \dfrac{1}{2}(\sigma_1+\sigma_3) - \dfrac{\sin\varphi_0}{2}(\sigma_1-\sigma_3) \\ b = \dfrac{2(\sin\varphi_{UST} - sin\,\varphi_0)}{2\,sin\,\varphi_0 - (1+\sin\varphi_0)\sin\varphi_{UST}} \end{cases} \quad (6)$$

where c_0 is the cohesion parameter; φ_0 is the internal friction parameter; φ_{UST} = the uniform internal friction parameter; and b represent the unified strength theory parameter. If the intermediate principal stress parameter m is introduced, $\sigma_2 = \frac{m}{2}(\sigma_1+\sigma_3)$ and Eq. (6) can be written as

$$F = \frac{2+bm}{2(1+b)}\sigma_1 - \frac{(1-\sin\varphi_0)(2+2b-bm)}{2(1+b)(1+sin\,\varphi_0)}\sigma_3 = \frac{2c_0\cos\varphi_0}{1+sin\,\varphi_0} \quad (7)$$

When the soil layer is in an elastic state, m < 1; when the soil yields, m → 1. When m = 1, Eq. (7) becomes,

$$F = \frac{2+b}{2(1+b)}\sigma_1 - \frac{(1-\sin\varphi_0)(2+b)}{2(1+b)(1+sin\,\varphi_0)}\sigma_3 = \frac{2c_0\cos\varphi_0}{1+sin\,\varphi_0} \quad (8)$$

Critical Span of Pressure Arch for karst cavity under Shear Failure at Arch Foot. Assuming that shear failure occurs at the arch foot (A), the principal stress at point A of the arch foot is

$$\begin{cases} \sigma_1 = \dfrac{\sigma_v sin^2\beta - \sigma_h cos^2\beta}{sin^2\beta - cos^2\beta} = \dfrac{qlsin^2\beta - qlf_0 cos^2\beta}{sin^2\beta - cos^2\beta} \\ \sigma_3 = \dfrac{\sigma_h sin^2\beta - \sigma_v cos^2\beta}{sin^2\beta - cos^2\beta} = \dfrac{qlf_0 sin^2\beta - qlcos^2\beta}{sin^2\beta - cos^2\beta} \\ \sigma_2 = \dfrac{m(\sigma_1+\sigma_3)}{2} \end{cases} \quad (9)$$

By combining Eq. (9) and Eq. (8), the critical karst cavity radius can be deduced:

$$l_0 = \frac{4c_0\cos\varphi_0(1+b)(sin^2\beta - cos^2\beta)}{q(2+b)((sin^2\beta - f_0 cos^2\beta)(1+sin\,\varphi_0) - (1-sin\,\varphi_0)(f_0 sin^2\beta - cos^2\beta))} \quad (10)$$

To evaluate the critical Span of Pressure Arch under Tension Shear Failure at Arch Crown, assuming that tensile shear failure occurs at the arch crown (O), the principal stress at point O of the arch crown is

$$\begin{cases} \sigma_1 = \sigma_h = qlf_0 \\ \sigma_3 = 0 \\ \sigma_2 = \dfrac{m(\sigma_1+\sigma_3)}{2} \end{cases} \quad (11)$$

By combining Eq. (11) and Eq. (8), the critical karst cavity radius can be obtained:

$$l_0 = \frac{4c_0\cos\varphi_0(1+b)}{qf_0(2+b)(1+sin\,\varphi_0)} \quad (12)$$

The vertical load is the sum of overlying soil pressure(p), train load(L_t) and water pressure, used to evaluate influence of water on karst cavity radius,

$$q = \rho gh + L_t + p \quad (13)$$

Sensitivity analysis of cavity critical Radius was conducted according to this deduction mechanism process was implemented using numerical tools, the cavity critical radius is related to such parameters as soil firmness coefficient, soil friction angle, soil cohesion, and overburden pressure. The influence of groundwater decline is out focus, and other parameters were taken as constant values in the analysis.

3.4 Failure mechanisms influenced by groundwater levels

The formation process of karst collapse could be primarily driven by groundwater pumping and drainage, which cause a drop in the groundwater level. This process is further amplified by train loads, reducing the buoyancy of the overburden soil layer, increasing water flow, and enhancing the erosivity and movement of soil particles. This leads to the collapse of the loose layer's bottom, forming concealed soil cavities. When the self-weight pressure of the overburden soil exceeds the compressive strength limit of these cavities, ground collapse occurs. Additionally, human activities such as groundwater extraction significantly intensify the transportation and erosion effects on karst cave fillings and overburden soil layers, promoting the development and occurrence of ground collapse. Karst groundwater, with its easily changing hydrodynamic conditions, may be the primary driving force for collapse. The flow of groundwater and the variations in its hydrodynamic conditions are among the most significant dynamic factors contributing to the formation of karst collapse. However, karst collapses occurring under natural conditions are generally of a smaller scale and are unlikely to regularly have a significant impact on infrastructures.

In this study, we are discussing two failure mechanisms of the karst sinkhole and overburden collapses: The one resulting from groundwater-induced cavity enlargement (Fig. 4a) and the second case is due to liquefaction of overburden soil induced by seepage force which dominate the inter-particles forces over time (Fig. 4b). The process of the overburden collapse is that which demonstrate in shear strength reduction process, the impact of the seepage force described the rate of reduction in the shear strength parameters (c and ϕ) leading to the failure phenomenon. First, Fig. 4a demonstrates the stress path at a point above an enlarging soil cave on its centerline when the cavity size magnifies due to movement of soil particles influenced by erosion effects of groundwater. Subsequently, the circles increased in size resulting from reduced vertical stress (σ'_v) due to groundwater extraction and fluidized soil layer mechanism leading to cavity enlargement until the Mohr circle coincides with the failure envelope(Soliman, 2020). Second, Fig. 4b shows another mechanism of the material failure, a constant change in stress condition representing a constant cavity size development at node in the FE mesh. consequently, the surrounding soil's shear strength reduces to influence the position of the failure envelope to touched the Mohr circle. then, local point failure of the material began proceeds outwards, and ultimately leading to a system global failure. Fig. 5a and 5c depict the system global failures in terms of the relative shear stresses (τ_{rel}):

$$\tau_{rel} = \frac{\tau_{mb}}{\tau_{mx}} \tag{14}$$

where, τ_{mb}= mobilized shear stress, τ_{mx}= maximum shear stress

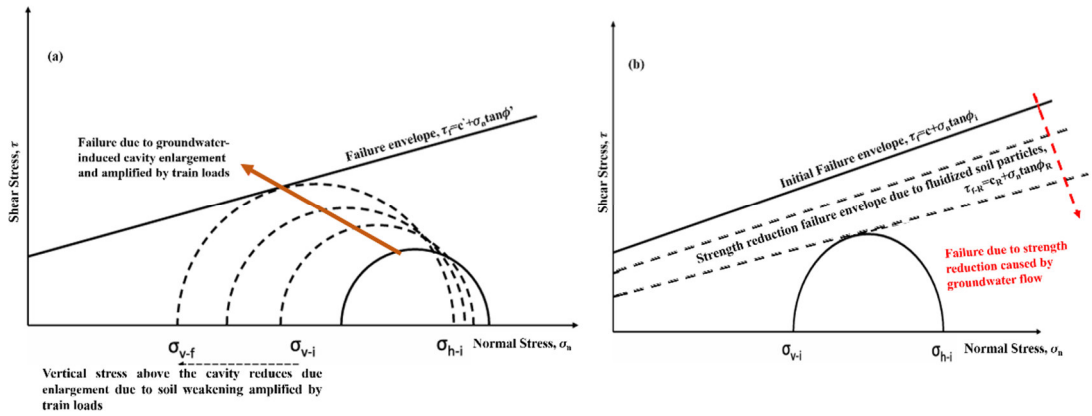


Fig. 4. Failure mechanisms: (a) first failure mechanism: failure due to the groundwater enlarged cavity, (b) second failure mechanism: failure due to groundwater induced strength reduction of surrounding soil

4.0 Results

4.1 Shear Stress Propagation

The maximum value of the relative shear stresses develops at the edges of the soil cavity and propagates upward to the ground surface (see Fig. 5a and 5c). At failure, the influence region at the ground level, where the shear strength of the material was fully mobilized (i.e., $\tau_{rel} \approx 1.0$), was approximately double the circumference of the soil cavity. This phenomenon is also observed at the edges of limestone cavities, with the bluish colors indicating that the impact of the reaction between limestone and water manifests from the cavity edges. Figures 5b and 5d depict the displacement profiles at the point of collapse, where the maximum deformations were observed above the cavity along its centerline, measuring 1.87m for declined groundwater levels and 0.43m for high groundwater levels. This indicates that declining groundwater has a more dramatic influence than high constant groundwater. The magnitude of deformation decreases as the distance from the centerline increases. The shear stresses and deformation profiles due to groundwater movement, coupled with train loading, reveal a failure mechanism associated with a subsurface cavity. This mechanism aligns with the failure mechanisms for substructures as suggested by Drumm(Drumm & Yang, 2005).

Fig. 5 shows a detailed relationship between the vertical displacement and distance across the tracks for both high and low groundwater levels during the cavity collapse process. This relationship between groundwater levels and vertical displacement is crucial for understanding the stability of railway tracks, especially for railway tracks in karst region. This clearly indicate a significant difference in displacement magnitudes between high and low groundwater levels. For high groundwater levels, represented by the blue trend line, the maximum vertical displacement is approximately -0.43m. In contrast, low groundwater levels, shown by the pink trend line, exhibit a maximum vertical displacement of -1.87m (see Fig. 6).

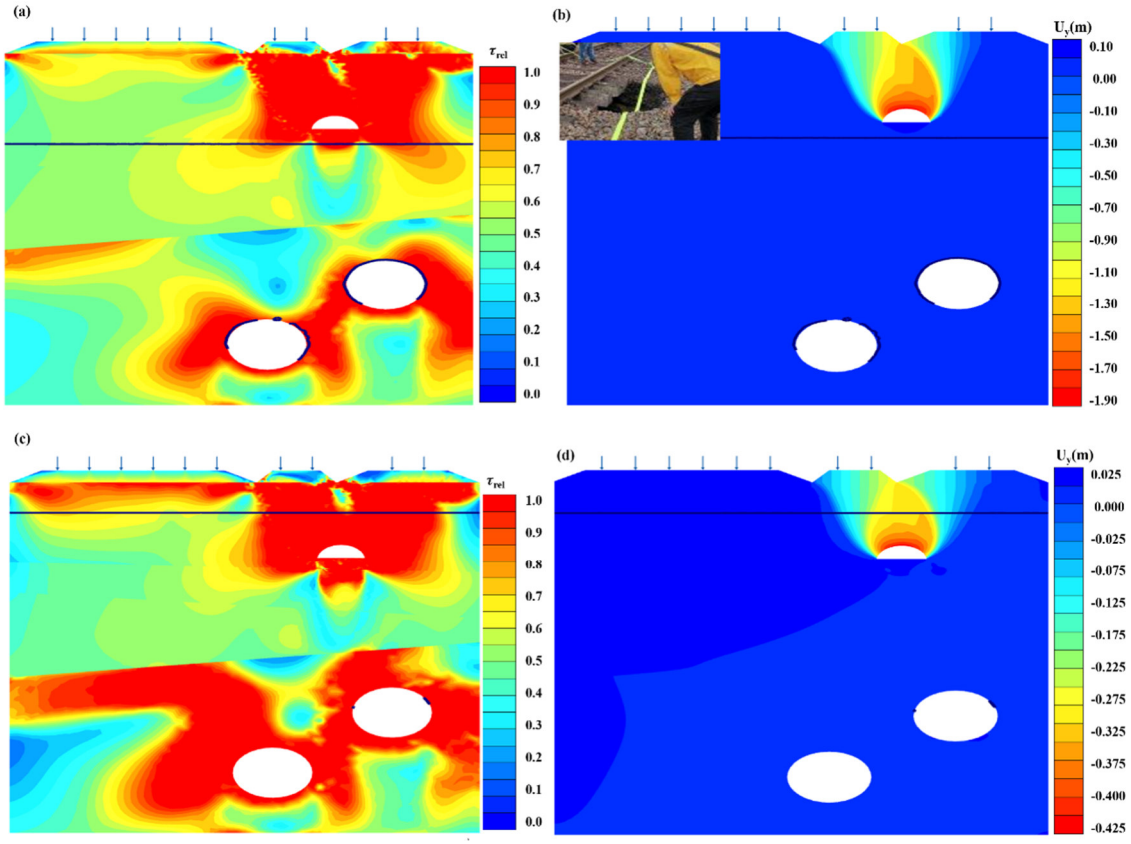


Fig. 5. Failure mechanisms: (a) relative shear stress (τ_{rel}) distribution showing the global shear failure due to decline groundwater, (b) displacement contour due to the simulated sinkhole due to decline groundwater(c) relative shear stress (τ_{rel}) for high groundwater, (b) displacement contour for high groundwater

This stark difference underscores the critical role of groundwater in providing buoyancy and support to the soil. Lower groundwater levels reduce buoyancy, leading to a higher effective stress in the soil, which in turn causes greater settlement and subsidence. Moreover, the displacement profiles for both groundwater conditions reveal approximately a V-shaped pattern, with the deepest point of displacement occurring at the centerline of the cavity of the middle tracks. However, the depth of displacement for low groundwater levels is significantly more pronounced and extends deeper than that for high groundwater levels. This deeper and more pronounced displacement at lower groundwater levels indicates a greater degree of soil movement and disturbance, which can have severe implications for the structural integrity of the railway embankment. These observations have significant implications for the stability and safety of railway tracks. The pronounced vertical displacement and broader deformation zone under low groundwater conditions highlight a higher risk of structural instability and potential damage to railway infrastructure. The increased vertical displacement suggests a higher likelihood of subsidence and collapse, which can disrupt railway operations and necessitate costly repairs.

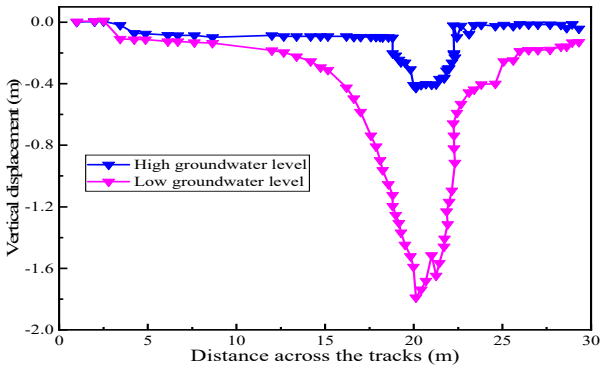


Fig. 6. Relationship between the vertical displacement and distance across the tracks for both high and low groundwater levels

4.2 Impact of Groundwater Levels on Displacement

In Figure 7a, the strain distribution appears relatively confined and less intense with a maximum value of approximately 1.09, indicated by the reddish-yellow regions, are primarily localized around the immediate vicinity of the cavity edges. This indicates that the high groundwater level helps contain the strain within a smaller area. The strain propagates vertically from the cavity edges towards the ground surface but diminishes in intensity as it moves upward, signified by the transition to cooler colors (green and light blue). This behaviour can be attributed to the buoyancy effect provided by the high groundwater level, which helps support the overburden soil and reduce overall stress concentration. In contrast, for the low groundwater levels (Fig. 7b) shows a more extensive and intense strain distribution with maximum values 5.6 (reddish regions) extend significantly further from the cavity edges compared to the high groundwater scenario. There is a pronounced vertical propagation of strain, reaching closer to the ground surface with greater intensity, indicated by the broader distribution of channel-like colors (bluish and orange). The decline in groundwater level leads to a substantial decrease in buoyancy, increasing the effective stress on the soil. This results in amplified strain around the cavity, facilitating its vertical and horizontal spread.

The comparison between the two scenarios underscores the significant impact of groundwater levels on strain behaviour and potential collapse mechanisms. Lower groundwater levels result in higher strain magnitudes and a broader distribution of strain, increasing the risk of soil deformation and structural instability. The concentrated strain around the cavity edges in both scenarios indicates critical points of potential failure. However, the extent and intensity of strain under low groundwater conditions suggest a more imminent risk of collapse. These findings emphasize the importance of reducing overexploitation groundwater to mitigate strain and reduce the likelihood of extensive deformation. Therefore, effective groundwater management is essential for ensuring the stability of structures built over karst terrains.

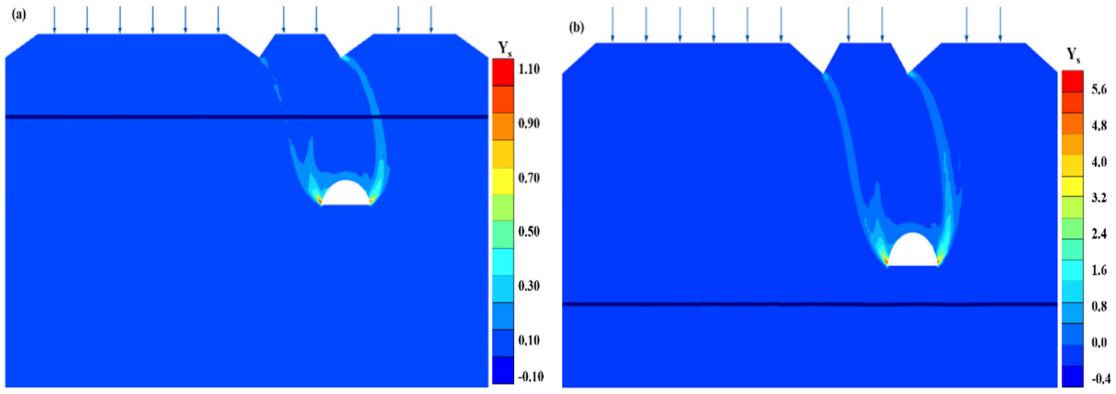


Fig. 7. Failure machanism for strain: (a) high groundwater levels (b) low groundwater levels

4.3 Strain Distribution under Cavity Radius and Groundwater Abstraction

we observe that, under shear failure at the arch foot and tensile shear failure at the arch crown, with the declining groundwater level, the critical cavity radius increased (From Fig. 8, using Eqn. (5) – (13) coded in Python). This indicates that groundwater abstraction has significant influence in cavity development, this means that during the groundwater abstraction, the soil porosity increases leading to increasing interparticles distance, and the more particles had to be lost from stratum and can flow along with water. Subsequently, the cavity enlarges and the buoyant force supporting the overburden materials decreases leading collapse. Moreover, under the same conditions, the soil layer is more prone to shear failure at the arch foot. we can observe that, under the two failure patterns, the cavity radius increased with the increase in groundwater abstraction. Under the tension shear failure pattern, the increase rate of the cavity radius increases relatively linearly. However, under shear failure patterns, the cavity radius is relatively nonlinear with groundwater.

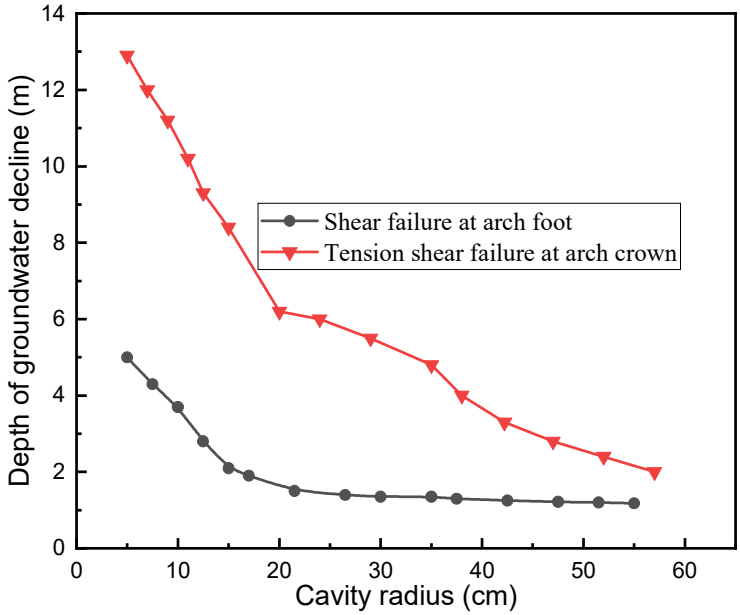


Fig.8. Relationship between cavity width and groundwater level for different failure patterns

conclusions

4.4 Failure Mechanisms

It was observed that the mechanism of karst cavity collapse induced by water and dynamic loading could be classified into three stages: a seepage flow stage, an arched stage during groundwater decline, and a collapse stage. The critical water pressure of stratum cavity collapse was related to the cavity diameter. With decreasing groundwater level, the cavity diameter increases due to increasing soil fluidity leading to decrease in buoyant force and enhances soil layer collapse. The maximum deformations were observed above the cavity along its centerline, measuring 1.87m for declined groundwater levels and 0.43m for high groundwater levels. This indicates that declining groundwater has a more dramatic influence than high constant groundwater levels for collapse mechanisms.

When groundwater level declines, soil collapsed downward in the vertical direction of maximum displacement and surface displacement have the same trend, with maximum vertical displacement occurring at the crown of the soil cavity, and generally starts with a cone depression as warning mechanism of collapse, beginning from the soil roof in form of vertical subsidence.

The factors influencing the collapse of cavity are complex most especially during their interactions. Therefore, the control of cavity collapse factors is nearly impossible. Thus, this paper has only evaluated two factors in 2D analysis with single radius, more scenarios in term of shape, the nature of the rock layer and construction dynamics in 3-D analysis could reveal more details about mechanism of collapses and their early warning.

5.0 Conclusion

By analysing shear stresses, displacement, and strain distribution, we can infer many important conclusions regarding how cavities behave under different groundwater conditions and train loads. The highest relative shear stresses primarily form at the boundaries of soil cavities and then propagate upwards to the surface of the ground, causing shear stress propagation. When the material fully utilizes its shear strength at the point of failure, the area of effect at ground level extends to nearly twice the cavity's radius. Groundwater levels influence a shared pattern of failure that is consistent in both soil and limestone cavities.Groundwater levels have a substantial impact on displacement. Groundwater levels have a significant impact on vertical displacement, with the greatest deformation occurring at 1.87 m for low groundwater levels and 0.43 m for high groundwater levels. The significant contrast underscores the fact that decreased groundwater levels result in increased soil subsidence and structural instability. During periods of low groundwater levels, the displacement profiles have a V-shaped configuration, emphasizing the most profound point near the hole's centerline. Strain Distribution at Elevated groundwater levels limit the spread of strain to a narrower region at the borders of the cavity, whereas reduced groundwater levels lead to a broader and more intense propagation of strain. Decreasing groundwater levels result in less buoyant support, causing more effective stress and increasing strain around the cavity. This promotes both vertical and horizontal expansion. The significant variation in strain distribution at low groundwater levels suggests an elevated likelihood of collapse and structural damage. The relationship between cavity radius and groundwater abstraction suggests that increasing groundwater extraction increases the cavity's size. This suggests that withdrawing groundwater has a significant impact on the cavity's development. Groundwater extraction increases soil porosity and decreases buoyant force, leading to larger cavity sizes and a higher risk of collapse. The study identified three stages of karst cavity collapse: seepage flow, the arching stage with groundwater decline, and the collapse stage.

The diameter of the cavity directly correlates with the critical water pressure for cavity collapse. As groundwater levels decrease, the cavity diameter increases, causing the soil to become more fluid. This, in turn, decreases the buoyant force and speeds up the collapse of the soil layer. These findings emphasise the intricate relationships among groundwater levels, train loads, and cavity stability. Efficient groundwater management is critical for relieving stress and minimizing the likelihood of significant distortion and collapse.

References

Aliyu, B. U., Xu, L., Bello, A.-A. D., Shuaibu, A., Kalin, R. M., Ahmad, A., Islam, N., & Raza, B. (2024). Prediction of Railway Embankment Slope Hydromechanical Properties under Bidirectional Water Level Fluctuations. *Applied Sciences*, *14*(8), 3402. https://www.mdpi.com/2076-3417/14/8/3402

Chen, F., Wang, Y., Liang, C., & Zhu, Z. (2024). Experimental and Theoretical Study on the Stratum Cavity Collapse Induced by Water and Sand Leakage in Subway Tunnels. *International Journal of Geomechanics*, *24*(5), 04024079.

Deng, L., Fan, W., Yu, B., & Wang, Y. (2020). Influence of the unified strength theory parameters on the failure characteristics and bearing capacity of sand foundation acted by a shallow strip footing. *Advances in Mechanical Engineering*, *12*(2), 1687814020907774.

Drumm, E. C., & Yang, M. Z. (2005). Preliminary screening of residual soil stability in karst terrain. *Environmental & Engineering Geoscience*, *11*(1), 29-42.

Latypov, A., Zharkova, N., & Ter-Martirosyan, A. (2018). Calculation of the stress-strain state of soil massifs with karst-suffusion cavities. IOP Conference Series: Materials Science and Engineering,

Linrong, X., Usman, A. B., Bello, A.-A. D., & Yongwei, L. (2023). Rainfall-induced transportation embankment failure: A review. *Open Geosciences*, *15*(1). https://doi.org/doi:10.1515/geo-2022-0558

Long, J., Meng, Y., Lujuan, L., & Renchao, Y. (2021). A multidisciplinary approach in cover-collapse sinkhole analyses in the mantle karst from Guangzhou City (SE China). *Natural Hazards*, *108*(1), 1389-1410.

Nerantzaki, S. D., & Nikolaidis, N. P. (2020). The response of three Mediterranean karst springs to drought and the impact of climate change. *Journal of hydrology*, *591*, 125296.

Park, K., Soliman, M., Kim, Y. J., & Nam, B. H. (2024). Sinkhole stability chart for geotechnical investigation. *Transportation Geotechnics*, *45*, 101191.

Peng, J., Tian, L., Zhang, Z., Zhao, Y., Green, S. M., Quine, T. A., Liu, H., & Meersmans, J. (2020). Distinguishing the impacts of land use and climate change on ecosystem services in a karst landscape in China. *Ecosystem Services*, *46*, 101199. https://doi.org/https://doi.org/10.1016/j.ecoser.2020.101199

Plaxis, B. (2018). Plaxis 2D reference manual. *The Netherlands*.

Shamet, R., & Nam, B. H. (2020). Probabilistic Field Assessment of Sinkhole Occurrence Using the Raveling Index. Geo-Congress 2020,

Soliman, M. (2020). Numerical Analysis on the Geomechanical Mechanisms and Stability of Sinkholes in Central Florida.

Tan, Y., & Long, Y.-Y. (2021). Review of cave-in failures of urban roadways in China: A database. *Journal of Performance of Constructed Facilities*, *35*(6), 04021080.

Verdenius, S., Hengeveld, S., & Maljaars, J. (2023). New fatigue load models for assessing railway bridges in Europe. *Engineering Structures*, *284*, 115914.

Wang, X.-W., & Xu, Y.-S. (2022). Investigation on the phenomena and influence factors of urban ground collapse in China. *Natural Hazards*, *113*(1), 1-33.

Xin, L., Mingzhou, B., Zijun, W., Pengxiang, L., Hai, S., & Ye, Z. (2021). Dynamic response and stability analysis of high-speed railway subgrade in Karst areas. *IEEE Access*, *9*, 129188-129206.

Xiong, Z., Lin, L., Sun, Q., & Chen, X. (2023). Study of the unified strength theory for seismic response of frame building on loess considering soil-structure interaction. *The Structural Design of Tall and Special Buildings*, *32*(13), e2038.

Xu, F., Yang, Q., Liu, W., Leng, W., Nie, R., & Mei, H. (2018). Dynamic stress of subgrade bed layers subjected to train vehicles with large axle loads. *Shock and Vibration*, *2018*, 1-12.

Zhao, R., Li, Z.-w., Feng, G.-c., Wang, Q.-j., & Hu, J. (2016). Monitoring surface deformation over permafrost with an improved SBAS-InSAR algorithm: With emphasis on climatic factors modeling. *Remote Sensing of Environment*, *184*, 276-287. https://doi.org/https://doi.org/10.1016/j.rse.2016.07.019

PREPARATION AND EVALUATION OF TRANSFEROSOMES LOADED WITH MULTIPLE ANTIWRINKLE AGENT

Meltem MACIT
Yeditepe University, Faculty of Pharmacy, Department of Pharmaceutical Technology,
ORCID: 0000-0001-9925-2387

Assist. Prof. Dr. Muhammed Abdur ROUF
Fenerbahce University, Faculty of Pharmacy, Department of Pharmaceutical Technology
ORCID: 0000-0001-5901-3947

ABSTRACT
Recently, new drug delivery systems have begun to be used in every field. Liposomes and transferosomes, among the new drug delivery systems, are preferred in gel formulation. The aim of this study was to reveal the effect of Carbopol type on gel properties, as well as the properties of transfersome and liposome and their effects on antiaging. First, liposomes and transferosomes were prepared by the thin film hydration method. The active ingredients were Vitamin E, glycolic acid and EDTA. Nanoparticle solutions were centrifuged and incorporated into gels containing Carbopol 934 and Ultrez 21 polymers. Characterization, pH and viscosity, and *in-vitro* release studies of gel formulations loaded with nanoparticles were performed. As a result, the particle sizes of transferosome and liposome were found to be 50.58 and 177.60 nm, and also their zeta potentials were 1.02 and 0.9 mV, PDI values were 0.2 and 0.3, repectively. The viscosities of the gels were measured for two types of nanoparticles and polymer types. The viscosities of the transferosome in the Ultrez 21 gel (GT21) and the liposome in the Ultrez 21 gel (GL21) were measured between 6000-1000 cP. The viscosities of the transferosme in Carbopol 934 (GT934) and liposome in Carbopol 934 (GL934) were measured between 16000-17000 cP, respectively. The in vitro release study showed that the maximum amount of vitamin E was 95% and 88% for GT21 and GL21, respectively.
Keywords: Transferosome, Liposome, Carbopol, Thin film hydration

ÇOKLU KIRIŞIKLIK KARŞITI AJAN İLE YÜKLÜ TRANSFEROZOMLARIN HAZIRLANMASI VE DEĞERLENDİRİLMESİ

ÖZET
Son zamanlarda her alanda yeni ilaç taşıyıcı sistemler kullanılmaya başlandı. Jel formülasyonunda yeni ilaç taşıyıcı sistemlerden lipozomlar ve transferozomlar tercih edilmektedir. Bu çalışmanın amacı Carbopol tipinin jel özelliklerine etkisinin yanı sıra transfersom ve lipozomun özelliklerini ve bunların antiaging üzerindeki etkilerini ortaya koymaktır. İlk olarak ince film hidrasyon yöntemiyle lipozomlar ve transferozomlar hazırlandı. Aktif bileşenler E Vitamini, glikolik asit ve EDTA idi. Nanopartikül çözeltileri santrifüjlendi ve Carbopol 934 ve Ultrez 21 polimerlerini içeren jellere dahil edildi. Nanopartiküllerle yüklü jel formülasyonlarının karakterizasyonu, pH ve viskozitesi ve *in-vitro* salım çalışmaları yapıldı. Sonuç olarak transferozom ve lipozomun partikül boyutlarının sırasıyla 50,58 ve 177,60 nm, zeta potansiyellerinin ise 1,02 ve 0,9 mV, PDI değerlerinin ise sırasıyla 0,2 ve 0,3 olduğu belirlendi. Jellerin viskoziteleri iki tip nanopartikül ve polimer tipi için ölçüldü. Ultrez 21 jelindeki (GT21) transferozomun ve Ultrez 21 jelindeki (GL21) lipozomun viskoziteleri 6000-1000 cP arasında ölçüldü. Carbopol 934'teki (GT934)

transferozmun ve Carbopol 934'teki (GL934) lipozomun viskoziteleri sırasıyla 16000-17000 cP arasında ölçüldü. *İn- vitro* salım çalışması maksimum E vitamini miktarının GT21 ve GL21 için sırasıyla %95 ve %88 olduğunu gösterdi.
Anahtar Kelimeler: Transferzom, Lipozom, Carbopol, İnce Film hidrasyon

INVESTIGATING HERBAL MEDICINE FOR RAPID WOUND HEALING IN DIABETICS

Sejal Porwal
Department of Pharmacy, School of Medical and Allied Sciences, Galgotias University

Rishabha Malviya
Department of Pharmacy, School of Medical and Allied Sciences, Galgotias University

Abstract
Managing diabetic wounds is a big problem for medical practitioners as patients with severe complications and delayed healing have much inferior quality of life. This article tries to study Natural goods' potential, especially plants, in the rehabilitation of wounds. It addresses these medications' mechanisms of action and therapeutic usefulness in controlling diabetic ulcers. The review examines the importance of nutrition in wound healing, highlighting the necessity to ingest adequate protein, energy, lipids, amino acids, vitamins, minerals, and water to facilitate healing. In diabetes, various herbs Rosmarinus officinalis, Carica papaya, Aloe vera, Annona squamosa, and Punica granatum are being researched for their potential to heal wounds. Numerous mechanisms of action of these plants include antioxidant, anti-inflammatory, antibacterial, and immunomodulatory actions that expedite wound healing, boost collagen production, and induce tissue regeneration. The vast variety of action mechanisms revealed in natural substances, mainly in plants shows promise for the treatment of diabetic wounds. It may also be conceivable to boost healing results and the quality of life for diabetic patients with chronic wounds by incorporating these herbal therapies into wound care regimens.
Keywords: Anti inflammatory, Tissue Regeneration, Wound Healing, Collagen Production, Herbal therapies.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

NOVEL APPROACHES TO PHARMACEUTICAL WASTE MANAGEMENT: IMPROVING DRUG RECOVERY

Deepak Kumar
Department of Pharmacy, School of Medical and Allied Sciences, Galgotias University

Rishabha Malviya
Department of Pharmacy, School of Medical and Allied Sciences, Galgotias University

Abstract
The pharmaceutical sector is a crucial component of current healthcare, manufacturing and distributing medications, biological substances, and medical equipment. Despite its advantages, the business creates considerable waste, including materials for packaging, industrial by-products, expired or unused pharmaceuticals, and other residues, posing health and environmental hazards. Appropriate pharmaceutical waste handling and drug recovery procedures are crucial for limiting these difficulties. The objective of this article is to examine and evaluate several approaches for recovering pharmaceuticals from pharmaceutical waste, underlining the necessity of sustainable waste management in the pharmaceutical sector. The report underlines the need to apply modern procedures such as liquid-liquid extraction, membrane crystallization, solid-liquid extraction, and adsorption to recover pharmaceuticals from pharmaceutical waste. Liquid-liquid extraction demonstrates high adaptability and efficiency for diverse active pharmaceutical ingredients (APIs), whereas membrane crystallization provides low-energy solutions for thermally sensitive molecules. Solid-liquid extraction is useful for recovering APIs from solid dosage forms, while adsorption techniques exploit substances like activated carbon for organic component recovery. Each process has distinct benefits and disadvantages, with the selection of approach based on waste properties and recovery aims. It underlines the promise of these technologies for high extraction yields, purity, and environmental sustainability, supporting effective pharmaceutical waste management practices. Additionally, challenges like as cost-effectiveness, scalability, and regulatory compliance are addressed, pointing to potential for future research and development to improve the efficacy of drug recovery techniques.
Keywords: Pharmaceutical waste, drug recovery, liquid-liquid extraction, membrane crystallization, solid-liquid extraction, adsorption, environmental sustainability.

EFFECTIVE CATALYTIC AND ANTIMICROBIAL PERFORMANCE OF MULTIPLE PHASE AgBr AND POLYACRYLIC ACID DOPED NICKEL OXIDE NANOSTRUCTURES WITH *IN SILICO* MOLECULAR DOCKING STUDY

Iram Shahzadi
School of Pharmacy, University of Management and Technology

Ali Haider
Department of Clinical Medicine, Faculty of Veterinary and Animal Sciences, Muhammad Nawaz Shareef, University of Agriculture

Abstract
A facile co-precipitation route was adopted to synthesize NiO_2 nanostructures (NSs) doped with various weight ratios (2 and 4 wt.%) of AgBr and a fixed amount of PAA. This study aimed to investigate the RhB degradation on multiple media with the antimicrobial activity of pristine and doped NiO_2. The morphological, structural, elemental, and optical characterizations of prepared samples were examined. X-ray diffraction spectra (XRD) exhibited the hexagonal structure of NiO_2 and confirmed the crystalline nature of the synthesized sample. The TEM images affirmed the nanoparticle and nanorod-like morphology. The UV–Vis analysis revealed that the absorption performance of synthesized samples is comprehensive in the ultraviolet region (277 nm), Fourier transform infrared (FTIR) has stretching and vibrational modes of Ni–O and other functional groups. The catalytic activity of AgBr/PAA doped NiO_2 demonstrates remarkable performance against RhB, with maximum degradation in acidic medium and exhibited higher antimicrobial efficacy for *Escherichia coli*. Docking studies were employed to decipher the mechanism underlying the bactericidal activity of AgBr/PAA-doped NiO_2 NSs and PAA-doped NiO_2 NSs for β-lactamase and DNA gyrase inhibition.
Keywords: Recombination rate, Dye degradation, Antibacterial activity, Molecular docking

IN SILICO PREDICTION OF CYTOTOXICITY FOR TUMOR AND NON-TUMOR CELL LINES OF 4-AZIDO-2-(4-METHOXYPHENYL)-5-(2-NITROPHENYL)-2H-1,2,3-TRIAZOLE

Nigar Ahmedova
Department of Organic Chemistry, Baku State University
ORCID: 0009-0009-6245-4837

Afaq Abdullayeva
Department of Organic Chemistry, Baku State University
ORCID: 0009-0000-2203-5077

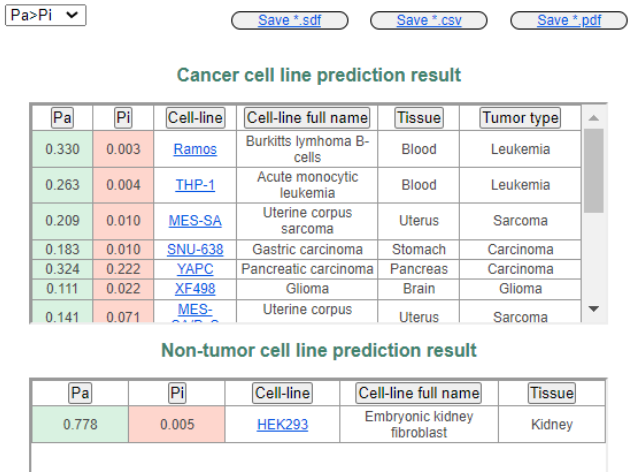
Gulnar Atakishiyeva
Department of Organic Chemistry, Baku State University
ORCID: 0000-0002-9659-5218

Gulnara Babayeva
Department of Analytical and Organic Chemistry, Azerbaijan State Pedagogical University

Gunel Rustemova
Department of Organic Chemistry, Baku State University
ORCID: 0009-0000-8565-5599

Namiq Shikhaliyev
Department of Organic Chemistry, Baku State University
ORCID: 0000-0002-6842-151X

Abstract
Oncological diseases are considered to be highly costly and often fatal worldwide. Despite advancements in drug development, achieving complete success remains challenging, underscoring the critical role of pharmaceutical industry advancement. To expedite successful outcomes while saving time and costs, scientists increasingly favor in silico research methods.One such method is CLC-Pred (Cell Line Cytotoxicity Predictor), which utilizes QSAR models to assess the cytotoxicity of compounds. In our study, we evaluated the cytotoxicity of 4-azido-2-(4-methoxyphenyl)-5-(2-nitrophenyl)-2H-1,2,3-triazole against tumor and non-tumor cell lines. The results are presented in two tables, detailing Pa and Pi values, full and abbreviated cell line names, and tissue types. Additionally, the types of tumors tested are specified.


Pa>Pi

Save *.sdf Save *.csv Save *.pdf

Cancer cell line prediction result

Pa	Pi	Cell-line	Cell-line full name	Tissue	Tumor type
0.330	0.003	Ramos	Burkitts lymhoma B-cells	Blood	Leukemia
0.263	0.004	THP-1	Acute monocytic leukemia	Blood	Leukemia
0.209	0.010	MES-SA	Uterine corpus sarcoma	Uterus	Sarcoma
0.183	0.010	SNU-638	Gastric carcinoma	Stomach	Carcinoma
0.324	0.222	YAPC	Pancreatic carcinoma	Pancreas	Carcinoma
0.111	0.022	XF498	Glioma	Brain	Glioma
0.141	0.071	MES-	Uterine corpus	Uterus	Sarcoma

Non-tumor cell line prediction result

Pa	Pi	Cell-line	Cell-line full name	Tissue
0.778	0.005	HEK293	Embryonic kidney fibroblast	Kidney

It is also known from the table that the synthesized 4-azido-2-(4-methoxyphenyl)-5-(2-nitrophenyl)-2H-1,2,3-triazole is possible to be one of the anticancer drugs in the future.

Keywords: triazole derivatives, QSAR, cancer

[1]. Lagunin A.A., et al. CLC-Pred: a freely available web-service for in silico prediction of human cell line cytotoxicity for drug-like compounds. PLOS One, 2018, 13 (1), e0191838

BREAST CANCER CELL-LINE CYTOTOXICITY PREDICTION OF 4-AZIDO-2-(4-METHOXYPHENYL)-5-(2-NITROPHENYL)-2H-1,2,3-TRIAZOLE

Nigar Ahmedova
Department of Organic Chemistry, Baku State University
ORCID: 0009-0009-6245-4837

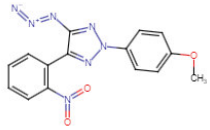
Afaq Abdullayeva
Department of Organic Chemistry, Baku State University
ORCID: 0009-0000-2203-5077

Gulnar Atakishiyeva
Department of Organic Chemistry, Baku State University
ORCID: 0000-0002-9659-5218

İrada Ahmadova
Department of Industrial Safety and Workforce Protection, Azerbaijan State Petrol and Industrial University
ORCID: 0000-0003- 3004-4242

Abel Maharramov
Department of Organic Chemistry, Baku State University
ORCID: 0009-0008-7739-2598

Abstract
It is well-documented in the literature that several drugs containing the triazole fragment are utilized in cancer treatment. Emphasizing the expansion of in silico research, we conducted breast cancer cell-line cytotoxicity predictions for 4-azido-2-(4-methoxyphenyl)-5-(2-nitrophenyl)-2H-1,2,3-triazole synthesized in our study. Our results using BC CLC-Pred based on the QSAR model are presented in the table below. The table includes IC50 and IG50 values for nine breast cancer cell lines: T47D, ZR-75-1, MX1, Hs-578T, MCF7-DOX, MCF7, Bcap37, MCF7R, and BT-20.The findings suggest that 4-azido-2-(4-methoxyphenyl)-5-(2-nitrophenyl)-2H-1,2,3-triazole has potential as a future drug for breast cancer treatment.



PDF Copy CSV Excel

Name	Classification				Quantitative			
	IC50		GI50		pIC50		pGI50	
	Value	AD	Value	AD	Value	AD	Value	AD
Bcap37	inactive	+						
BT-20	inactive	+	active	+			5.9519	+
Hs-578T	inactive	+	inactive	+				
MCF7			inactive	+	5.6037	+	5.0122	+
MCF7-DOX	active	+			6.1409	+		
MCF7R	inactive	+			4.6651	+		
MX-1	inactive	+			5.8157	+		
T47D	inactive	+	active	+	4.6994	+	6.1710	-
ZR-75-1	active	+	inactive	+	6.0509	+	6.0596	+

"+" - the structure of compound is in the applicability domain of the appropriate (Q)SAR model; "-" - the structure of compound is out the applicability domain of the appropriate (Q)SAR model.

Keywords: triazole derivatives, QSAR, breast cancer

[1]. Lagunin, A. A., et al. (2023). BC CLC-Pred: a freely available web-application for quantitative and qualitative predictions of substance cytotoxicity in relation to human breast cancer cell lines. *SAR and QSAR in Environmental Research*, *35*(1), 1–9

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

ÖNERİLEN GÖRÜNTÜ İŞLEME YAKLAŞIMI İLE OPTİMİZE EDİLEN DİJİTAL BLAST HÜCRE GÖRÜNTÜLERİNİN MOBILENETV2 TRANSFER ÖĞRENME MİMİRİSİ İLE SINIFLANDIRILMASI

Dr. Fatma AKALIN
Sakarya Üniversitesi, Bilgisayar ve Bilişim Bilimleri Fakültesi, Bilişim Sistemleri Mühendisliği Bölümü
ORCID: 0000-0001-6670-915X

Doç. Dr. Mehmet Fatih ORHAN
Sakarya Üniversitesi, Tıp Fakültesi, Çocuk Hematoloji ve Onkoloji Bölümü
ORCID: 0000-0001-8081-6760

ÖZET
Günümüz dünyasında bilgisayar teknolojisi ve bilgisayar bilimi, görüntüler üzerinde çalışan sezgisel mekanizmalar vasıtasıyla çıkarımlar sağlayarak hedef veriyi anlamlandırma işlevselliğine sahiptir. Çünkü görüntülerin anlamlandırma çerçevesinde sahip olduğu niteliklerin açığa çıkarılması daha başarılı ve daha kararlı bir aksiyon alma imkânı tanımaktadır. Bu çalışmada ALL (Akut lenfoblastik lösemi) hastalığının tespitinde önemli bir gösterge olan blast hücrelerinin nonblast kategorisine sahip sınıflardan ayırt edilmesi için yeni bir görüntü işleme yaklaşımı geliştirilmiştir. Geliştirilen yaklaşımın başarısını ispat etmek için MobileNetv2 transfer öğrenme mimarisinin kullanıldığı 4 farklı deney yapılmıştır. Birinci deney, MobileNetV2 mimarisinin sıfırdan eğitilmediği bir sınıflandırma sunmaktadır. Orijinal görüntülerin girdi olarak verildiği bu mimaride elde edilen doğruluk ve kayıp değerleri istikrarsız çıktılar sunmuştur. İkinci deney, MobileNetV2 mimarisinin sıfırdan eğitildiği bir sınıflandırma süreci sunmaktadır. Orijinal görüntülerin girdi olarak verildiği bu mimaride elde edilen doğruluk ve kayıp değerleri istikrarlı çıktılar sunmuştur. Ayrıca eğitim ve test veri kümesi üzerinde sırasıyla %100 ve %85.90 doğruluk oranına ulaşılmıştır. Üçüncü ve dördüncü deney, sıfırdan eğitilen MobileNet mimarisine sırasıyla BGR ve RGB renk uzayındaki iyileştirilmiş periferik kan yayma görüntülerinin girdi olarak sunulduğu sınıflandırma biçimidir. Görüntü işleme yaklaşımı ile iyileştirilmiş görüntüler üzerinde istikrarlı ve kararlı çıktılar sunan bu deneyde eğitim ve test veri kümesi için ulaşılan doğruluk değerleri sırasıyla %100 ve %89.74 ile %100 ve %91.03 olarak elde edilmiştir. Ulaşılan sonuçlar, önerilen görüntü işleme yaklaşımının otomatik sınıflandırma tekniklerine daha iyi bir görüntü sunmak üzere başarım oranını güçlendirdiğini ispat etmektedir.
Anahtar Kelimeler: Önerilen görüntü işleme yaklaşımı, MobileNetV2 transfer öğrenme mimarisi, Blast ve nonblast hücre kategorilerinin sınıflandırılması, RGB ve BGR renk uzayları

CLASSIFICATION OF DIGITAL BLAST CELL IMAGES ENHANCED WITH THE PROPOSED IMAGE PROCESSING APPROACH USING MOBILENETV2 TRANSFER LEARNING ARCHITECTURE

ABSTRACT
In today's world, computer technology and computer science have the functionality to make sense of target data by providing inferences through intuitive mechanisms working on images. Because revealing the qualities of images within the framework of meaning provides the opportunity to take more successful and more determined action. In this study, a new

image processing approach was developed to distinguish blast cells, which are an important indicator in the detection of ALL (Acute lymphoblastic leukemia) disease, from nonblast categories. To prove the success of the developed approach, 4 different experiments were conducted using the MobileNetv2 transfer learning architecture. The first experiment presents a classification in which the MobileNetV2 architecture is not trained from scratch. The accuracy and loss values obtained in this architecture, where original images are given as input, provide unstable outputs. The second experiment presents a classification process in which the MobileNetV2 architecture is trained from scratch. The accuracy and loss values obtained in this architecture, where original images are given as input, provide stable outputs. Additionally, an accuracy rate of 100% and 85.90% was achieved on the training and test dataset, respectively. The third and fourth experiments are a form of classification in which enhanced peripheral blood smear images in BGR and RGB color space, respectively, are provided as input to the MobileNet architecture trained from scratch. In this experiment, which provided stable and stable outputs, the accuracy values obtained for the training and test data sets were 100% - 89.74% and 100% - 91.03%, respectively. The results obtained prove that the proposed image processing approach strengthens the performance rate in order to provide a better image to automatic classification techniques.
Keywords: Proposed image processing approach, MobileNetV2 transfer learning architecture, Classification of blast and nonblast cell categories, RGB and BGR color spaces

GİRİŞ

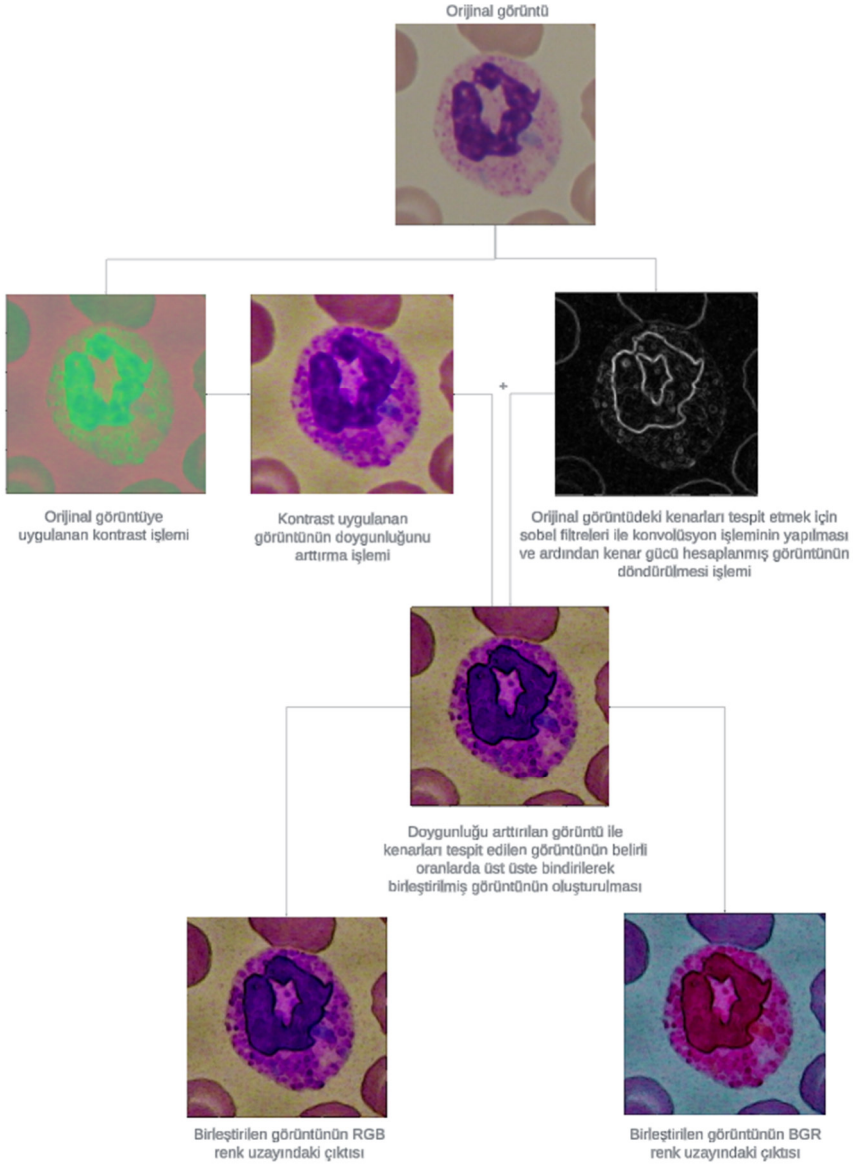
Görüntü iyileştirme, görüntülerde yer alan bilgilerin insanlar tarafından anlaşılmasını ve algılanmasını kolaylaştıran önemli bir yaklaşımdır. Bu yaklaşım, görüntülerin anlamlandırılması ve yorumlanması çerçevesinde sahip olduğu belirli niteliklerin geliştirilmesini sağlar. Bu niteliklerin değerlendirilmesi için faydalanılan insan faktörü, kendi doğasında var olan kişisel özelliklerin yanı sıra sahip olduğu tecrübe kriteri ile nihai kararı etkileyebilecek bir ihtimale sahiptir (Maini ve Aggarwal, 2010). Ancak, ayrıntıları belirginleştirilmiş bir görüntü ile bu ihtimal azalır.

Son yıllarda bilişim teknolojisinin gelişmesi ile veri sayısında bir artış gözlemlenmektedir. Özellikle tek bir kişi için incelenmesi gereken binlerce unsurun yer aldığı örneklerin olduğu durumlar olayın vahametini arttırmaktadır. Periferik kan yayma testi vasıtasıyla elde edilen kan örneğinde incelenmesi gereken blast hücre sayısının ALL hastalığına sahip bireyler için çok fazla olması bu duruma örnektir. Sürecin işlemesini sağlayan manuel analiz, yoğun çalışan tıp personelleri için büyük bir zorluk oluşturmaktadır (Akalın, 2023). Bu nedenle manuel analizin otomatikleştirilmesi önem arz eden bir durumdur. Otomatik sınıflandırma tekniklerine dahi iyi bir görüntü sunmak kritik bir gerekliliktir. Böylece görüntüde yer alan tüm ayrıntıların açığa çıkarılmak suretiyle benzer çıkarımlar üzerinden değerlendirilmesi mümkün olacaktır. (Akalın ve Yumuşak, 2024), (Akalın ve Yumuşak, 2022) (Yadav, Gupta ve Lamba, 2024) (Abbood, Hamed, Rahim, Rehman, Saba ve Bahaj, 2022) makalelerinde dijital görüntüler için uygulanan görüntü işleme yaklaşımlarının başarımı arttırdığı ifade edilmektedir. Histogram eşleştirme, yerel geliştirme, histogram istatistikleri bazı görüntü iyileştirme yöntemleridir (Maini ve Aggarwal, 2010). Fakat bu çalışmada yeni bir görüntü işleme yaklaşımı geliştirilmiştir. Ardından orijinal görüntülere uygulanan bu yaklaşım, MobileNetV2 transfer öğrenme mimarisi ile sınıflandırılmıştır. Sınıflandırma sonucuna göre blast ve nonblast kategorisine sahip hücreler, maksimum %91.03 doğruluk oranı ile ayırt edilmiştir.

ARAŞTIRMA VE BULGULAR

Deneysel Çalışmalar

Görüntü iyileştirme, belirli bir amaç çerçevesinde görüntüde var olan niteliklerin daha uygun hale getirilmesidir. Bu niteliklerin seçimi, modifikasyonu, uzaklaştırılması vb. tüm durumlar amaca uygun olarak şekillenmektedir (Maini ve Aggarwal, 2010). Bu çalışmada ALL-IDB veri kümesi (ALL-IDB Dataset, 2024) vasıtasıyla ALL hastalığının tanısında önemli bir gösterge olan blast hücrelerinin tespiti için yeni bir görüntü işleme yaklaşımı önerilmiştir. Bu bağlamda tespit doğruluğunu arttırmak amacıyla (Mohammed ve Abdulla, 2021) (Rodellar, Alférez, Acevedo, Molina ve Merino, 2018) (Merino, Puigví, Boldú, Alférez ve Rodellar, 2018) (Putzu, Caocci ve Di Ruberto, 2014), (Negm, Hassan ve Kandil, 2018), (Li, Zhu, Mi, Cao ve Yao, 2016), (Mishra, Majhi, Sa ve Sharma, 2017), (Putzu, Caocci ve Di Ruberto, 2014) çalışmalarından esinlenerek geliştirilen görüntü işleme yaklaşımı ile blast hücrelerin nonblast kategorisine sahip diğer kan elementlerinden ayırt edilmesi için hücre yapılarına ilişkin sınırların netleştirilmesi sağlanmıştır. Geliştirilen metodolojinin akış diyagramı Şekil 2.1'de sunulmaktadır.



Şekil 2.1. Önerilen görüntü işleme yaklaşımının nonblast hücre üzerinde gerçekleştirimi

Şekil 2.1'de verilen akış diyagramında dijital görüntülere, kontrastın ayarlanması ve doygunluğun arttırılması işlemleri ardı sıra uygulanmıştır. Ardından işlenen görüntü, gri tonlamaya dönüştürme, görüntüye birer piksel genişliğinde padding işlemi uygulama, sobel filtrelerini tanımlama, görüntüdeki her piksel için 3x3'lük bir pencere kullanarak sobel filtreleri üzerinden konvolüsyon işlemi ile kenar tespit sonuçlarını elde etme, kenar tespit sonuçları ile kenar gücünü hesaplama, kenar gücü değerlerini normalize etme ve dönüştürme işlemlerini kapsayan kenar gücü hesaplanmış görüntü ile belirli bir oranda birleştirilmiştir. Bu oran, hücre zarı, sitoplazma ve çekirdek yapılarının birbirinden net bir şekilde ayrılması için deneme yanılma yol ile belirlenmiştir. Son aşamada RGB ve BGR uzayları için ayrıntıları netleştirilen görüntüler MobileNetV2 transfer öğrenme mimarisi ile sınıflandırmak üzere kaydedilmiştir.

Deneysel Sonuçlar

ALL hastalığının tespitinde önemli bir gösterge olan blast hücrelerine ilişkin otomatik analizin benzer koşullar altında gerçekleştirilebilmesi önemlidir. Çünkü otomatik sınıflandırma tekniklerine dahi iyi bir görüntü sunmak sürecin kolaylaştırılabilmesini sağlamaktadır. Bu doğrultuda yeni bir görüntü işleme yaklaşımı önerilmiştir. Ardından önerilen görüntü işleme yaklaşımı çerçevesinde modifiye edilen görüntülerin RGB ve BGR renk uzaylarına ilişkin çıktıları incelenmiştir. Son aşamada geliştirilen görüntü işleme yaklaşımı ile üretilen çıktılara ilişkin başarımın değerlendirilmesi için orijinal görüntüler ile iyileştirilen görüntüler, MobileNetV2 transfer öğrenme algoritması ile sınıflandırılmıştır.

Transfer Öğrenme

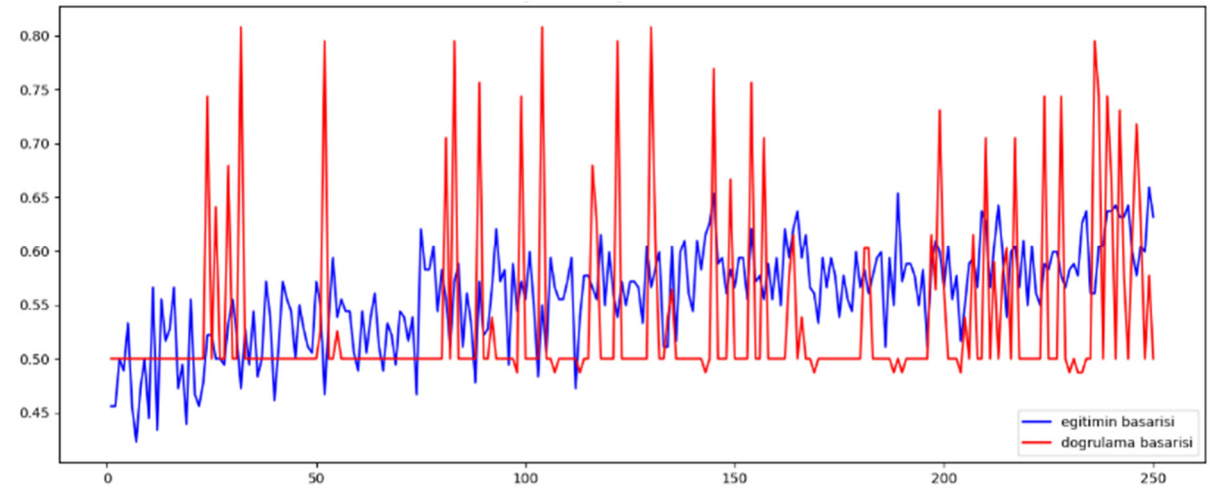
Transfer öğrenme, bir görevin eğitiminde atanan ağırlıkların yeni bir görev için kullanılmasıdır. Hedef veri kümesine uyarlanacak transfer öğrenme mimarisinde model sıfırdan eğitilmez. Böylece zaman ve donanım kısıtından dolayı modelin yeterinde eğitilememesi durumuna karşın bir çözüm sunulur. Fakat zaman ve donanım kısıtının olmadığı durumlarda modelin sıfırdan eğitilmesi de mümkündür. Bu bağlamda geçmişten günümüze çeşitli transfer öğrenme mimarileri geliştirilmiştir (Alzubaidi ve diğerleri, 2021). Bu çalışmada MobileNetV2 transfer öğrenme mimarisi kullanılmıştır.

MobileNet, hafif evrişimli sinir ağıdır. Bu nedenle hesaplama depolamasını azaltmayı ve tanıma hızını arttırmayı amaçlar. MobileNet, hafif boyutu ve başarılı performansı nedeniyle çeşitli tanıma alanlarında tercih edilen bir seri sunar (Qin, Tang, Xin, Yang, Zhang ve Yang, 2023).

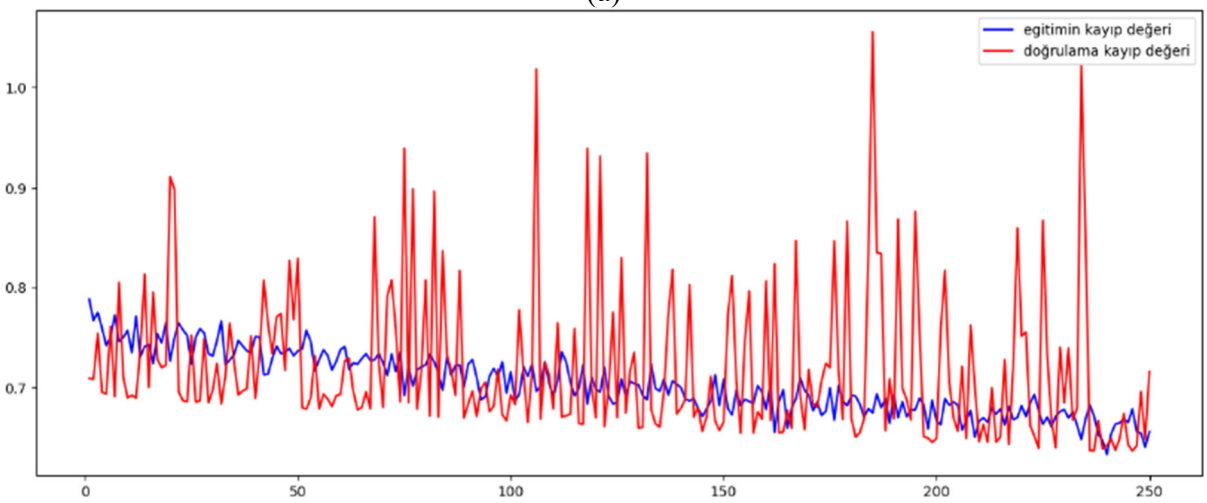
Bu kısımda orijinal ve iyileştirilmiş periferik kan yayma görüntüleri üzerinde MobileNetv2 mimarileri ile blast ve nonblast kategorilerine ilişkin sınıflandırma işleminin gerçekleştirilmesi için deneyler yapılmıştır. Bu deneylerde son katman kaldırılmıştır. Kaldırılan katman yerine 2 kategorinin sınıflandırılmasına yönelik yoğun bir katman eklenmiştir.

1.Deney

1. deney, orijinal görüntülerin sınıflandırılması için ImageNet veri kümesi üzerinde kazanılan ağırlıkların kullanılmasına yönelik olarak kurgulanmıştır. Toplam 2.260.546 parametrenin yer aldığı mimaride eğitilebilir parametre sayısı 2.562 iken eğitilemez parametre sayısı 2.257.984'dir. Orijinal periferik kan yayma görüntüleri üzerinde deney sonucunda elde edilen doğruluk oranı ve kayıp değeri grafikleri Şekil 2.2'de verilmiştir.



(a)



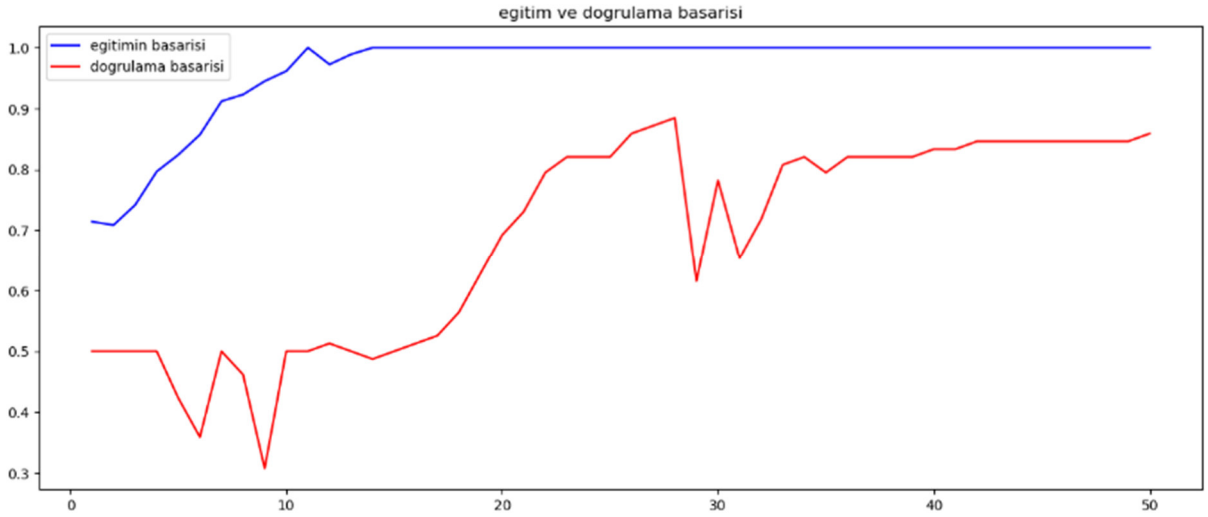
(b)

Şekil 2.2. Birinci deney sonucunda orijinal görüntüler için elde edilen doğruluk oranı ve kayıp değeri grafikleri

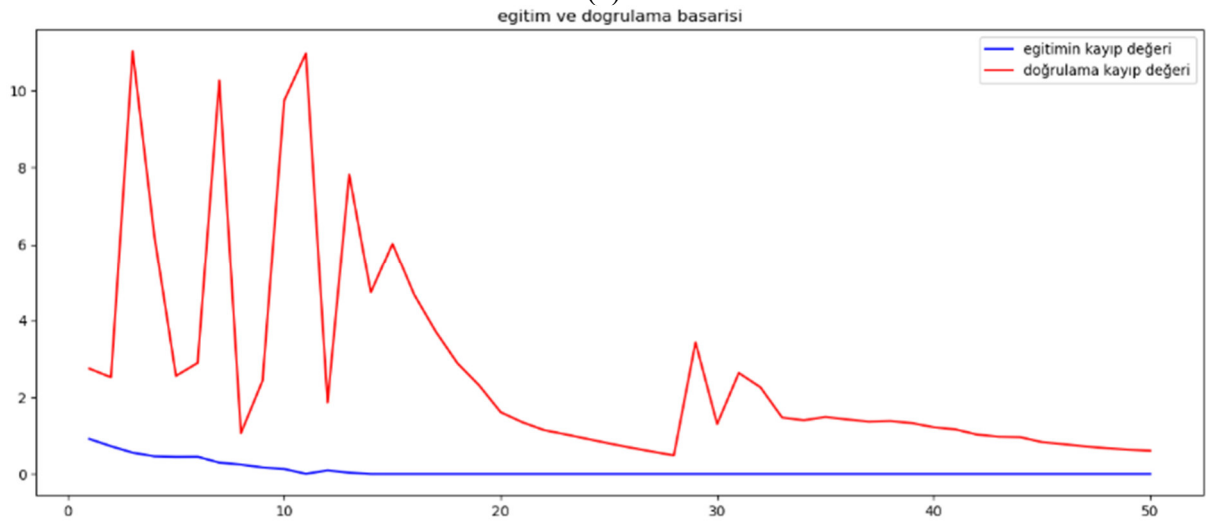
Şekil 2.2'de verilen grafikler incelendiğinde ImageNet veri kümesi ile gerçekleştirilen eğitimde atanan değerlerin blast ve nonblast hücre kategorisine ilişkin gerçekleştirilen sınıflandırma işlemi için başarılı olmadığı görülmektedir. Bu durum eğitim ve test veri kümesi üzerinde başarı oranı ve kayıp değeri grafiklerinde çizilen osilosyonlar ile tasvir edilmektedir. İstikrarsızlık ve kararsızlık durumlarına işaret eden bu sonuçlar, diğer deneyler için tüm mimarinin sıfırdan eğitilmesi ile çözümlenmiştir.

2.Deney

2. deney, orijinal görüntülerin sınıflandırılması için tüm mimarinin sıfırdan eğitildiği bir düzen sunmaktadır. Orijinal periferik kan yayma görüntüleri üzerinde deney sonucunda elde edilen doğruluk oranı ve kayıp değeri grafikleri Şekil 2.3'te verilmiştir.



(a)



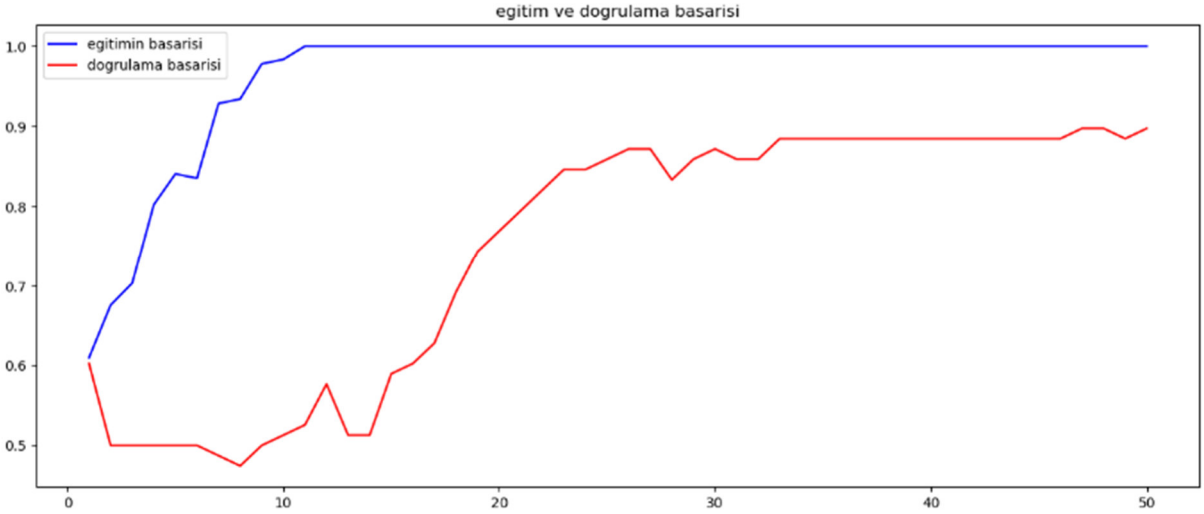
(b)

Şekil 2.3. İkinci deney sonucunda orijinal görüntüler için elde edilen doğruluk oranı ve kayıp değeri grafikleri

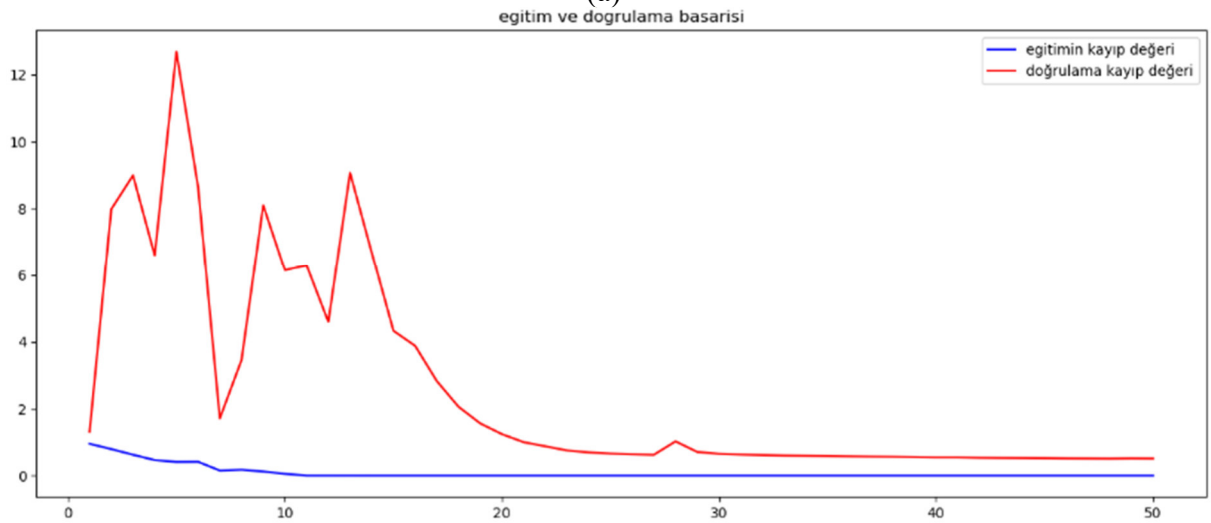
Şekil 2.3'te verilen grafikler incelendiğinde orijinal görüntüler üzerinde gerçekleştirilen deney sonucunda eğitim ve test veri kümesi çeperinde ulaşılan sonuçlar, başarılı ve istikrarlıdır. Ayrıca eğitim ve test veri kümesi üzerinde sırasıyla %100 ve %85.90 doğruluk oranına ulaşılmıştır.

3.Deney

3. deney, orijinal görüntülere uygulanan görüntü işleme yaklaşımı sonucunda elde edilen iyileştirilmiş görüntülerin BGR renk uzayındaki sınıflandırma sonucunu araştırmayı amaçlamaktadır. Bu bağlamda BGR renk uzayında iyileştirilmiş periferik kan yayma görüntüleri için deney sonucunda elde edilen doğruluk oranı ve kayıp değeri grafikleri Şekil 2.4'te verilmiştir.



(a)



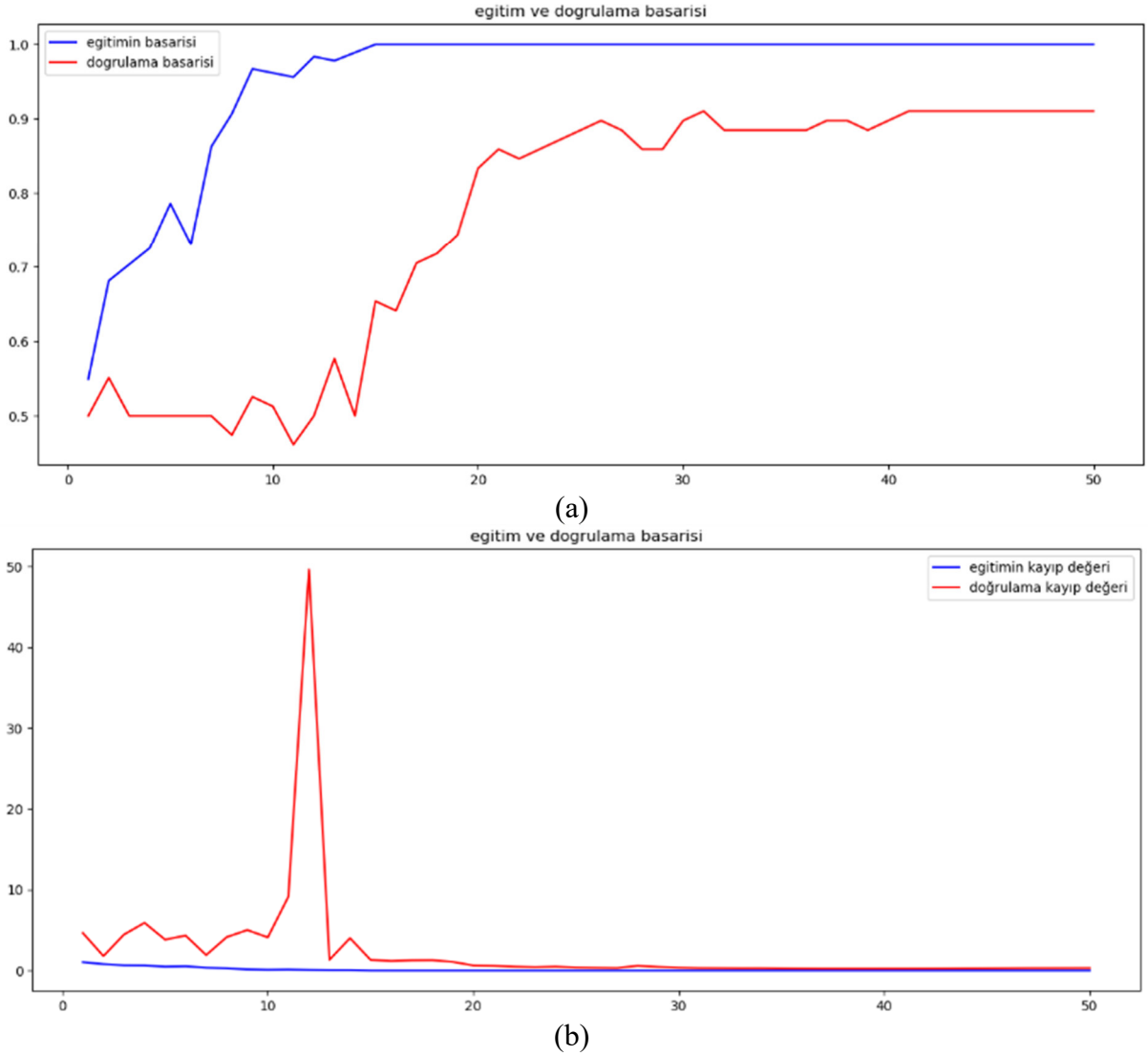
(b)

Şekil 2.4. Üçüncü deney sonucunda BGR renk uzayındaki görüntüler için elde edilen doğruluk oranı ve kayıp değeri grafikleri

Şekil 2.4'te verilen grafikler incelendiğinde orijinal görüntüler üzerinde gerçekleştirilen deney sonucunda eğitim ve test veri kümesi çeperinde ulaşılan sonuçlar, başarılı ve istikrarlıdır. Ayrıca eğitim ve test veri kümesi üzerinde sırasıyla %100 ve %89.74 doğruluk oranına ulaşılmıştır.

4. Deney

4. deney, orijinal görüntülere uygulanan görüntü işleme yaklaşımı sonucunda elde edilen iyileştirilmiş görüntülerin RGB renk uzayındaki sınıflandırma sonucunu araştırmayı amaçlamaktadır. Bu bağlamda RGB renk uzayında iyileştirilmiş periferik kan yayma görüntüleri için deney sonucunda elde edilen doğruluk oranı ve kayıp değeri grafikleri Şekil 2.5'te verilmiştir.



Şekil 2.5. Dördüncü deney sonucunda RGB renk uzayındaki görüntüler için elde edilen doğruluk oranı ve kayıp değeri grafikleri

Şekil 2.5'te verilen grafikler incelendiğinde orijinal görüntüler üzerinde gerçekleştirilen deney sonucunda eğitim ve test veri kümesi çeperinde ulaşılan sonuçlar, diğer tüm deneylere göre daha başarılı ve daha istikrarlıdır. Ayrıca eğitim ve test veri kümesi üzerinde sırasıyla %100 ve %91.03 doğruluk oranına ulaşılmıştır. Maksimum performans, bu aşamada elde edilmiştir.

SONUÇ

Bu çalışmada ALL hastalığının tespitinde önemli bir gösterge olan blast hücrelerin nonblast kategorisine sahip hücrelerden ayırt edilmesi için ALL-IDB halka açık veri kümesi üzerinde yeni bir görüntü işleme metodolojisi önerilmiştir. Bu doğrultuda orijinal görüntülerin önerilen görüntü işleme yaklaşımı ile iyileştirilen görüntülerden ayırt edilmesi için MobileNetV2 transfer öğrenme mimarisi ile 4 farklı deney ile sınıflandırılmıştır. Deney sonuçları üç temel çıkarım sunmaktadır. Bunlar,

1- Periferik kan yayma görüntülerinin tespiti için kullanılan MobileNetV2 mimarisi, sıfırdan eğitildiğinde daha başarılı, istikrarlı ve kararlı olmaktadır.

2- Orijinal görüntülere uygulanan görüntü işleme yaklaşımı sonucunda elde edilen iyileştirilmiş görüntülerin BGR renk uzayındaki sınıflandırma sonucu orijinal görüntüler ile gerçekleştirilen sınıflandırma sonucuna kıyasla daha başarılı, istikrarlı ve kararlıdır.
3- Orijinal görüntülere uygulanan görüntü işleme yaklaşımı sonucunda elde edilen iyileştirilmiş görüntülerin RGB renk uzayındaki sınıflandırma sonucu orijinal ve BGR renk uzayındaki görüntüler ile gerçekleştirilen sınıflandırma sonucuna kıyasla daha başarılı, istikrarlı ve kararlıdır.
Sonuçlar incelendiğinde önerilen görüntü işleme yaklaşımı çeperinde inşa edilen bilgisayar destekli sistemin doktorlara yardımcı bir fikir sunması hedeflenmektedir.

KAYNAKÇA

Maini, R., & Aggarwal, H. (2010). A comprehensive review of image enhancement techniques. J Comput, 2(3), 8-13.

Akalın, F. (2023). Sayısal haritalama teknikleri kullanılarak DNA dizilimleri üzerinden lösemi hastalığının temel türlerinin yapay zeka tabanlı algoritmalar ile sınıflandırılması (Doktora Tezi, Sakarya Üniversitesi Fen Bilimleri Enstitüsü, B. Mühendisliği, A. Dalı).

Akalin, F., & Yumusak, N. (2024). Detection of gastrointestinal anomalies with a deep learning-based ensemble classifier approach. Pamukkale University Journal of Engineering Sciences, 30(3), 366-373. https://doi.org/10.5505/pajes.2023.90602.

Akalin, F., & Yumuşak, N. (2022). Classification of exon and intron regions obtained using digital signal processing techniques on the DNA genome sequencing with EfficientNetB7 architecture. Journal of the Faculty of Engineering and Architecture of Gazi University, 37(3), 1355-1371. https://doi.org/10.17341/gazimmfd.900987.

Yadav, P. S., Gupta, B., & Lamba, S. S. (2024). A new approach of contrast enhancement for medical images based on entropy curve. Biomed Signal Process Control, 88, https://doi.org/10.1016/j.bspc.2023.105625.

Abbood, S. H., Hamed, H. N. A., Rahim, M. S. M., Rehman, A., Saba, T., & Bahaj, S. A. (2022). Hybrid retinal image enhancement algorithm for diabetic retinopathy diagnostic using deep learning model. IEEE Access, 10, 73079-73086. https://doi.org/10.1109/ACCESS.2022.3189374.

ALL-IDB Acute Lymphoblastic Leukemia Image Database for Image Processing. Retrieved from https://scotti.di.unimi.it/all/.

Mohammed, Z. F., & Abdulla, A. A. (2021). An efficient CAD system for ALL cell identification from microscopic blood images. Multimed Tools Appl, 80(4), 6355-6368. https://doi.org/10.1007/s11042-020-10066-6.

Rodellar, J., Alférez, S., Acevedo, A., Molina, A., & Merino, A. (2018). Image processing and machine learning in the morphological analysis of blood cells. Int J Lab Hematol, 40, 46-53. https://doi.org/10.1111/ijlh.12818.

Merino, A., Puigví, L., Boldú, L., Alférez, S., & Rodellar, J. (2018). Optimizing morphology through blood cell image analysis. International Journal of Laboratory Hematology, 40, 54-61. https://doi.org/10.1111/ijlh.12832.

Putzu, L., Caocci, G., & Di Ruberto, C. (2014). Leucocyte classification for leukaemia detection using image processing techniques. Artif Intell Med, 62(3), 179-191. https://doi.org/10.1016/j.artmed.2014.09.002.

Negm, A. S., Hassan, O. A., & Kandil, A. H. (2018). A decision support system for acute leukaemia classification based on digital microscopic images. Alexandria Engineering Journal, 57(4), 2319-2332. https://doi.org/10.1016/j.aej.2017.08.025.

Li, Y., Zhu, R., Mi, L., Cao, Y., & Yao, D. (2016). Segmentation of white blood cell from acute lymphoblastic leukemia images using dual-threshold method. Comput Math Methods Med, 2016, 9514707. https://doi.org/10.1155/2016/9514707.

Mishra, S., Majhi, B., Sa, P. K., & Sharma, L. (2017). Gray level co-occurrence matrix and random forest based acute lymphoblastic leukemia detection. Biomed Signal Process Control, 33, 272-280. https://doi.org/10.1016/j.bspc.2016.11.021.

Putzu, L., Caocci, G., & Di Ruberto, C. (2014). Leucocyte classification for leukaemia detection using image processing techniques. Artif Intell Med, 62(3), 179-191. https://doi.org/10.1016/j.artmed.2014.09.002.

Alzubaidi, L., et al. (2021). Review of deep learning: concepts, CNN architectures, challenges, applications, future directions. J Big Data, 8(1). https://doi.org/10.1186/s40537-021-00444-8.

Qin, Y., Tang, Q., Xin, J., Yang, C., Zhang, Z., & Yang, X. (2023). A rapid identification technique of moving loads based on MobileNetV2 and transfer learning. Buildings, 13(2). https://doi.org/10.3390/buildings13020572.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

INCEPTIONV3 TRANSFER ÖĞRENME MİMARİSİNE UYGULANMAK ÜZERE GELİŞTİRİLEN HİBRİT AKTİVASYON FONKSİYONU İLE DİJİTAL BLAST HÜCRE GÖRÜNTÜLERİNİN SINIFLANDIRILMASI

Dr. Fatma AKALIN
Sakarya Üniversitesi, Bilgisayar ve Bilişim Bilimleri Fakültesi, Bilişim Sistemleri Mühendisliği Bölümü
ORCID: 0000-0001-6670-915X

Doç. Dr. Mehmet Fatih ORHAN
Sakarya Üniversitesi, Tıp Fakültesi, Çocuk Hematoloji ve Onkoloji Bölümü
ORCID: 0000-0001-8081-6760

ÖZET
Yapay zeka, bilişsel yeteneklerin makineler tarafından gerçekleştirilmesini sağlayan bir çerçevedir. Makine öğrenmesi, yapay sinir ağları ve derin öğrenme bu çerçeve de yer alan alt disiplinlerdir. Özellikle derin öğrenme, sağlık alanında sunduğu etkinlik nedeniyle tıbbi görüntüleme, teşhis, ilaç geliştirme, prognoz, risk değerlendirme vb. birçok uygulamada tercih edilmektedir. Aslında teknolojinin hızlı gelişimi ile birlikte yapay zekanın tıpta kullanımı umut verici çıktılar sunduğu için derin öğrenme tabanlı çalışmalar popülerlik kazanmıştır. Derin öğrenme algoritmaları içerisinde yer alan evrişimsel sinir ağları (CNN), genellikle görüntülerin sınıflandırılması için tercih edilmektedir. Son yıllarda uygulamaların performansını arttırmak üzere çeşitli evrişimsel sinir ağı mimarileri önerilmiştir. Bu çalışmada hesaplama maliyetinin minimize edilmesi için geliştirilen InceptionV3 transfer öğrenme mimarisi kullanılmıştır. Bu mimaride girdi olarak alınan verilerin özellikleri otomatik olarak çıkarıldıktan sonra aktivasyon fonksiyonu yardımı ile çıktı elde edilmektedir. Doğrusal olmayan gerçek dünya problemlerinin ağa öğretilmesine yardımcı olan aktivasyon fonksiyonları, pratikte farklı davranışlar sergilediği için seçimi kritik bir konudur. Bu bağlamda blast hücrelerin nonblast hücre kategorisine sahip görüntülerden ayırt edilmesi için çeşitli hibrit aktivasyon fonksiyonları önerilmiştir. 7 farklı deney arasında sigmoid, softmax ve Leakly_ReLU aktivasyon fonksiyonlarının birlikte kullanıldığı hibrit yapı deneyi, eğitim ve test veri kümesi üzerinde sırasıyla %100 ve %94.87 doğruluk oranı ile daha kararlı, istikrarlı ve başarılı bir çıktı üretmiştir. Bu sonuçlar, karar vericiler için güvenli, verimli ve maliyet etkin çıktılar ürettiği için tatmin edicidir.
Anahtar Kelimeler: Evrişimsel Sinir Ağı, InceptionV3 Transfer Öğrenme Mimarisi, Blast ve Nonblast Hücreleri, Önerilen Hibrit Aktivasyon Fonksiyonu

CLASSIFICATION OF DIGITAL BLAST CELL IMAGES WITH IMPROVED THE HYBRID ACTIVATION FUNCTION TO BE APPLIED TO INCEPTIONV3 TRANSFER LEARNING ARCHITECTURE

ABSTRACT
Artificial intelligence is a framework that enables cognitive abilities to be performed by machines. Machine learning, artificial neural networks and deep learning are subdisciplines within the framework of artificial intelligence. Especially deep learning is preferred in many applications such as medical imaging, diagnosis, drug development, prognosis, risk assessment, etc. due to the effectiveness it offers in the field of health.

In fact, with the rapid development of technology, deep learning-based studies have gained popularity as the use of artificial intelligence in medicine offers promising results. Convolutional neural networks (CNN), which are among deep learning algorithms, are frequently preferred, especially for classifying images. In recent years, various convolutional neural network architectures have been proposed to improve the performance of applications. In this study, the improved InceptionV3 transfer learning architecture to minimize the computational cost was used. In this architecture, after the features of the data taken as input are automatically extracted, the output is obtained with the help of the activation function. The selection of activation functions, which help teach nonlinear real-world problems to the network, is a critical issue because they exhibit different behaviors in practice. In this context, various hybrid activation functions have been proposed to distinguish blast cells from images with the nonblast cell category. Among 7 different experiments, the hybrid structure in which sigmoid, softmax and Leakly_ReLU activation functions were used together produced a more stable, stable and successful output with an accuracy rate of 100% and 94.87% on the training and test dataset, respectively. These results are satisfactory as they produce safe, efficient and cost-effective outputs for decision makers.
Keywords: Convolutional Neural Network, InceptionV3 Transfer Learning Architecture, Blast and Nonblast Cells, Proposed Hybrid Activation Function

GİRİŞ

Yapay zeka; makine öğrenmesi, yapay sinir ağları ve derin öğrenme yöntemlerini içeren bir çerçevedir. Bu çerçeve kapsamında yer alan makine öğrenmesi, veriler üzerinde eğitilmiş modelleri kullanarak karar verme süreçlerini inşa eder. Makine öğrenmesinin alt kümesi yapay sinir ağıdır. İnsan beyninin sahip olduğu işlevsellikleri simüle etmeyi amaçlar (Kufel ve ark., 2023). Biyolojik sinir sisteminden ilham alan bu yapı girdi katmanı, çıktı katmanı ve gizli katman/katmanlardan oluşmaktadır (Hashimoto, Ward ve Meireles, 2020), (Zheng ve Mazumder, 2019), (Hayou, Doucet ve Rousseau, 2019). Yapay sinir ağı yapısındaki gizli katman sayısının derinleşmesi ile derin öğrenme meydana gelmektedir (Kufel ve ark., 2023). Karmaşık yapıların ve ilişkilerin elde edilmesini mümkün kılan derin öğrenme yönteminde öğrenme kalıpları ve bağlantılar inşa edilerek güçlü bir bilgi çıkarım süreci oluşturulur. Aynı zamanda doğrusal olmayan dönüşümlerle daha derin çıkarımlar sağlanarak soyut ve karmaşık temsiller elde edilir. Derin öğrenme algoritmaları içerisinde yer alan Evrişimsel Sinir Ağları, çoğunlukla görüntüleri sınıflandırmak amacıyla kullanılmaktadır (Najafabadi ve ark., 2015). Son yıllarda uygulamaların performansını arttırmak için çeşitli CNN mimarileri önerilmiştir (Alzubaidi ve ark., 2021). Bu çalışmada önerilen mimariler arasında yer alan InceptionV3 transfer öğrenme mimarisi kullanılmıştır. 2015 yılında Szegedy ve arkadaşları tarafından (Szegedy ve ark., 2016) makalesinde tanıtılan InceptionV3, hesaplama maliyetinin minimize edilmesi için büyük boyutlu filtreler yerine asimetrik küçük boyutlu filtreler tercih etmektedir. Ayrıca büyük boyutlu filtrelerden önce 1*1 boyutunda darboğaz konvolüsyonu, Inceptionv3 modelinin bir diğer özelliğidir (Alzubaidi ve ark., 2021).

InceptionV3 mimarisi tarafından girdi olarak alınan verinin özellikleri otomatik olarak çıkarıldıktan sonra aktivasyon fonksiyonu yardımıyla çıktı elde edilir. Performans üzerinde büyük etkisi olan aktivasyon fonksiyonlarının seçimi kritik bir konudur. Doğrusal olmayan gerçek dünya problemlerinin sinir ağına öğretilmesini sağlar (Hashimoto, Ward ve Meireles, 2020), (Zheng ve Mazumder, 2019), (Hayou, Doucet ve Rousseau, 2019). Karmaşık temsillerin ağa öğretilebilmesini sağlayan aktivasyon fonksiyonu, pratikte farklı davranışlar ortaya çıkarır.

Örneğin sinir ağlarının erken döneminde sigmoid en çok tercih edilen aktivasyon fonksiyonu idi. Fakat gerçekleştirilen çalışmalar, gradyanların ölmesi problemine neden olabileceğini gösterdi. Bu nedenle ilerleyen zamanlarda ReLU en çok kullanılan aktivasyon fonksiyonu olarak tercih edildi (Rasamoelina, Adjailia ve Sincak, 2020).

ARAŞTIRMA VE BULGULAR

Deneysel Çalışmalar

Aktivasyon fonksiyonları bir veya daha fazla nörondan bilgiyi alıp bir çıktı değeri ile eşleştiren yapılardır. Eşleştirilen bu çıktı değeri bir sonraki nöron katmanına aktarılmaktadır (Kufel ve ark., 2023). Bu çalışmada ALL-IDB veri kümesi (ALL-IDB Dataset, 2024) vasıtasıyla ALL hastalığının tanısında önemli bir gösterge olan blast hücrelerinin tespiti için hibrit bir aktivasyon fonksiyonu önerilmiştir. Sinir ağlarının eğitiminde önemli bir rol oynayan aktivasyon fonksiyonları, pratikte farklı davranışlar ortaya çıkardığı için seçimi kritik bir konudur (Rasamoelina, Adjailia ve Sincak, 2020). Bu çalışmada ikili sınıflandırma problemleri için kullanılan sigmoid aktivasyon fonksiyonu ve çok sınıflı sınıflandırma problemleri için kullanılan softmax aktivasyon fonksiyonu ile blast hücrelerin tespitine ilişkin istikrar ve başarım değerleri incelenmiştir. Ardından gradyan hesaplamasını basitleştirerek ağın hızlı bir şekilde çözüme yakınsamasını sağlayan ReLU aktivasyon fonksiyonu ile bu fonksiyonun muadilleri olan ELU ve Leakly ReLU ile hibrit fonksiyon yapıları oluşturulmuştur.

Deneysel Sonuçlar

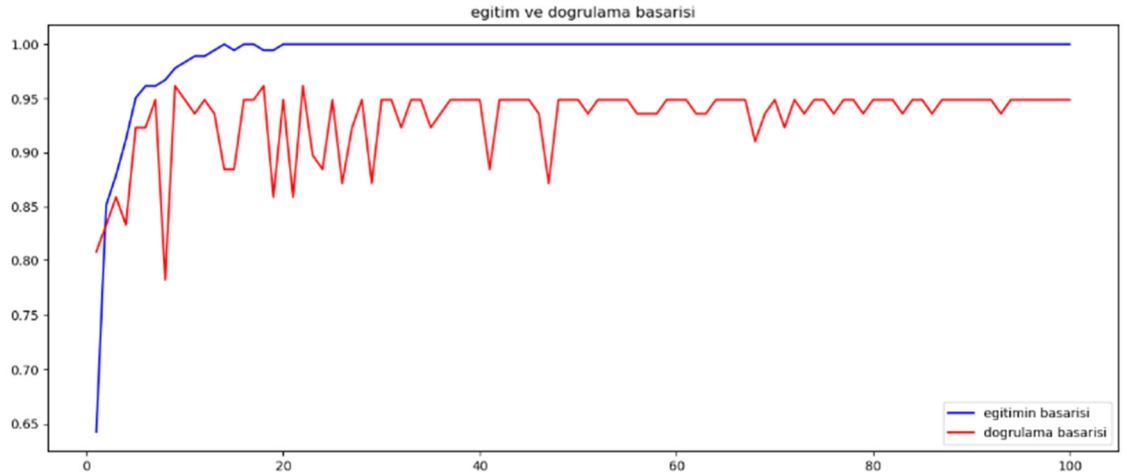
Bu kısımda orijinal ve iyileştirilmiş periferik kan yayma görüntüleri üzerinde InceptionV3 mimarileri ile blast ve nonblast kategorilerine ilişkin sınıflandırma işleminin gerçekleştirilmesi için deneyler yapılmıştır. Bu deneylerde son katman kaldırılmıştır. Kaldırılan katman yerine 2 kategorinin sınıflandırılmasına yönelik yoğun bir katman eklenmiştir.

Maksimum performans ve istikrar çıktısına ulaşmak üzere sıfırdan eğitilmeyen InceptionV3 mimarisi üzerinde gerçekleştirilen deneyde 2 kategorinin sınıflandırılmasına ilişkin olarak eklenen yoğun katman için sigmoid aktivasyon fonksiyonu kullanılmıştır. Eğitim sonucunda ulaşılan eğitim ve doğrulama başarısı Şekil 2.1'de verilmiştir.



Şekil 2.1. Birinci deney sonucunda elde edilen eğitim ve doğrulama başarısı grafiği

Şekil 2.1'de verilen grafik incelendiğinde istikrarsız bir çıktı elde edildiği görülmektedir. Bu nedenle çoklu sınıflandırma problemi için tercih edilen softmax fonksiyonunun ikili sınıflandırma probleminde üreteceği performans araştırılmıştır. Sıfırdan eğitilmeyen InceptionV3 mimarisi kapsamında gerçekleştirilen deneyde ulaşılan eğitim ve doğrulama başarısı Şekil 2.2'de verilmiştir.



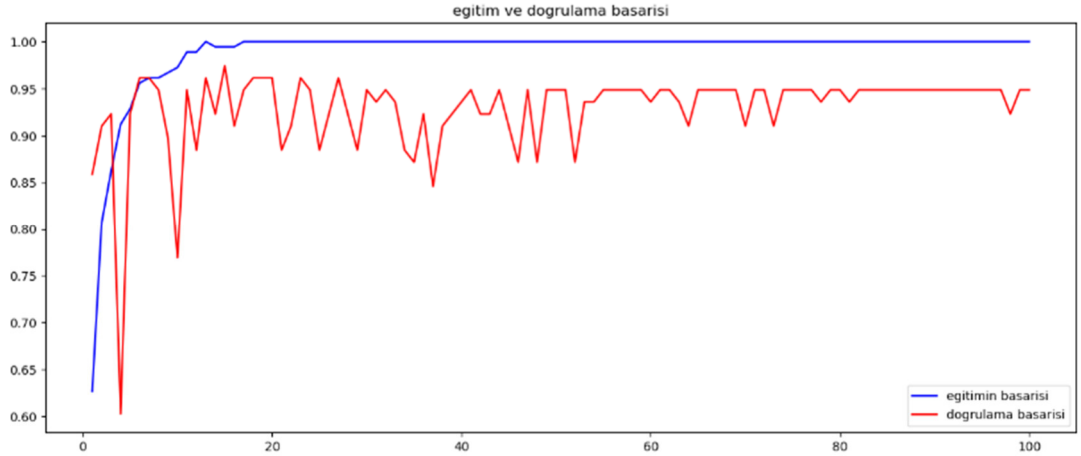
Şekil 2.2. İkinci deney sonucunda elde edilen eğitim ve doğrulama başarısı grafiği

Şekil 2.2'deki grafikte istikrarsız bir çıktı sunmuştur. Bu nedenle bu deneyde sigmoid ve softmax fonksiyonu hibrit bir şekilde kullanılmıştır. Softmax fonksiyonuna sigmoid fonksiyonunun ürettiği çıktının girdi olarak verildiği hibrit yapı için sıfırdan eğitilmeyen InceptionV3 mimarisi kapsamında elde edilen eğitim ve doğrulama başarısı Şekil 2.3'te verilmiştir.



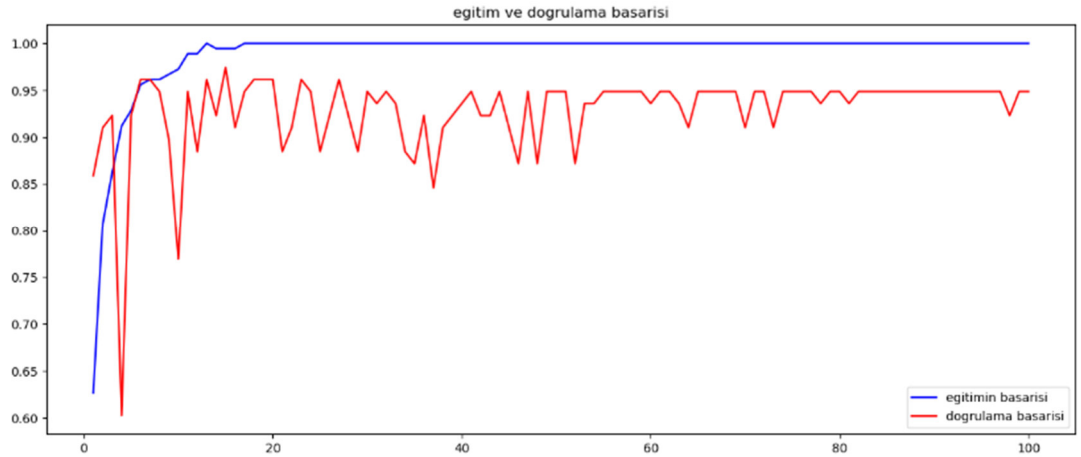
Şekil 2.3. Üçüncü deney sonucunda elde edilen eğitim ve doğrulama başarısı grafiği

Şekil 2.3'te üretilen çıktı, Şekil 2.1. ve Şekil 2.2'ye göre daha büyük bir istikrarsızlık sunmuştur. Bu nedenle bu deneyde sigmoid fonksiyonuna softmax fonksiyonunun ürettiği çıktının girdi olarak verildiği hibrit yapı için sıfırdan eğitilmeyen InceptionV3 mimarisi kapsamında Şekil 2.4.'te sunulan eğitim ve doğrulama başarısı incelenmiştir.



Şekil 2.4. Dördüncü deney sonucunda elde edilen eğitim ve doğrulama başarısı grafiği

Şekil 2.4'te incelenen grafikte, Şekil 2.1, Şekil 2.2 ve Şekil 2.3'te yer alan grafiklere göre daha güçlü bir istikrara ulaşıldığı görülmektedir. Fakat bu istikrarın arttırılması özellikle insan sağlığına yönelik karar vericiler için önemli bir husustur. Bu nedenle istikrara yönelik iyileşmenin geliştirilmesi için sigmoid fonksiyonuna softmax fonksiyonunun ürettiği çıktının girdi olarak verildiği hibrit yapıdaki sigmoid aktivasyon fonksiyonu için relu aktivasyon fonksiyonunun entegrasyonu sağlanmıştır. Bu bağlamda matematiksel ifadesi 1/1+e^x olan ana sigmoid fonksiyonu 1/1+e^(relu(x)) olarak yeniden düzenlenmiştir. Sıfırdan eğitilmeyen InceptionV3 mimarisi kapsamında elde edilen eğitim ve doğrulama başarısı Şekil 2.5'te verilmiştir.



Şekil 2.5. Beşinci deney sonucunda elde edilen eğitim ve doğrulama başarısı grafiği

Şekil 2.5. incelendiğinde gradyan hesaplamasını basitleştirerek ağın hızlı bir şekilde çözüme yakınsamasını (Singh, Saini ve Savita, 2023) sağlaması nedeniyle önerilen hibrit yapıya entegre edilen ReLU aktivasyon fonksiyonunun Şekil 2.4'te üretilen eğitim ve doğrulama başarısı ile benzer çıktılar sunduğu gözlemlenmektedir. Bu durum ağırlıkları güncellenen ağda gradyanları çok küçük hale gelen ağırlıkları, ağın etkili bir şekilde öğrenememesi (Singh, Saini ve Savita, 2023) ile açıklanabilmektedir. Bu nedenle ReLU aktivasyon fonksiyonunun bir türevi olan ve ölü ReLU sorununu ele alarak performansı arttırmak üzere tanıtılan Exponential Linear Unit (ELU) fonksiyonu kullanılmıştır.

Sigmoid fonksiyonuna softmax fonksiyonunun ürettiği çıktının girdi olarak verildiği hibrit yapıdaki ana sigmoid aktivasyon fonksiyonu, 1/1+e^(elu(x)) olarak yeniden düzenlenmiştir. Sıfırdan eğitilmeyen InceptionV3 mimarisi kapsamında elde edilen eğitim ve doğrulama başarısı Şekil 2.6'da verilmiştir.



Şekil 2.6. Altıncı deney sonucunda elde edilen eğitim ve doğrulama başarısı grafiği

Şekil 2.6 incelendiğinde önerilen hibrit yapıya entegre edilen ELU aktivasyon fonksiyonunun uzun soluklu bir istikrar ürettiği görülmektedir.
Bu deneyde kullanılan ELU fonksiyonu Kod 1 kapsamında sunulmuştur.

Kod 1: ELU fonksiyonunun tasviri (Singh, Saini ve Savita, 2023)

```
def elu(x, alpha=1.0):
    return tf.where(x > 0, x, alpha * (tf.exp(x) - 1))
```

ELU fonksiyonunun yanı sıra ölü ReLU sorununu ele almak için Leakly ReLU [9] aktivasyon fonksiyonunun entegre edildiği bir deney daha yapılmıştır. Sigmoid fonksiyonuna softmax fonksiyonunun ürettiği çıktının girdi olarak verildiği hibrit yapıdaki ana sigmoid aktivasyon fonksiyonu 1/1+e^(leakly_relu(x)) olarak yeniden düzenlenmiştir. Sıfırdan eğitilmeyen InceptionV3 mimarisi kapsamında elde edilen eğitim ve doğrulama başarısı Şekil 2.7'de verilmiştir.



Şekil 2.7. Yedinci deney sonucunda elde edilen eğitim ve doğrulama başarısı grafiği

Şekil 2.7 incelendiğinde önerilen hibrit yapıya entegre edilen ELU aktivasyon fonksiyonunun gerçekleştirilen diğer deneylere kıyasla kararlı ve istikrarlı bir sonuç ürettiği görülmektedir. Bu deneyde kullanılan Leakly_Relu fonksiyonu Kod 2 kapsamında sunulmuştur.

Kod 2: Leakly_ReLU fonksiyonunun tasviri (Singh, Saini ve Savita, 2023)

```
def leaky_relu(x, alpha=0.2):
    return tf.maximum(alpha * x, x)
```

Şekil 2.7'de verilen grafik incelendiğinde blast ve nonblast hücre kategorilerine ilişkin sınıflandırma sürecinin başarılı bir şekilde gerçekleştiği görülmektedir. Özellikle grafikte çizilen osilasyonlar yaklaşık 65. İterasyondan sonra hiç gözlemlenmemiştir. Bu durum tıpta karar vericiler için tasarlanacak güçlü bir bilgisayar destekli sistemin varlığına işaret etmektedir.

SONUÇ

Bu çalışmada ALL hastalığının tespitinde önemli bir gösterge olan blast hücrelerin nonblast kategorisine sahip hücrelerden ayırt edilmesi için InceptionV3 transfer öğrenme mimarisi kullanılmıştır. Eğitim sürecinde Inceptionv3 mimarisi tarafından girdi olarak alınan verilerin özellikleri, otomatik çıkarıldıktan sonra aktivasyon fonksiyonları yardımı ile çıktı üretilmiştir. Aktivasyon fonksiyonları, karmaşık ve doğrusal olmayan temsillerin ağa öğretilmesini sağladığı için pratikte farklı davranışlar ortaya çıkarmaktadır. Bu bağlamda gerçekleştirilen 7 farklı deney incelendiğinde sigmoid, softmax ve Leakly_ReLU aktivasyon fonksiyonlarının birlikte kullanıldığı hibrit yapının daha kararlı, istikrarlı ve başarılı bir performans eğrisi ürettiği gözlemlenmektedir. Bu sonuçlar, karar vericilere güvenli, verimli ve maliyet etkin çıktılar ürettiği için tatmin edicidir.

KAYNAKÇA

Kufel, J., et al. "What Is Machine Learning, Artificial Neural Networks and Deep Learning?—Examples of Practical Applications in Medicine." Diagnostics, 13(15). Multidisciplinary Digital Publishing Institute (MDPI). https://doi.org/10.3390/diagnostics13152582

Hashimoto, D. A., Ward, T. M., & Meireles, O. R. "The Role of Artificial Intelligence in Surgery." Advances in Surgery, 54. Academic Press Inc., pp. 89–101. https://doi.org/10.1016/j.yasu.2020.05.010

Zheng, N., & Mazumder, P. "Fundamentals and Learning of Artificial Neural Networks." In Learning in Energy-Efficient Neuromorphic Computing, Wiley, 2019, pp. 11–60. https://doi.org/10.1002/9781119507369.ch2

Hayou, S., Doucet, A., & Rousseau, J. "On the Impact of the Activation Function on Deep Neural Networks Training." Feb. 2019, [Online]. Available: http://arxiv.org/abs/1902.06853

Najafabadi, M. M., Villanustre, F., Khoshgoftaar, T. M., Seliya, N., Wald, R., & Muharemagic, E. "Deep learning applications and challenges in big data analytics." J Big Data, 2(1). https://doi.org/10.1186/s40537-014-0007-7

Alzubaidi, L., et al. "Review of deep learning: concepts, CNN architectures, challenges, applications, future directions." J Big Data, 8(1). https://doi.org/10.1186/s40537-021-00444-8

Szegedy, C., Vanhoucke, V., Ioffe, S., Shlens, J., & Wojna, Z. "Rethinking the Inception Architecture for Computer Vision." In Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition, IEEE Computer Society, pp. 2818–2826. https://doi.org/10.1109/CVPR.2016.308

Rasamoelina, A. D., Adjailia, F., & Sincak, P. "A Review of Activation Function for Artificial Neural Network." In SAMI 2020: IEEE 18th World Symposium on Applied Machine Intelligence and Informatics: proceedings: January 23-25, 2020, Herl'any, Slovakia, 2020, pp. 281–286.

Singh, Y., Saini, M., & Savita. "Impact and Performance Analysis of Various Activation Functions for Classification Problems." In Proceedings of IEEE InC4 2023 - 2023 IEEE International Conference on Contemporary Computing and Communications, Institute of Electrical and Electronics Engineers Inc., 2023. https://doi.org/10.1109/InC457730.2023.10263129

ALL-IDB Acute Lymphoblastic Leukemia Image Database for Image Processing. Retrieved from https://scotti.di.unimi.it/all/.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

Tİ6AL4V ALAŞIMININ KURU, MMY, HBN ŞARTLARI ALTINDA TORNALANMASINDA YÜZEY PÜRÜZLÜLÜĞÜ, KESME SICAKLIĞI VE GÜÇ TÜKETİMİNİN İNCELENMESİ

Ali Cevahir ERKANİ
Düzce Üniversite, Mühendislik Fakültesi, Mekatronik Mühendisliği Bölümü
ORCID: 0009-0004-1465-2672

Eralp DEMİR
Düzce Üniversite, Mühendislik Fakültesi, Mekatronik Mühendisliği Bölümü
ORCID: 0009-0008-3302-8583

Baddal KARTAL
Düzce Üniversite, Mühendislik Fakültesi, Mekatronik Mühendisliği Bölümü
ORCID: 0009-0009-8959-1516

Hakan Zafer KIZILKAYA
TUSAŞ-Türk Havacılık Uzay Sanayii A.Ş.
ORCID: 0000-0002-7842-241X

Doç. Dr. Şenol ŞİRİN
Düzce Üniversite, Mühendislik Fakültesi, Mekatronik Mühendisliği Bölümü
ORCID: 0000-0002-3629-9003

ÖZET
Titanyum alaşımları mükemmel ısı ve korozyon direnci, yüksek tokluk, dayanım, yüksek çalışma sıcaklığı ve düşük ağırlık gibi özelliklere sahiptir. Tüm bu üstün özellikleri yüzünden uzay ve havacılık alanı gibi çeşitli endüstriyel alanlarda titanyum alaşımları, yaygın şekilde tercih edilmektedirler. Ancak üstün avantajlı özelliklerinin yanında titanyum alaşımları şekillendirilmesi zor malzemeler olarak da bilinirler. Şekillendirme operasyonları esnasında kullanılan geleneksel kesme sıvıları petrol esaslı oldukları için çevre ve insan sağlığı üzerinde olumsuz etkileri bulunmaktadır. Bu çalışmada uzay ve havacılık endüstrisinde yaygın şekilde kullanılan Ti6Al4V alaşımının sürdürülebilir şartlar altında tornalanması amaçlanmıştır. Bu amaç doğrultusunda ise kuru, bitkisel esaslı minimum miktarda yağlama (MMY), hegzagonal bor nitrür (hBN) nanopartikül takviyeli nanoakışkan şartları tercih edilmiştir. Tornalama merkezinin kullanıldığı deneysel yürütülen çalışmada, soğutma/yağlama şartlarının etkisinin irdelenmesi için kesme hızı, ilerleme, kesme derinliği ve MMY sistem parametreleri sabit alınmıştır. Ti6Al4V malzemenin tornalama performans değerlendirme kriterleri: yüzey pürüzlülük ortlama değeri (Ra), yüzey pürüzlülük yüksek tepe-derin çukur ortalama değeri (Rz), kesme bölgesinde azami sıcaklık (T) ve güç tüketimi (P) tercih edilmiştir. Deneysel çalışmadan elde edilen veriler ışığında, hBN şarı kuru şarta kıyasla, Ra, Rz, T ve P değerlerini sırasıyla %41.72, %30.42, %21.01 ve %41.38 oranında azalma göstermiştir. Sonuç olarak hBN nanoakışkan şartı kuru ve MMY şartlarına göre tüm değerlendirme kriterlerinde daha üstün bir performans sergilemiştir.
Anahtar Kelimeler: Sürdürülebilir imalat, Ti6Al4V, nanoakışkan, hBN, havacılık ve uzay

INVESTIGATION OF SURFACE ROUGHNESS, CUTTING TEMPERATURE AND POWER CONSUMPTION WHEN TURNING TI6AL4V ALLOY UNDER DRY, MQL, HBN CONDITIONS

ABSTRACT
Titanium alloys have excellent heat and corrosion resistance, high toughness, strength, high processing temperature and low weight. Because of all these superior properties, titanium alloys are widely preferred in various fields such as aerospace and aviation industrials. However, in addition to their superior properties, titanium are also known to be difficult materials to cut alloys. Conventional cutting fluids used during machining operations are petroleum-based and have negative effects on the environment and employee health. In this study, it was aimed to Ti6Al4V alloy, which is widely used in the aerospace industry, turning under sustainable conditions. For this purpose, dry, vegetable-based minimum quantity lubrication (MQL), hexagonal boron nitride (hBN) nanoparticle reinforced nanofluid conditions were preferred. In the experimental study using the turning center, cutting speed, feed, depth of cut, and MQL system parameters were taken constant to examine the effect of cooling/lubrication conditions. Turning performance evaluation criteria of Ti6Al4V material: surface roughness average value (Ra), surface roughness high peak-deep pit average value (Rz), maximum temperature in the cutting zone (T) and power consumption (P) were preferred. In the light of the data obtained from the experimental study, the Ra, Rz, T and P values of the hBN nanofluid showed a reduction of 41.72%, 30.42%, 21.01% and 41.38%, respectively, compared to the dry condition. As a result, the hBN nanofluid condition outperformed the dry and MMY conditions in all evaluation criteria.
Keywords: Sustainable manufacturing, Ti6Al4V, nanofluids, hBN, aerospace and aviation

GİRİŞ
Ti6Al4V Grade 5 alaşımı süper alaşım kategorisinde yer almaktadır. Titanyum alaşımları üstün korozyon direnci, tokluk, mukavemet, yüksek çalışma sıcaklığı ve düşük ağırlık gibi özelliklere sahiptir. Bu yüzden titanyum alaşımları uzay ve havacılık sektörü başta olmak üzere, savunma sanayisinde ve petro kimya endüstrisinde yaygın bir şekilde kullanılmaktadır. Ancak bu kadar avantajının yanında titanyum alaşımları şekillendirilmesi zor alaşımlar olarak da bilinmektedir [1]. Özellikle konvansiyonel işlemede bu titanyum alaşımlarının şekillendirilmesinde ciddi sorunlarla karşılaşılmaktadır. Bu sorunların en başında şekillendirme operasyonları esnasında yüksek sıcaklık oluşumları, kesici takımlarda ani aşınmalar, yüzey kalitesinin istenen düzeyde olmaması gibi bir sürü dezavantaj da beraberinde gelmektedir.
Konvansiyonel şekillendirme operasyonlarında kesme bölgesindeki sıcaklığın azaltılması ve işlenen yüzeyi kalitesinin artırılması için kesme yağları kullanılmaktadır [2]. Bu kesme yağları su/ yağ karışımı ihtiva eden emülsiyonlardır. Özellikle sürdürülebilir işleme teknolojilerinde petrol esaslı kesme sıvılarının kullanımının azaltılması bir gerekliliktir [3]. Ekolojik işleme olarak da adlandırılan kuru işleme, kesme sıvısı kullanmaması nedeniyle avantajlı olsa da istenilen takım ömrü ve yüzey kalitesi elde edilemediğinden ciddi dezavantaj oluşturabilmektedir.
Son yıllarda özellikle araştırmacılar kesme bölgesine çok az miktarda kesme sıvısının gönderildiği minimum miktarda yağlama (MMY) üzerine çalışmalarını yoğunlaştırmışlardır. MMY çok düşük miktarda yağ kullanımı ile konvansiyonel soğutma/yağlama yöntemine göre yüksek oranda tasarruf edilmesini sağlayan yeni nesil soğutma/yağlama yöntemi olarak ifade edilebilir [4]. MMY yönteminde farklı kesme yağları kullanılabilmektedir.

Yöntemde avantaj sağlaması, işleme verimliliği yüzünden, bitkisel esaslı yağlar sıklıkla tercih edilmektedir. Bitkisel esaslı yağlar biyobozunabilir olmakla birlikte çevreye de herhangi bir zararı yoktur. MMY yöntemin çok az miktarda kullanılan yağı basınçlı hava ile karıştırarak aerosol sis bulutu şeklinde iş parçasına gönderilen bir sistem olarak bilinmektedir [5]. Her ne kadar etkili bir yöntem gibi gözükse de konvansiyonel işleme ile kıyaslandığında işlenebilirlik performansı açısından bu yöntemde yetersiz gelebilmektedir. Bu sebeple içerisine nanoakışkan hazırlamada kullanılan ve termal iletim katsayısı yüksek aynı zamanda katı yağlayıcılığı da üstün performans sergileyen nanopartiküller de eklenebilmektedir. Hegzagonal bor nitrür (hBN), nanopartikül olarak kesme sıcaklığı ve yüzey kalitesinde iyi sonuçlar verdiği bilinmektedir [6]. Bunlara ek olarak biyobozunabilir çevreci olarak da adlandırılabilir. Yapılan çalışmalar incelendiğinde, Şirin yaptığı çalışmada AISI 904L süper dubleks paslanmaz çeliğini tornalamıştır. Yapılan deneysel çalışmada araştırmacı kuru, MMY ve MMY+hBN soğutma/yağlama koşulları altında gerçekleştirmiştir. Deneysel çalışma sonucunda MMY+hBN soğutma/yağlamanın diğer koşullara göre daha iyi performans gösterdiğini ifade etmiştir [4]. Aynı zamanda literatürde yer alan ve MMY sistemi ile konvansiyonel soğutma sisteminin karşılaştırıldığı birçok çalışmada buna benzer sonuçlar elde edilmiştir. Örneğin; Yıldırım vd., Waspaloy süper alaşımını işlerken kuru, ıslak ve MMY sistemini karşılaştırmışlardır. Araştırmacılar, ıslak ve MMY sisteminin birbirine yakın sonuçlar verdiğini ifade etmişlerdir [7]. Aynı zamanda, Er ve Zeyrek, yaptıkları çalışmada Ti-6Al-4V alaşımını MMY koşulları altında tornalamışlardır. MMY soğutma/yağlamanın son derece avantajlı sonuçlar verdiğinin altını çizmişlerdir [8]. MMY sistemine bakıldığında daha az yağ kullanarak sıcaklık değerlerinde iyileşme görülse de yüzey kalitesi ve kesici takım hızında konvansiyonel işleme ile arasında çok büyük bir fark olmadığı görülmektedir.

Yapılan deneyler ve literatür araştırmalarına bakıldığında petrol esaslı kesme yağlarının kullanımını azaltmak için çeşitli çalışmalar mevcut olup, bunlara ek olarak da yeni çalışmalar yapılmaya çalışıldığı görülmektedir. Buradaki en önemli husus kesme yağları azaltılırken kesme sıcaklığı, yüzey pürüzlülük, güç tüketimi ve takım aşınması gibi parametrelerinin verimliliğini düşürmeden kesme yağlarının kullanımının azaltılması amaçlanmaktadır. Bunun için çeşitli malzemeler, işleme yöntemi, katkı maddesi, karıştırma oranı vb. gibi parametrelerin araştırılması önemli bir husustur. Literatür çalışmalarında özellikle titanyum ve alaşımları üzerine çalışmaların yetersiz kaldığı ve vorteks soğutma ile çalışmaların ise neredeyse hiç kullanılmadığı anlaşılmıştır. Bu çalışmada kuru, MMY, MMY+hBN, soğutma/yağlama koşulları altında Ti6Al4V Grade 5 malzeme tornalanmıştır. İşleme performans kriteri olarak, yüzey kalitesi, kesme sıcaklığı ve güç tüketimi tercih edilmiştir. Çalışma ile ilgili detaylı bilgileri aşağıdaki bölümlerde dikkatlice ele alınmıştır.

MATERYAL YÖNTEM

Özellikle havacılık ve uzay sektöründe ve savunma sanayisinde geçmişten günümüze kadar birçok demir, çelik, nikel ve süper alaşım gibi malzemeler kullanılmıştır. Bu malzemeler her ne kadar sürdürülebilir imalat ve işlenebilirlik açısından iyi bir yere sahip olsa bile istenilen korozyon direnci ve hafiflik bakımından yeterli görülmedikleri için günümüz koşullarında yetkinlikleri azalmaktadır. Bu deneyde kullanacağımız Ti6Al4V Grade 5 alaşımı korozyon direnci ve hafif olduğundan dolayı kullanılmaktadır.

Ti6Al4V alaşımı, titanyum (Ti), alüminyum (Al) ve vanadyum (V) elementlerini içeren bir metal alaşımıdır. Özellikle havacılık ve uzay sektöründe, savunma sanayisinde önemli bir yere sahiptir.

Ti6Al4V alaşımı mükemmel ısı ve korozyon direnci, tokluk, mukavemet, yüksek çalışma sıcaklığı ve düşük ağırlık gibi özelliklere sahiptir. Ti6Al4V Grade 5 alaşımın elemement içeriği ve fiziksel özellikleri Tablo 1'de verilmiştir.

Tablo 1. Ti6Al4V element içeriği ve fiziksel özellikleri.

Ti-6Al-4V (% Ağırlıkça)		Ti-6Al-4V Teknik Özellikler	
Al	6	Yoğunluk (g/cm^3)	4,43
Fe	Maks 0,25	Erime Noktası (°C)	1649
O	Maks 0,2	Isı İletkenlik (W/Mk)	7,2
Ti	90	Elastisite Modülü (GPa)	114
V	4	Maksimum Mukavemet (MPa)	1000
		Akma Mukavemeti (MPa)	880

2.1 Takım Tezgahı ve Kesici Takım

Tornalama deneyleri için Ti6Al4V alaşımı ticari halde temin edilmiş olup herhangi bir işlem (su verme vb. uygulanmamıştır. Ti6Al4V Grade 5 alaşımı 45mm çapında 250mm uzunlukta olup, CNC Torna merkezine (ayna-punto arasına) rijit bir şekilde bağlanmıştır. Kullanılan CNC torna tezgahı ACCCUWAY JT 150 CNC Torna merkezi Şekil 1'de verilmiştir.



Şekil 1. ACCCUWAY JT 150 CNC Torna Tezgahı

Tornalama deneylerinde ISCAR marka ISO CNMG 120404 kodlu, 431 EUP kalite TiAlN PVD kaplamalı sementit karbür kesici takımlar kullanılmıştır. Kesici takımların rijit bir şekilde bağlanmasında TBurst PCLNR2020M12-TB takım kateri kullanılmıştır.
Tornalama deneylerinde kesme hızı 50 m/dk, ilerleme hızı(f) 0.30 mm/dev ve kesme derinliği 1mm sabir alınmış ve tornalama deneyleri gerçekleştirilmiştir.

2.2 Soğutma Yağlama Koşulları

CNC torna ve frezeler talaşlı imalat kısmında büyük bir önem arz etmektedir. Talaşlı imalatta akla ilk gelen işleme kuru işlemedir. Kuru işleme her ne kadar metallerde etkili olsada istenilen yüzey kalitesi ve kesici takım ömrü gibi parametrelerde eksik kalmaktadır. Aynı zamanda alüminyum gibi yumuşak metallerde de yüksek sıcaklıktan dolayı iş parçasında bozulma, kesici takıma talaş yapışma gibi problemleri bulunmaktadır.

Bu sorunlardan dolayı endüstriyel alanda talaşlı imalatta yaygın olarak kullanılan kesme sıvıları (emülsiyon sıvıları, metal kesme yağları vb.) kullanılmaktadır. Bu kesme sıvıları da her ne kadar metal, alüminyum ve çelik gibi metallerde etkili olsa dahi hem insan sağlığını olumsuz etkilemekte hem de Ti6Al4V gibi alaşımlarda verimli olmadığı ifade edilmiştir.
Bu çalışmada, kuru, MMY ve hBN soğutma/yağlama stratejileri altında Ti6Al4V alaşımına bir dizi deneysel performans testleri uygulanmıştır. Kuru işleme için herhangi bir soğutma/yağlama stratejisi kullanılmadan tornalama işlem yapılmıştır. Çıkan değerler kaydedilmiştir ve referans olarak kullanılmıştır. MMY soğutma yağlama prosesi için SKF LubriLean Vario (Şekil 2) model bir cihaz kullanılmıştır. MMY sisteminde bitkisel esaslı yağ için Opet Fuchs PlantoCut 10 SR tercih edilmiştir.



Şekil 2. SKF LubriLean Vario MMY Cihazı

Literatürde yapılan çalışmalarda, bitkisel esaslı yağın içine hacimce %0,5-1 oranında hBN nanopartikül eklenerek daha iyi değerler alındığı görülmüştür. Literatürde yapılan çalışmalardan elde edilen bilgiler doğrultusunda, bu çalışmada bitkisel esaslı kesme yağının içerisine hacimce %0,65 oranında hBN nanopartikülleri eklenerek nanoakışkan karışımlar hazırlanmıştır. Nanoakışkan hazırlamada kullanılan hBN nanopartikül özellikleri Tablo 2'de verilmiştir.

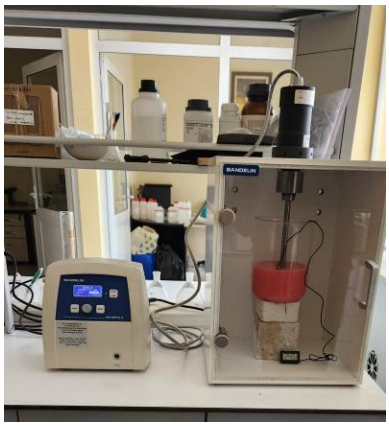
Tablo 2. hBN nanopartikül özellikleri

Boyut (mm)	Saflık(%)	Yoğunluk (gr/cm3)	Şekil	Renk
80	99,9	2,3	küresel	beyaz

Nanoakışkan hazırlama iki aşamada yapılmıştır. İlk olarak Daihan HD3200 mekanik karıştırıcıda (Şekil 3) bitkisel esaslı yağ, ardından hacimce %0,65 olan hBN nanopartikülü eklenmiştir. Mekanik karıştırma 750 dev/dak hızda ve 1 saat süreyle devam etmiştir. Ardından elde edilen karışım Bandelin Sonopuls HD 320 Ultrasonik Homojenizatörüne (Şekil 4) alınmıştır. Burada 20 kHz ve 200 W gücünde, 30 dakika süreyle tekrar karıştırılmaya devam edilmiştir. Karıştırma aşamaları sonunda, karışım hazır hale gelmiştir. Daha sonra hBN nanoakışkanı hemen taze olarak, MMY sistemine eklenerek deneyler gerçekleştirilmiştir.



Şekil 3. Daihan HD3200Mekanik Karıştırıcı



Şekil 4. Bandelin Sonopuls HD 320 Ultrasonik

Kesme sıcaklığı ölçümlerinde Optris PI 450 kızılötesi termal kamera kullanılmıştır. Termal kamera torna makinesi içine bağlantıları yapılarak sabitlenmiştir. Alınan ölçümler bilgisayarda ekran termal kamera programı kayıt ve anlık olarak kaydedilerek verilerin kaydedilmesi sağlanmıştır. Termal kamera konumu ve tezgaha konumlandırması Şekil 5'te verilmiştir.



Şekil 5. Termal kamera görüntüsü

Tezgah güç tüketim için FLUKE 1732 Üç Fazlı Elektrik Enerjisi Kayıt Cihazı kullanılmıştır. Torna tezgahı giriş fazlarına aparat ile takılarak ölçümler gerçekleştirilmiştir. Alınan verileri kayıt cihazı hafızasına kaydedilip sonradan değerlendirilmeye alınmıştır. Güç tüketim ölçer cihazı Şekil 6'da verilmiştir.

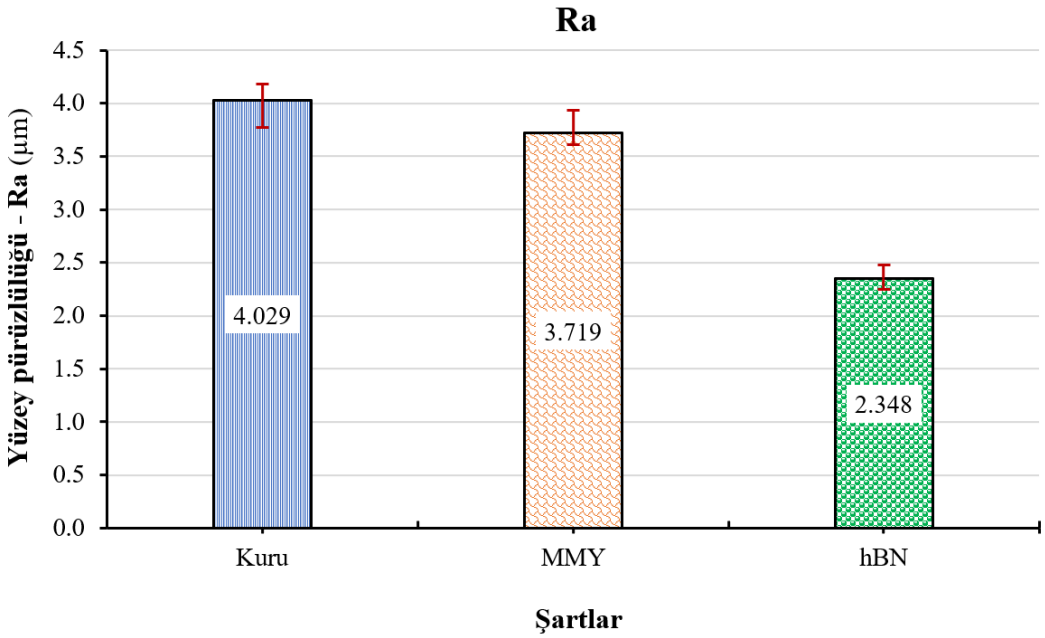


Şekil 6. FLUKE 1732 Üç Fazlı Elektrik Enerjisi Kayıt Cihazı

BULGULAR VE TARTIŞMA

3.1 Yüzey Pürüzlülük Sonuçları

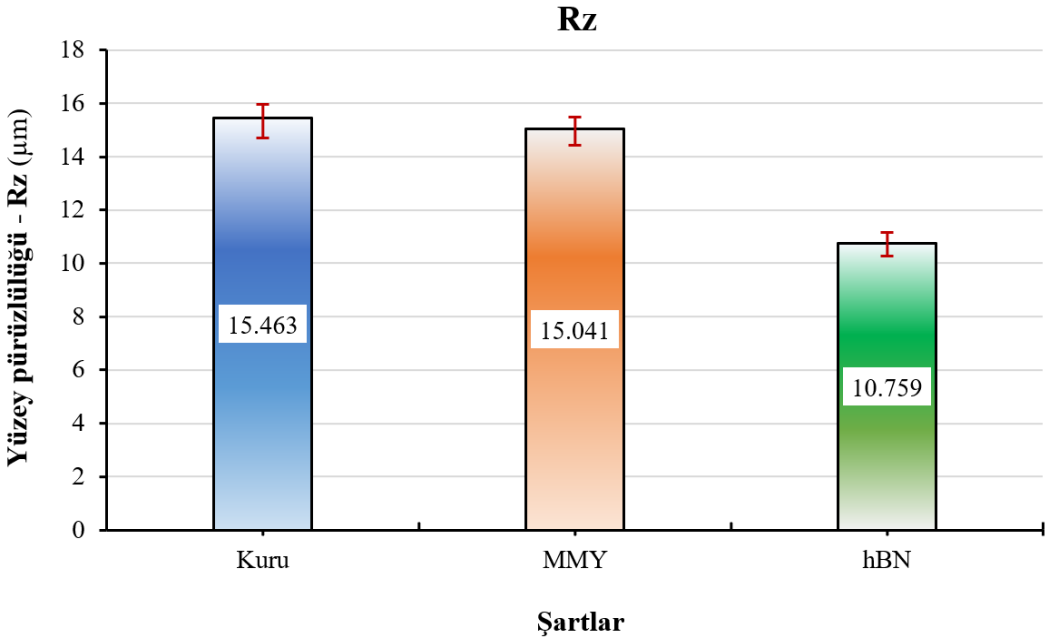
Yüzey pürüzlülüğü, bir iş parçasının yüzeyinde imalat yönteminden kaynaklanan takım izleri, sapmalar ve dalgalanmalar gibi hataların toplamına tanımıdır [4]. Bu hatalar sonucunda iş parçasında gözle görülmesinde mikro ve makro seviyesinde deformasyonlar meydana gelmektedir. Bu deformasyonların ölçülmesinde başlıca Ra (Ra değeri, ortalama çizgisinden ölçülen yükseklik değişimlerinin aritmetik ortalamasıdır) ve Rz (Rz değeri, yüzey profilndeki en yüksek tepe ve en düşük çukurun ortalamasını temsil etmektedir) değerleri başlıca ölçülmektedir. Bu deformasyonlar tornalama işlemi sırasında tezgah hızı, kesme derinliği ve ilerleme hızına göre farklılık göstermektedir. Bu sebeple deneyler kesme hızı 50 m/dak, ilerleme hızı 0,30 ve kesme derinliği 1 mm olacak şekilde sabit bir şekilde tornalanmıştır. İşleme sırasında ve sonrasından oksitlenmeden ve iş parçası zarar gelebilmesi sebebi ile tornalama işlemi sonrası bekletilmeden ölçümler gerçekleştirilmiştir. İlk olarak tornalama işlem sonrası Ra değerleri ölçülmeye başlanmıştır. Elde edilen Ra değerlerine ait sonuçlar Şekil 7'de verilmiştir.



Şekil 7. Farklı şartlar altında yüzey pürüzlülük Ra sonuçları

Şekil 7'de görüldüğü gibi en düşük Ra değeri 2.348µm ile hBN ile tornalama işleminde görülmüştür. Ardından MMY 3.719 µm ve kuru işlemede 4.029 µm olarak ölçülmüştür. Her tornalama işlemi sonrasında kesici takım değiştirilmiş ve torna tezgahı ilerleme hızı, kesme derinliği ve ilerleme hızı sabit bırakılmıştır. MMY ve hBN koşulları kuru işeme koşuluna göre sırasıyla %7,69 ve %41,72 oranında azalma olmuştur.

Şekil 8'de farklı şartlar altında elde edilen Rz değerleri verilmiştir. Görüldüğü gibi en düşük Rz değeri 10.759 µm ile hBN ile yapılan tornalama işleminde görülmüştür. Ardından sırasıyla MMY ve kuru işleme sonuçları 15.041 µm ve 15.463 µm değerler ile ölçülmüştür. MMY ve hBN koşulları kuru işleme koşuluna göre sırasıyla %2,72 ve %30,72 oranında azalma görülmüştür. Yüzey kalitesinde bu azalma hBN nanopartiküllerinin üstün yağlayıcılık ve nanopartikül etkisinden kaynaklandığı düşünülmektedir. Literatürde yapılan çalışmalarda hBN nanoakışkanlarının tamir, parlatma etkisi sayesinde işlenen yüzeylerin kalitesinin iyileştiği ifade edilmiştir [9,10].

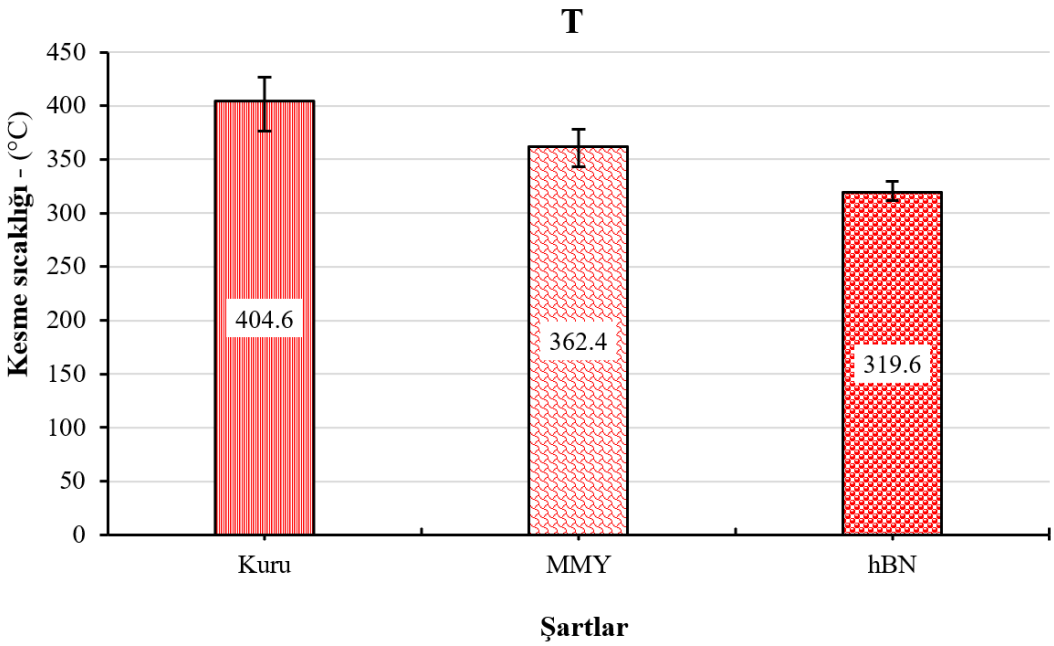


Şekil 8. Farklı şartlar altında yüzey pürüzlülük Rz sonuçları

3.2 Kesme Sıcaklığı Sonuçları

Tornalama işlemi sırasında oluşan plastik deformasyon sonucu iş parçasında yüksek sıcaklık değerleri oluşmaktadır. İş parçası ve kesici takımın sürekli temas halinde olması ve oluşan sürtünmeyle birlikte iş parçası çok yüksek sıcaklıklara ulaşmaktadır. Bu yüksek sıcaklık yüzey kalitesinde düşüşe ve kesici takım aşınmasında önemli bir rol oynamaktadır. Bu çalışmada farklı soğutma/yağlama koşulları ile iş parçası üzerindeki sıcaklığı düşürmek için iki farklı soğutma/yağlama yöntemi olan MMY ve hBN koşulları sağlanarak tornalama işlemi yapılmıştır. Bu koşullar altında sıcaklığın ölçülmesi adına kızılötesi termal kamera kullanılmıştır. Kesme sıcaklığında ulaşılan maksimum sıcaklık kabul edilmiştir. Kesme bölgesinde farklı şartlar altında ölçülen kesme sıcaklığı değerleri Şekil 9'da verilmiştir.

Şekil 9'da görüldüğü üzere en düşük sıcaklık 319.6 °C ile hBN ile tornalama işleminde görüşmüştür. MMY ve kuru işlemeye bakıldığında sırasıyla 362.4 °C ve 404.6 °C olarak ölçülmüştür. Kuru işleme ile kıyaslandığında hBN ile tornalama işleminde %21, MMY ile tornalama işleminde %11,64 oranında sıcaklık düşüşü görülmüştür. Bu sayede hBN tek başına büyük bir sıcaklık düşüşü sağlamıştır. hBN nanopartikülleri kuru halde termal iletim katsayıları yüksektir. Yağlayıcı olarak kullanılan hBN nanopartikülleri kesme bölgesindeki sıcaklığın tahliyesinde etkin bir rol üstlenebilmektedirler [11].

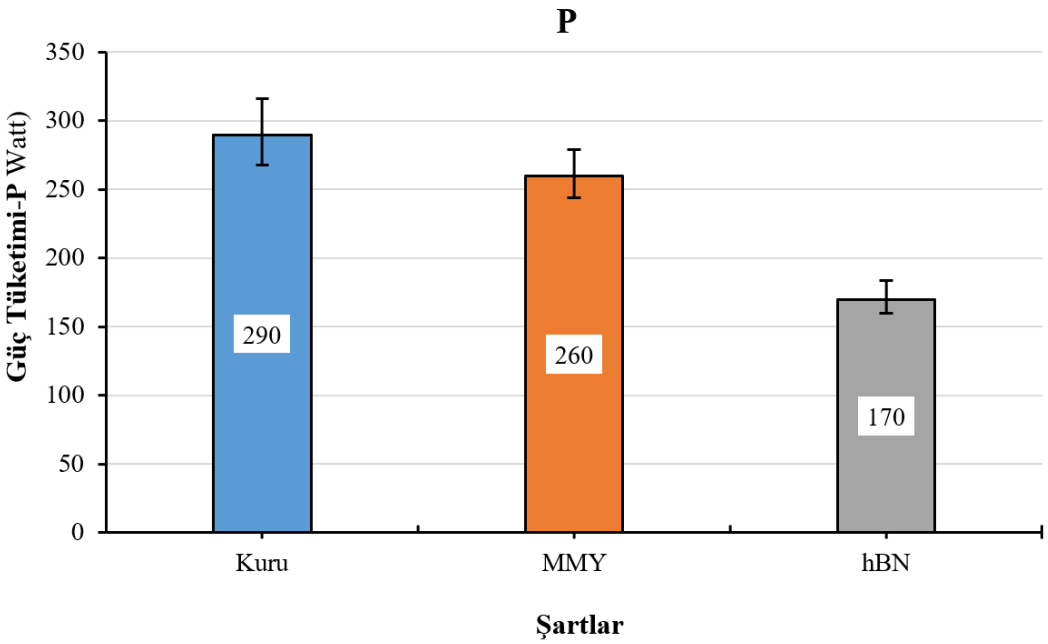


Şekil 9. Farklı şartlar altında kesme sıcaklığı sonuçları

3.3 Tezgah Güç Tüketimi Sonuçları

Ti6Al4V alaşımı yüksek mukavemet ve tokluk direncine sahip bir alaşımdır. Bu alaşımın talaş kaldırma işlemi yüksek mukavemet ile zor olmaktadır. Bu zorluk karşısında tornalama sırasında kesme hızı ve derinlik büyük önem arz etmektedir. Kesme hızı ve derinlik çok yüksek değerlere çıkarıldığında tezgahta çekilen güç tüketimi de artmaktadır. Nitekim Ş. Karabulut vd., yaptığı çalışmada Hadfield çeliğine farklı hızlarda ve farklı derinliklerde tornalama işlemi uygulamıştır [7]. Bu tornalama işlemi sonrasında kesme derinliği ve kesme hızı arttırıldıkça tezgahın çektiği gücün arttığı gözlemlenmiştir. Bu çalışmada kesme kesme hızı 50m/dak, ilerleme hızı 0,30 mm/dev ve kesme derinliği 1 mm olacak şekilde 3 koşulda sabit bırakılmıştır. Bu sayede soğutma/yağlama performans değeri olan kuru işleme, MMY ve hBN ile soğutma/yağlama yapılarak oluşan tezgah güç tüketimi değerlerine ulaşılmıştır. Güç tüketim değerleri Şekil 10'da verilmiştir.

Şekil 10 incelendiğinde, en düşük tezgah güç tüketimi 170 Watt ile hBN ile soğutma/yağlama koşuluna aittir. MMY ve kuru işlemeye bakıldığında sırasıyla 260 Watt ve 290 Watt olarak ölçülmüştür. Kuru işlemeye kıyasla, hBN %41,37 tasarruf sağlarken MMY ile yapılan soğutma/yağlama koşulunda %10,34 tasarruf sağlanmıştır. Bu sayede kesme hızı, ilerleme hızı ve kesme derinliği sabit bırakılıp soğutma/yağlama koşulları değiştirilerek tezgah güç tüketiminde tasarruf sağlanmıştır. Nanopartiküllerin yuvarlanma, yastıklama etkisi göstermesiyle kesme işlemini kolaylaştırdığı ve tezgahta güç tüketiminin azalmasına katkı sağladığı düşünülmektedir. Zira yapılan literatür çalışmalarında nanopartiküllerin kesme işlemine yardımcı mekanizmaları etkin hale getirdiği ve bu sayede kesme işleminin nispeten kolaylaştığı ifade edilmektedir [12].



Şekil 9. Farklı şartlar altında güç tüketimi sonuçları

SONUÇLAR

Bu çalışmada Ti6Al4V alaşımının kuru, MMY ve hBN olmak üzere 3 farklı koşulda sabit kesme hızı (50 m/dak), sabit ilerleme hızı (0,30 mm/dev) ve sabit kesme derinliği (1 mm) koşulları ile tornalanmıştır. Tornalama deneylerinden elde edilen sonuç aşağıda verilmektedir.

- Yüzey pürüzlülük sonuçlarına göre en düşük Ra değeri hBN ile tornalama koşulunda (2.348µm), en yüksek Ra değeri kuru tornalama koşulunda (4.029µm) gerçekleşmiştir. Bu sayede kuru tornalama işlemine göre hBN ile tornalama %41,72 daha iyi çıkmıştır.
- Yüzey pürüzlülük sonuçlarına göre en düşük Rz değeri hBN ile tornalama koşulunda (10.759µm), en yüksek Ra değeri kuru tornalama koşulunda(15.463µm) gerçekleşmiştir. Bu sayede kuru tornalamaya göre hBN ile tornalama koşulu %30,72 daha iyi performans sergilemiştir.
- Kesme sıcaklığı sonuçlarına göre en düşük kesme sıcaklığı hBN ile tornalama koşulunda(319,6°C), en yüksek kesme sıcaklığı kuru tornalama koşulunda(404,6°C) gerçekleşmiştir. Bu sayede hBN ile tornalama koşulu kuru işlemeye göre %21 daha iyi performans sergilemiştir.
- Tezgah güç tüketimi sonuçlarına göre en düşük tezgah güç tüketimi hBN ile tornalama koşulunda (170 Watt), en yüksek tezgah güç tüketimi kuru tornalama koşulunda (290 Watt) gerçekleşmiştir. Bu çerçevede tezgah güç tüketimi yalnızca ilerleme hızı ve kesme derinliği gibi parametrelerle değil kullanılacak olan çevreci ve yeni nesil soğutma/yağlama yöntemleri ile tezgah güç tüketiminin düşürülebileceği de görülmüştür.

TEŞEKKÜRLER

Bu çalışmayı TAI LiftUp projesiyle destekleyen TUSAŞ-Türk Havacılık ve Uzay Sanayii A.Ş.'ne ve 2209-B projesiyle destekleyen Türkiye Bilimsel ve Teknolojik Araştırma Kurumu, TÜBİTAK'a teşekkürler.

REFERANSLAR

[1] Liu Z, He B, Lyu T, Zou Y. A Review on Additive Manufacturing of Titanium Alloys for Aerospace Applications: Directed Energy Deposition and Beyond Ti-6Al-4V. JOM 2021;73:1804–18. https://doi.org/10.1007/S11837-021-04670-6.

[2] Şirin E. Evaluation of tribological performance of MQL technique combined with LN_2, CO_2, N_2 ecological cooling/lubrication techniques when turning of Hastelloy C22 superalloy. Tribol Int 2023;188:108786. https://doi.org/https://doi.org/10.1016/j.triboint.2023.108786.

[3] Shah P, Khanna N, Chetan. Comprehensive machining analysis to establish cryogenic LN2 and LCO2 as sustainable cooling and lubrication techniques. Tribol Int 2020:106314. https://doi.org/https://doi.org/10.1016/j.triboint.2020.106314.

[4] Şirin Ş. AISI 904L Süper Dubleks Paslanmaz Çeliğin Tornalanmasında MMY, hBN ve N2 Soğutma/Yağlama Koşullarının Performans Değerlendirmesi. International Journal of Innovative Engineering Applications 2022;6:103–10. https://doi.org/10.46460/IJIEA.1064021.

[5] Şirin Ş. Sustainable Materials and Manufacturing Technologies. In: Khanna N, Gajrani KK, Giasin K, Davim JP, editors. 1st ed., CRC Press; 2023, p. 125–51. https://doi.org/https://doi.org/10.1201/9781003291961.

[6] Şirin Ş. Investigation of the performance of cermet tools in the turning of Haynes 25 superalloy under gaseous N2 and hybrid nanofluid cutting environments. J Manuf Process 2022;76:428–43. https://doi.org/10.1016/J.JMAPRO.2022.02.029.

[7] Yıldırım ÇV, Şirin Ş, Kıvak T. Waspaloy Süper Alaşımının Frezelenmesinde Nanopartikül Katkılı Yağlamanın Takım Aşınması Üzerindeki Etkisinin Araştırılması. Düzce Üniversitesi Bilim ve Teknoloji Dergisi 2019;7:466–76.

[8] Er A, and KZ-IJ of ER, 2021 undefined. Ti-6Al-4V Alaşımının Tornalanmasında Minimum Miktarda Yağlama (MMY) Yöntemi İle Kesme Sıvısı Uygulamanın İşlenebilirliğe Etkilerinin Araştırılması. DergiparkOrgTrAO Er, K ZeyrekInternational Journal of Engineering Research and Development, 2021•dergiparkOrgTr 2021;13:653–65. https://doi.org/10.29137/umagd.907630.

[9] Şirin Ş. Performance evaluation of MQL, hBN and N2 lubrication/cooling conditions when turning of AISI 904L super duplex stainless steel. International Journal of Innovative Engineering Applications 2022;6:103–10. https://doi.org/https://doi.org/10.46460/ijiea.1064021.

[10] Akıncıoğlu S, Şirin Ş. Evaluation of the tribological performance of the green hBN nanofluid on the friction characteristics of AISI 316L stainless steel. Industrial Lubrication and Tribology 2021;73:1176–86. https://doi.org/10.1108/ILT-04-2021-0140.

[11] Çelik M, Çakır Şencan A, Şirin Ş, Erdoğan B, Şencan C. Effect of hBN and SDS added vegetable based cutting fluid application on the performance of turning Ti6Al4V alloys: A Comparative analysis with Taguchi and ANN approaches. Mater Chem Phys 2024;322:129552. https://doi.org/10.1016/J.MATCHEMPHYS.2024.129552.

[12] DEMİR İ, KIVAK T, ŞİRİN Ş. AISI 329 Paslanmaz Çeliğin Frezelenmesinde Farklı Surfaktan Katkılı CuO Nanoakışkanların Performans Değerlendirmesi. Manufacturing Technologies and Applications 2022;3:9–21. https://doi.org/10.52795/MATECA.1135978.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

FARKLI YAPIŞTIRICILAR İLE BİRLEŞTİRİLMİŞ 3B BASKI PARÇALARININ YAPIŞMA PERFORMANSLARININ BELİRLENMESİ

Elif TOPAL
Ondokuz Mayıs Üniversitesi, Mühendislik Fakültesi, Makine Mühendisliği Bölümü
ORCID: 0009-0000-3783-3960

Dr. Öğr. Üyesi Cengiz Görkem DENGİZ
Ondokuz Mayıs Üniversitesi, Mühendislik Fakültesi, Makine Mühendisliği Bölümü
ORCID: 0000-0003-1308-3223

ÖZET
Son yıllarda 3B yazıcı kullanımında hızlı bir artış görülmektedir. 3B yazıcılar ile malzemeler katmanlar halinde yığılarak karmaşık geometrilere sahip parçalar üretilebilmektedir. Bu da üretim maliyetini ve malzeme kullanımını azaltmaktadır. Fakat, yazıcı tabla boyutlarının kısıtlı olması nedeniyle büyük parçalar için parçalı üretim yapılır ve bu parçalar çeşitli birleştirme yöntemleri (kaynak, yapıştırıcı vb.) ile bir araya getirilir. Bu nedenle, 3B yazıcı ile üretilen parçaların birleştirilmesi konusunda yapılan araştırmalar gün geçtikçe artmaktadır. Bu çalışmada, alüminyum sac ve farklı filamentler (PLA ve ABS) kullanılarak numuneler üretilmiştir. Daha sonra bu numuneler çeşitli yapıştırıcılar (Loctite 406, 3M 540, Loxeal 31-42, Weicon Plastic-Bond) ile bindirme uzunluğu boyunca yapıştırılarak tek tesirli bindirme bağlantıları oluşturulmuştur. Oluşturulan tek tesirli bindirme bağlantılarına yapışma dayanımlarını belirlemek amacıyla çekme testi uygulanmıştır. Yapılan testler sonucunda, farklı yapıştırıcıların ve numune malzemelerinin yapışma bağlantısındaki yapışma dayanımı üzerindeki etkileri değerlendirilmiştir. Çekme testi sonuçlarına göre, en yüksek kuvvet değeri hızlı yapıştırıcı Loctite 406 ile yapıştırılmış PLA-PLA numunede elde edilmiştir. En düşük kuvvet değeri ise akrilik yapıştırıcı olan Weicon Plastic-Bond ile yapıştırılmış ABS-ABS numunede gözlemlenmiştir. Bununla birlikte, Weicon Plastic-Bond yapıştırıcısı tam kurumadığından, kopma anında yapıştırıcının kendi içerisinde ayrıldığı gözlemlenmiştir. Çekme testi sonucu elde edilen maksimum kuvvetlerdeki uzama değerleri incelendiğinde yer değiştirmenin en yüksek olduğu numunenin Loctite 406 ile yapıştırılmış PLA-PLA numunede olduğu görülmüştür.
Anahtar kelimeler: Eklemeli imalat, 3B baskı, Tek tesirli bağlantı

DETERMINATION OF ADHESION PERFORMANCE OF 3D PRINTED PARTS BONDED WITH DIFFERENT ADHESIVES

ABSTRACT
In recent years, there has been a rapid increase in the use of 3D printers. 3D printers can produce parts with complex geometries by stacking materials layer by layer. This capability reduces production costs and minimizes material usage. However, due to the limited size of printer beds, large parts are often produced in sections and then assembled using various joining methods such as welding or adhesives. Consequently, research on the assembly of parts produced with 3D printers is growing. In this study, samples were produced using aluminum sheet and different filaments (PLA and ABS). These samples were then joined along the bonding length using various adhesives (Loctite 406, 3M 540, Loxeal 31-42, Weicon Plastic-Bond) to create single-lap adhesive joints. Tensile tests were conducted to determine the adhesive strengths of these joints.

Based on the test results, the effects of different adhesives and sample materials on the adhesive strength of the joints were evaluated. According to the tensile test results, the highest force value was achieved in the PLA-PLA sample bonded with the Loctite 406.The lowest force value was observed in the ABS-ABS sample bonded with the acrylic adhesive Weicon Plastic-Bond. Additionally, it was noted that the Weicon Plastic-Bond adhesive did not fully cure, causing the adhesive to separate internally at the point of failure. Furthermore, analysis of the elongation values at the maximum force obtained from the tensile tests showed that the sample with the highest displacement was the PLA-PLA sample bonded with Loctite 406 adhesive.
Keywords: Additive manufacturing, 3D printing, Single lap joint

GİRİŞ

Son yıllarda geleneksel imalat yöntemleri yerine 3B yazıcı kullanımı sıklıkla tercih edilmektedir. 3B yazıcı kullanılarak parçalar malzemenin katmanlarla bir araya getirilmesiyle oluşturulmaktadır. Bu karmaşık geometrilere sahip parçaların üretiminde avantaj sağlamaktadır (Kamer vd., 2022). Katmanlı imalat yöntemleri ürün maliyetini, üretim süresini ve malzeme kullanımını azalttığı için diğer yöntemlere kıyasla daha avantajlıdır (Akgümüş vd., 2023). Yazıcı boyutuna göre üretilecek parçanın boyutunun kısıtlı olması ise bu yöntemin dezavantajıdır. Büyük parçalar için parçalı üretim yapıldıktan sonra çeşitli birleştirme yöntemleri (kaynak, yapıştırıcı vb.) ile asıl parça elde edilebilmektedir (Çelik vd., 2022). Eklemeli imalat yönteminin kullanımının gün geçtikçe artması ile bu yöntemle elde edilen parçaların birleştirilmesi konusunda araştırmalar artmıştır (Polat vd., 2023). 3B yazıcı ile parça üretimi mimari, otomotiv, medikal, mühendislik ve makine tasarımları gibi birçok alanda kullanılmaktadır (Günay vd., 2020).

Farklı 3B imalat yöntemleri (seçici lazer sinterleme (SLS), eriyik yığma modelleme (EYM), dijital ışık işleme (Dİİ) vb.) mevcuttur. Bu yöntemler arasından en yaygın kullanılan yöntem eriyik yığma modelleme (EYM) yöntemidir (Özmen vd., 2023). EYM yöntemi, maliyetin diğer yöntemlerden daha düşük olması, kolay kullanımı ve çevre dostu olmasından dolayı oldukça avantajlıdır. EYM yönteminde nozul çapı, dolgu yoğunluğu, dolgu deseni, nozul sıcaklığı, yazdırma açısı ve katman kalınlığı gibi yazdırma parametrelerinin değiştirilebilmesi üretilen parçanın mekanik özellikleri üzerinde değişiklik yapılabilmesine olanak sağlamaktadır (Kamer vd., 2022). EYM yönteminde termoplastik malzemeler kullanılmaktadır (Akgümüş vd., 2023). EYM ile parçalar, filamentin ekstrüder ile eritilip tabla üzerine katmanlar halinde eklenmesiyle elde edilmektedir. Bu yöntemde en çok tercih edilen termoplastik malzemeler polilaktik asit (PLA), akrilonitril bütadiyen stiren (ABS) ve termoplastik poliüretan (TPU) filamentlerdir. PLA filamenti, yenilenebilir kaynaklardan üretildiği için daha çevre dostudur. Ayrıca parça üretimi sırasında ABS filamentine kıyasla daha az duman ve koku meydana getirmektedir (Özmen vd., 2023).

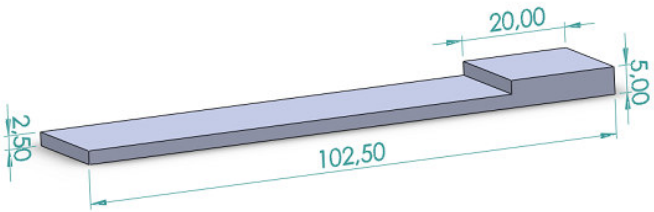
Literatürde eklemeli imalat yöntemi ile üretilen parçaların yapıştırıcı kullanılarak birleştirilmesi hakkında çeşitli çalışmalar mevcuttur. Çelik vd. (2022) yapıştırıcı, kaynak, yapıştırıcı-kaynak ve pim ile birleştirdikleri çekme testi numunelerinin mekanik dayanımı incelemişlerdir. Bu çalışmada çekme testi numunelerinin üretiminde PLA filament kullanmışlardır. Çekme testi sonucunda bağlantı bölgelerinde hasar oluşumundan yola çıkarak birleşme bölgelerinin parça için en zayıf bölge olduğunu belirtmişlerdir. Sonuç olarak en yüksek kuvveti yapıştırıcı ile kaynağın bir arada kullanıldığı numunede elde etmişlerdir. En düşük kuvvet ise pim ile gerçekleştirilen bağlantıda meydana gelmiştir. Polat vd. (2023) 3B yazıcı ile PLA filament kullanarak farklı doluluk oranlarına sahip numuneler üretmişlerdir. Yapışma yüzeylerini iki farklı zımpara ile zımparalamışlardır.

Yapıştırma işlemi için ise iki farklı yapıştırıcı ve üç farklı yapıştırıcı kalınlığı tercih etmişlerdir. Doluluk oranı, yapıştırıcı tipi, yapıştırıcı kalınlığı ve yüzey işlemlerinin bağlantı mukavemetine etkisini incelemişlerdir. Çekme testi sonucunda doluluk oranının artmasıyla numunelerdeki mukavemetin arttığı sonucuna ulaşmışlardır. Yapıştırıcı türüne göre ise zımparalama işleminin ve yapıştırıcı kalınlığının bağlantı mukavemetini etkilediği görülmüştür. PLA numuneleri birleştirmek için kullandıkları yapıştırıcılardan Loctite EA 9492'nin Teroson PU 9225'e kıyasla daha iyi bağlantı oluşturduğu sonucunu elde etmişlerdir. Çetin ve Fossi (2023) higrotermal koşullar altında, farklı parametrelerin birleştirdikleri PLA numune bağlantılarındaki mekanik özellikleri üzerindeki etkilerini araştırmışlardır. Farklı yüzey desenlerine sahip PLA numuneleri üretmişlerdir. Bu numunelerin birleşiminde iki farklı yapıştırıcı kullanmışlar ve 4 farklı yaşlandırma süresi seçmişlerdir. Birleştirdikleri numunelerde yaptıkları çekme testi sonucunda yapıştırıcı seçiminin bağlantı mukavemetini etkilediğini görmüşlerdir. Ayrıca yaşlanma süresi arttıkça tüm numunelerde mukavemetin azaldığı sonucunu elde etmişlerdir. Frascio vd. (2021) ABS filament kullanarak eklemeli imalat yöntemiyle ürettikleri parçalar ile tek tesirli bindirme bağlantıları oluşturmuşlardır. Mekanik testler ile bağlantı oluştururken kullandıkları farklı yüzey hazırlama işlemleri ve yapıştırıcıların etkilerini incelemişlerdir. Khosravani vd. (2021) farklı yazdırma parametrelerine sahip PLA numuneleri üretmişlerdir. Bu numunelerden tek tesirli bindirme bağlantısı oluştururken farklı yapıştırıcı kalınlıkları tercih etmişlerdir. Sonuç olarak yazdırma parametrelerinin ve yapıştırıcı kalınlığının bağlantı performansına olan etkilerini incelemişlerdir. Gerçekleştirdikleri deneysel testlerin yanı sıra ABAQUS'te tek tesirli bindirme bağlantısı için 3B-FEM modeli de oluşturmuşlardır. Öz ve Öztürk (2023) farklı desen açısı, numune kalınlığı ve bindirme uzunluğuna sahip numuneler üreterek tek tesirli bindirme bağlantıları oluşturmuşlardır. Değiştirdikleri parametrelerin etkilerini incelemişlerdir. Deneysel çalışmalarla birlikte 3B sonlu elemanlar analizini de gerçekleştirmişlerdir.

Bu çalışmada alüminyum sac ve farklı filamentler kullanılarak numuneler üretilmiştir. Farklı yapıştırıcılar ile birleştirilen bu numunelerden tek tesirli bindirme bağlantıları oluşturulmuştur. Çekme testi yapılarak oluşturulan tek tesirli bindirme bağlantılarında yapışma bağlantısı dayanımları incelenmiştir.

MATERYAL VE YÖNTEM

Bu çalışmada alüminyum sac ve farklı filamentler kullanılarak tek tesirli bindirme bağlantısı için numuneler üretilmiştir. Şekil 1'de numune boyutları gösterilmektedir. 3B baskı yönteminde numuneler Creality marka CR-10 S5 model 3B yazıcı kullanılarak oluşturulmuştur.



Şekil 1. Numune Boyutları

Numuneler için 1,75 mm çapında Filameon marka PLA filament ve ABS HighFlow filament kullanılmıştır. Kullanılan PLA ve ABS filamentlerinin özellikleri Tablo 1'de verilmiştir.

Tablo 1. PLA ve ABS filament özellikleri

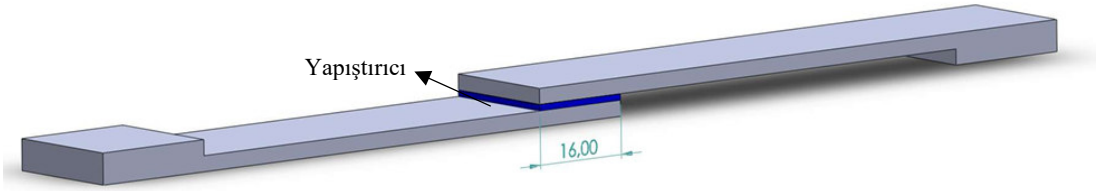
Özellik	Nozul Sıcaklığı (C°)	Yoğunluk (g/cm^3)	Çekme Dayanımı (MPa)	Uzama Gerinimi (%)	Eğme Dayanımı (MPa)
PLA	190-230	1,24	53	6	83
ABS	230-260	1,04	45	10	73

Numunelerin G kodları Ultimaker Cura yazılımı kullanılarak oluşturulmuştur. Ultimaker Cura yazılımında baskı için gereken parametre değerleri kullanılan filamentlere uygun olarak girilmiştir. PLA ve ABS filamentleri ile üretilecek numunelerde nozul çapı, katman yüksekliği, duvar kalınlığı, baskı hızı, dolgu deseni, desen açısı ve dolgu yoğunluğu parametreleri için aynı değerler girilmiştir. Nozul ve tabla sıcaklığı ise PLA ve ABS filamentlerinde farklılık göstermektedir. PLA filament ile numune üretiminde nozul sıcaklığı 210 °C olarak ayarlanmıştır. Tabla sıcaklığı ise 60 °C tercih edilmiştir. PLA ile numune üretimine soğutma açıktır. ABS filament ile numune üretiminde ise nozul sıcaklığı 245 °C ve tabla sıcaklığı 100 °C olacak şekilde ayarlanmıştır. ABS ile numune üretiminde soğutma kapalıdır. Hazırlanan G kodları 3B yazıcıya aktarılarak sırasıyla PLA ve ABS filamentlerinden tek tesirli bindirme bağlantısı için numuneler üretilmiştir. Alüminyum numune ise 2 mm kalınlığındaki alüminyum sac kullanılarak lazer kesim ile elde edilmiştir. PLA, ABS filamentleri ve alüminyum malzemeden elde edilen numuneler Şekil 2'de verilmiştir.



Şekil 2. Numuneler a)PLA , b)ABS ,c) Alüminyum

Elde edilen numuneler yapıştırıcı ile birleştirilerek bindirme uzunluğu 16 mm olan tek tesirli bindirme bağlantıları oluşturulmuştur (Şekil 3).



Şekil 3. Tek tesirli bindirme bağlantısı

Bu çalışmada 4 farklı yapıştırıcı kullanılmıştır. Bunlar hızlı yapıştırıcı Loctite 406, poliüretan yapıştırıcı 3M 540, epoksi yapıştırıcı Loxeal 31-42 ve akrilik yapıştırıcı Weicon Plastic-Bond'tur.

Loctite 406, plastikler ve elastomerik materyallerin kısa sürede birleştirilmesini sağlamaktadır. Tek bileşenli olan bu yapıştırıcı atmosferik nem ile kurumaktadır. Kurumanın büyük bir kısmı kısa sürede gerçekleşse de kuruma 24 saat boyunca devam ederek tam kuruma gerçekleşmektedir. 3M 540, plastik üzerinde kullanıma uygundur. Atmosferik nem ile 24 saatte sertleşmektedir. Loxeal 31-42, metal, cam, ahşap ve bazı plastikler gibi birçok malzeme için kullanılabilmektedir. İki bileşenli olan bu yapıştırıcının karışma oranı 1:1'dir. 5 dk sabitleme zamanına sahiptir. Fonksiyonel kürlenme süresi 20-30 dk'dır. Plastic Bond ise alüminyum, çelik ve plastik gibi malzemelere iyi yapışmaktadır. İki bileşenlidir ve karıştırma oranı 1:1'dir. Tam sertliğe 12 saatte ulaşmaktadır.

Sırasıyla PLA-PLA numuneler hızlı yapıştırıcı, PLA-Alüminyum numuneler poliüretan yapıştırıcı, ABS- PLA numuneler epoksi yapıştırıcı ve ABS-ABS numuneler akrilik yapıştırıcı ile yapıştırılarak oda sıcaklığında kurumaya bırakılmıştır. Daha sonra oluşturulan tek tesirli bindirme bağlantılarındaki yapışma dayanımlarını belirlemek amacıyla çekme testi yapılmıştır. Çekme testi INSTRON marka universal test cihazı ile 1,3 mm/dk hızda gerçekleştirilmiştir (Şekil 4).

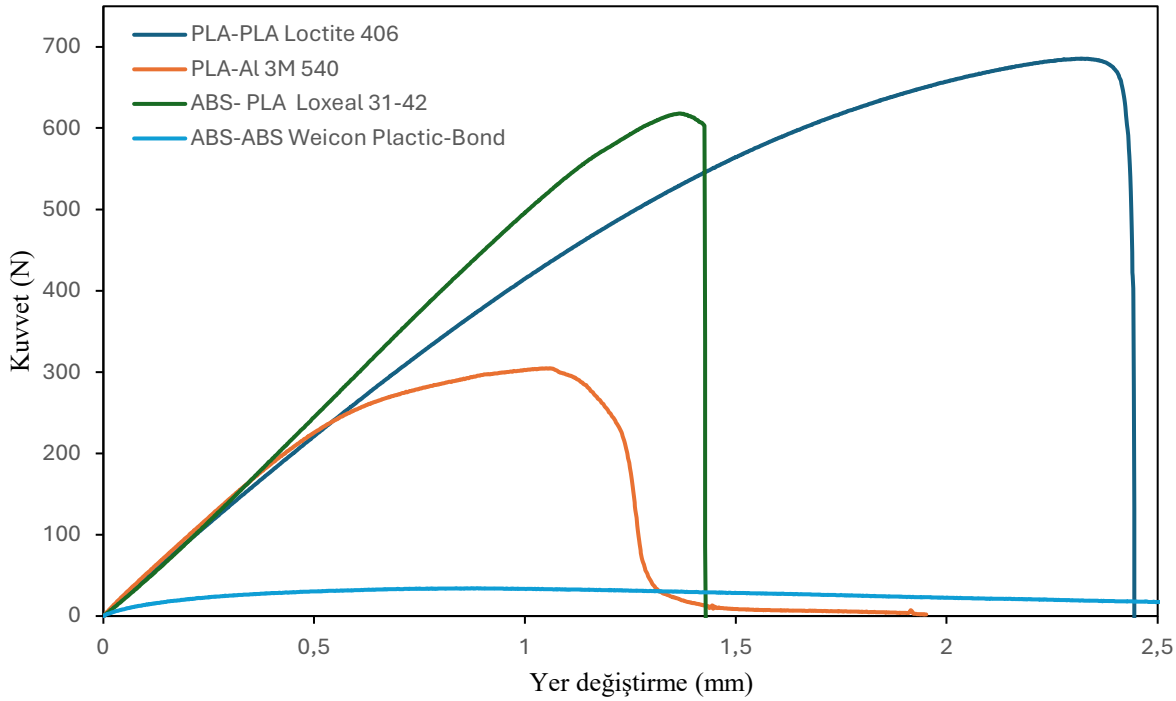


Şekil 4. Universal test cihazı

BULGULAR VE TARTIŞMA

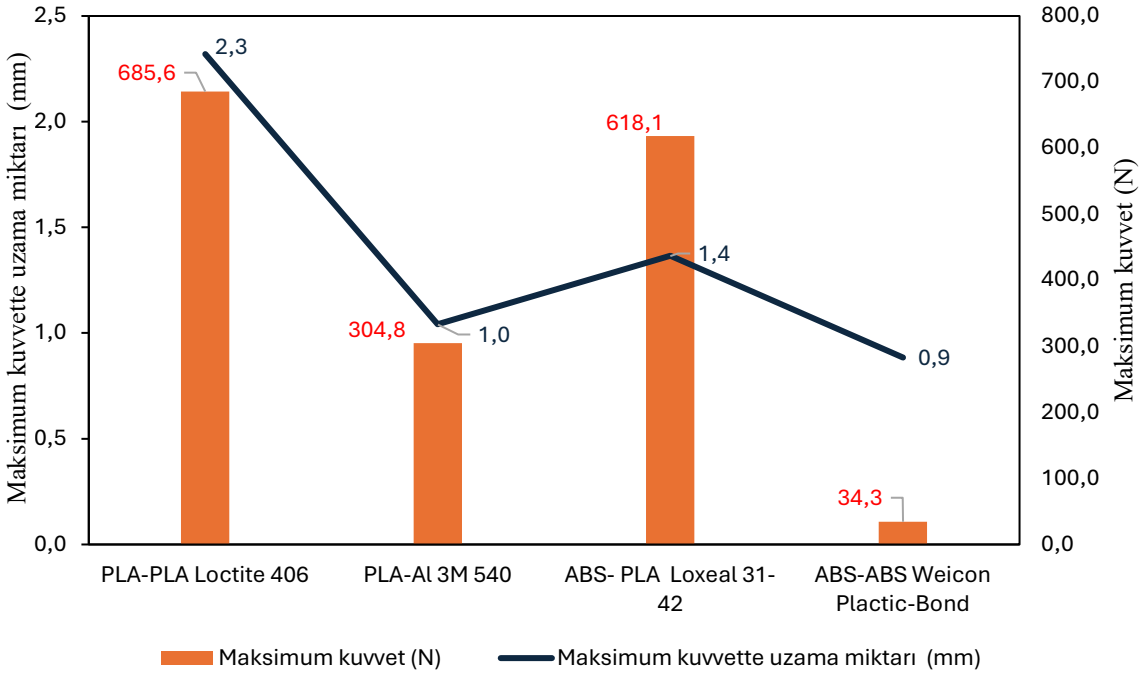
Farklı yapıştırıcılar kullanılarak oluşturulan PLA-PLA, PLA-Al, ABS-PLA ve ABS-ABS tek tesirli bindirme bağlantılarının yapışma dayanımlarını belirlemek amacıyla çekme testi uygulanmıştır. Çekme testi sonucunda bağlantıların kuvvet-yer değiştirme grafiği Şekil 5'te verilmiştir.

Yapılan çekme testlerinin sonucunda en yüksek kuvvet değeri Loctite 406 ile yapıştırılmış PLA-PLA numunede elde edilmiştir. Şekil 5'e göre en düşük maksimum kuvvet ise Weicon Plastic-Bond ile yapıştırılmış ABS-ABS numunede görülmektedir. Numune incelendiğinde yapıştırıcının tam kurumadığı ve bu nedenle çekme testi sırasında bindirme uzunluğu boyunca kayma meydan geldiği gözlemlenmiştir. Çekme testi sonucunda elde edilen maksimum kuvvetler sırasıyla Loctite 406 ile birleştirilmiş PLA-PLA numunede 685,6 N, Loxeal 31-42 uygulanmış ABS-PLA numunede 618,12 N, 3M 540 yapıştırıcı ile birleştirilmiş PLA-Al numunede 304,84 N ve Weicon Plastic-Bond ile yapıştırılmış ABS-ABS numunede 34,33 N olduğu görülmektedir.



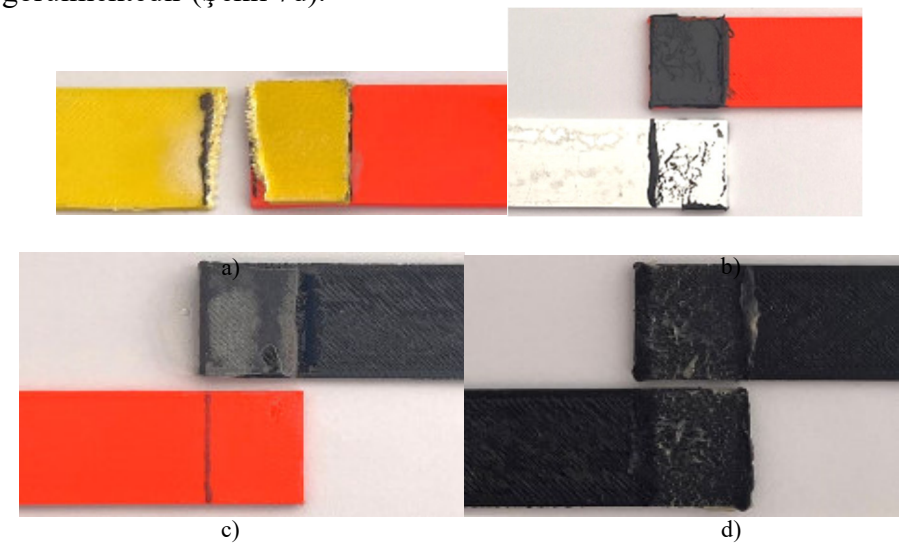
Şekil 5. Tek tesirli bindirme bağlantıları kuvvet-yer değiştirme grafiği

Çekme testi sonucu elde edilen maksimum kuvvetlerdeki uzama değerleri maksimum kuvvetler ile birlikte Şekil 6'da verilmiştir. Loctite 406 ile yapıştırılmış PLA-PLA numunede maksimum kuvvette elde edilen uzama 2,3 mm, 3M 540 yapıştırıcı ile birleştirilmiş PLA-Al numunede 1 mm, Loxeal 31-42 uygulanmış ABS-PLA numunede 1,4 mm ve Weicon Plastic-Bond ile yapıştırılmış ABS-ABS numunede 0,9 mm'dir. Şekil incelendiğinde PLA-PLA numunede kullanılan Loctite 406 sonucunda maksimum kuvvetin yanı sıra uzama miktarının da en yüksek olduğu görülmektedir. Bu da diğer yapıştırıcılara göre Loctite 406 yapıştırıcın hem daha dayanıklı hem de daha sünek olduğunu göstermektedir.



Şekil 6. Maksimum kuvvetler ve maksimum kuvvetteki uzama değerleri

Çekme testi sonucu tek tesirli bindirme bağlantılarında meydana gelen kopma/ayrılma bölgeleri Şekil 7'de verilmiştir. Çekme testi sonucunda hızlı yapıştırıcı kullanılarak oluşturulan tek tesirli bindirme bağlantısında kırılma PLA numunesinin gövdesinde gerçekleşmiştir (Şekil 7a). Poliüretan, epoksi ve akrilik yapıştırıcı kullanılarak oluşturulan tek tesirli bindirme bağlantılarında ise kopma/ayrılma bindirme uzunluğu boyunca meydana gelmiştir. Şekil 7b incelendiğinde kopma sonucunda poliüretan yapıştırıcının PLA numunesinin yüzeyinde kaldığı ve Al numuneden ayrıldığı görülmektedir. Epoksi yapıştırıcı PLA numune yüzeyinden tamamen ayrılarak ABS numunesinin yüzeyinde kalmıştır (Şekil 7c). Kopma sonucunda akrilik yapıştırıcının ise ABS numunelerinin her iki yüzeyinde de bulunduğu görülmektedir (Şekil 7d).



Şekil 7. Kopma/Ayrılma bölgeleri a) PLA PLA-Loctite 406, b) PLA-Al 3M 540, c) ABS-PLA Loxeal 31-42, d) ABS-ABS Weicon Plastic Bond

SONUÇLAR

Yapılan bu çalışmada farklı yapıştırıcılar kullanılarak oluşturulan PLA-PLA, PLA-Al, ABS-PLA ve ABS-ABS tek tesirli bindirme bağlantılarının yapışma dayanımları incelenmiştir. Elde edilen sonuçlar aşağıda verilmiştir:

- En yüksek kuvvet 685,60 N olarak Loctite 406 ile birleştirilmiş PLA-PLA numunede elde edilmiştir.
- En düşük kuvvet 34,33 N olarak Weicon Plastic-Bond ile birleştirilmiş ABS-ABS numunede bulunmuştur. Bunun nedeni yapıştırıcının malzeme yüzeyine yapışması ancak kendi içerisinde tam kurumamasından kaynaklı kayma meydana gelmesidir.
- 3M 540 yapıştırıcı ile birleştirilmiş PLA-Al numunede maksimum kuvvet 304,84 N olarak elde edilmiştir.
- Loxeal 31-42 uygulanmış ABS-PLA numunede ise maksimum kuvvet 618,12 N olarak elde edilmiştir.
- Çekme testi sonucunda 2,3 mm olarak en fazla yer değiştirme (uzama) Loctite 406 ile birleştirilmiş PLA-PLA bağlantısında elde edilmiştir. Bu da diğer yapıştırıcılara göre Loctite 406 yapıştırıcının hem daha dayanıklı hem de daha sünek olduğu sonucunu ortaya koymaktadır.

KAYNAKLAR

Akgümüş, G. D., Kılıçtek, S., Gök, S. ve Yakut, N. (2023). Katmanlı imalat teknolojilerinin karşılaştırılmasına yönelik bir araştırma. *Gümüşhane Üniversitesi Fen Bilimleri Dergisi*, 13(3), 517-537**.**

Cetin, E. ve Fossi, C. T. (2023). Experimental investigation on mechanical strength of adhesively bonded 3D-printed joints under hygrothermal conditions using Taguchi method. *International Journal of Adhesion and Adhesives*, 126,103472

Çelik, T., Mutlu, İ. ve Özkan, A. (2022). Parçalı olarak üretilen 3 boyutlu yazıcı çıktılarında kullanılan bağlantı tiplerinin mekanik açıdan değerlendirilmesi. *International Journal of 3D Printing Technologies and Digital Industry*, 6(1), 137-142.

Frascio, M., Mandolfino, C., Moroni, F., Jilich, M., Lagazzo, A., Pizzorni, M., Bergonzi, L., Morano, C., Alfamo, M. ve Avalle, M. (2021). Appraisal of surface preparation in adhesive bonding of additive manufactured substrates. *International Journal of Adhesion and Adhesives*. 106. 10.1016/j.ijadhadh.2020.102802

Günay M., Gündüz S., Yılmaz H., Yaşar N. Ve Kaçar R. (2020). PLA esaslı numunelerde çekme dayanımı için 3D baskı işlem parametrelerinin optimizasyonu. *Politeknik Dergisi*, 23(1):73-79.

Kamer, M. S., Temiz, Ş., Yaykaşlı, H., Kaya, A. ve Akay, O. E. (2022). 3B yazıcıda farklı yazdırma hızlarında ABS ve PLA malzeme ile üretilen çekme test numunelerinin mekanik özelliklerinin karşılaştırılması. *Gazi Üniversitesi Mühendislik Mimarlık Fakültesi Dergisi*, 37(3), 1197-1212.

Khosravani, M. R., Soltani, P., Weinberg K. ve Reinicke T. (2021). Structural integrity of adhesively bonded 3D-printed joints, *Polymer Testing*, 100,107262, ISSN 0142-9418.

Öz, Ö. ve Öztürk, F. (2023). An investigation on failure behaviour of bonded polylactic acid adherends produced by 3D printing process: experimental and numerical approach. *Journal of the Brazilian Society of Mechanical Sciences and Engineering*. 45. 10.1007/s40430-023-04321-8.

Özmen, Ö., Sürmen, H. K. ve Sezgin, A. (2023). 3 boyutlu baskıda dolgu biçiminin çekme dayanımına etkisi. *Mühendislik Bilimleri ve Tasarım Dergisi*, 11(1), 336-348.

Polat, N., Anaç, N. ve Mert, F. (2023). Eklemeli imalat ile üretilen PLA parçaların yapıştırılmasında yapıştırma parametrelerinin mekanik dayanımına etkisinin incelenmesi. *Politeknik Dergisi*, 26(3), 1145-1154.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

FAZ DEĞİŞTİREN MALZEME İLE ÇİFT BORULU ENERJİ DEPOLAMADA KANAT YERLEŞİM DÜZENİNİN ERİME VE KATILAŞMA PERFORMANSINA ETKİSİ

Orçun ALTINOK
Amasya Üniversitesi, Fen Bilimleri Enstitüsü, Bölüm, Makine Mühendisliği Bölümü
ORCID: 0009-0006-5959-4837

Doçent Burak KURŞUN
Amasya Üniversitesi, Mühendislik Fakültesi, Makine Mühendisliği Bölümü
ORCID: 0000-0001-5878-3894

ÖZET
Faz değiştiren malzeme (FDM) kullanımı yüksek enerji depolama yoğunlukları ve düşük ısıl kayıpları nedeni ile enerji depolamada tercih edilen yöntemler arasındadır. Ancak düşük ısıl iletkenliğe sahip olmaları enerji depolama performanslarını düşüren temel unsurdur. Liretatürde ısıl iletkenliğin artırılması amacı ile nanopartikül ilavesi, metal köpük ve kanatçık kullanımı gibi yöntemler uygulanarak FDM'lerin enerji depolama ve salma performansının artırılması hedeflenmiştir. FDM ile çift borulu enerji depolamada kanatçık kullanımı ve yerleşim düzeni yaygın olarak çalışılan konulardandır. Bu çalışmada ise literatürdeki çalışmalardan farklı olarak sistemin alt bölgesine farklı açılarda kanatçıklar konumlandırılmış ve bu yerleşim düzeninin erime ve katılaşma performansı açısından etkisi birlikte ele alınmıştır. Kanatçıkların sistemin alt bölgesine yerleştirilmesi ile erime neticesindeki doğal konveksiyon akışının artırılması ve şarj (erime) süresinin iyileştirilmesi hedeflenmiştir. Bu doğrultuda bir çift borulu sistemde kanatçıklar uniform ve alt bölgede yoğunlaşacak şekilde iki farklı türde konumlandırılmıştır. Kanatçıkların üniform dağılımlı olduğu koşulda dört kanat iç boru üzerine aralarında 90° açı olacak biçimde yerleştirilmiştir (Model-1). Diğer koşulda ise kanatlar iç borunun alt yarım dairesi üzerine aralarında 30° (Model-2), 45° (Model-3) ve 60° (Model-4) olacak biçimde uniform olmayan bir dağılımda konumlandırılmıştır. Modellenen sistemler için sonlu hacimler yöntemi kullanılarak sayısal analizler gerçekleştirilmiştir. Parametrik analizler öncesinde sayısal sonuçların doğrulanması için deneysel çalışma sonuçları ile karşılaştırma yapılmıştır. Sayısal analizler neticesinde Model 1 ile şarj süresi (100% erime) 22 dakika sürerken Model-2, Model-3 ve Model-4 ile sırası ile 17 dakika, 16 dakika ve 21 dakikalık şarj süreleri elde edilmiştir. Şarj süresindeki en yüksek düşüş Model-3 ile 27.2% oranında sağlanmıştır. Ancak kanatçıkların üniform olmayan bir yapıda yerleştirilmesi deşarj süresini (100% katılaşma) artırıcı bir etki yapmıştır. Uniform yerleşim ile 48 dakika sonunda 100% katılaşma sağlanırken Model-2, Model-3 ve Model-4 kullanılarak sırası ile 110 dakika, 107 dakika ve 102 dakikada 100% katılaşmaya ulaşılabilmiştir. Uniform olmayan kanatçık dağılımları ile deşarj sürelerinin artırılması daha uzun süreli enerji salınımı anlamına gelmektedir. Enerji depolama sisteminden yüksek verim alınabilmesi için düşük şarj ve yüksek deşarj süreleri sağlanması daha uygun bir seçenek olmaktadır. Bu nedenle erime için Model-3'ün katılaşma için Model-2'nin enerji depolama sistemi için en uygun kanat yerleşim düzenlerini içerdiği anlaşılmaktadır.
Anahtar Kelimeler: Çift boru, Enerji depolama, Erime, Faz değişim malzemesi, Katılaşma.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

EFFECT OF FIN PLACEMENT ON MELTING AND SOLIDIFICATION PERFORMANCE IN DOUBLE-TUBE ENERGY STORAGE WITH PHASE CHANGING MATERIAL

ABSTRACT
The use of phase change materials (PCM) is among the preferred methods in energy storage due to their high energy storage density and low thermal losses. However, their low thermal conductivity is the main factor that reduces their energy storage performance. In the literature, it is aimed to increase the energy storage and release performance of PCMs by applying methods such as nanoparticle addition, metal foam and fin use in order to increase thermal conductivity. The use and layout of fins in double-pipe energy storage with PCM have been extensively researched topics. In this study, unlike the studies in the literature, fins were positioned at different angles in the lower part of the system and the effect of this layout in terms of melting and solidification performance was discussed together. By placing the fins in the lower part of the system, it is aimed to increase the natural convection flow resulting from melting and to improve the charging (melting) time. In this direction, in a double-pipe system, the fins are positioned in two different types, uniform and concentrated in the lower region. In the condition that the fins are uniformly distributed, four fins are placed on the inner tube with a 90° angle between them (Model-1). In the other condition, the wings were positioned on the lower semicircle of the inner tube in a non-uniform distribution with an angle of 30° (Model-2), 45° (Model-3) and 60° (Model-4). Numerical analyzes were carried out for the modeled systems using the finite volume method. Before parametric analysis, a comparison was made with experimental study results to verify the numerical results. As a result of numerical analysis, while the charging time (100% melting) was 22 minutes with Model 1, charging times of 17 minutes, 16 minutes and 21 minutes were obtained with Model-2, Model-3 and Model-4, respectively. The highest reduction in charging time was achieved by Model-3 by 27.2%. However, placing the fins in a non-uniform structure had an increasing effect on the discharge time (100% solidification). While 100% solidification was achieved after 48 minutes with uniform placement, 100% solidification was achieved in 110 minutes, 107 minutes and 102 minutes using Model-2, Model-3 and Model-4, respectively. Increasing discharge times with non-uniform fin distributions means longer-term energy release. In order to obtain high efficiency from the energy storage system, providing low charging and high discharging times is a more suitable option. Therefore, it is understood that Model-3 for melting and Model-2 for solidification contain the most suitable wing layouts for the energy storage system.
Key Words: Double pipe, Energy storage, Melting, Phase change material, Solidification.

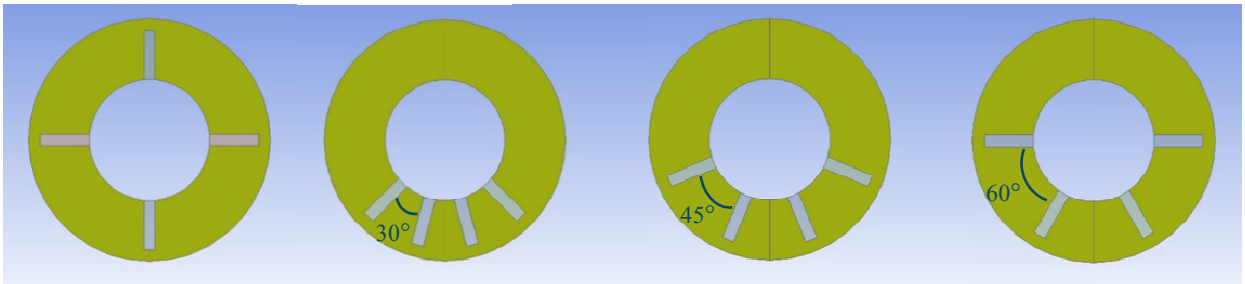
1. GİRİŞ
Enerji depolama enerjinin verimli ve etkin bir şekilde kullanımı için oldukça önemli bir hususdur. Enerji depolama için günümüzde duyulur ve gizli ısı enerjisi depolama yöntemleri mevcut olup, faz değişim malzemeleri gizli ısı enerjisi depolamada tercih edilme potansiyeli yüksek olan malzemelerdendir. Faz değişim malzemeleri (FDM), ısı depolama ve ısı yönetimi için kullanılan enerji depolama yoğunluğu yüksek olan maddelerdir. Bu malzemeler, belirli bir sıcaklıkta eriyerek veya katılaşarak faz değiştirmekte ve bu süreçte büyük miktarda ısıyı depolamakta veya serbest bırakabilmektedir.

FDM'lerin dezavantajlı yönü ise düşük ısıl iletkenlik değerine sahip olmalarıdır. Bu problemin üstesinden gelebilmek için birçok yöntem geliştirilmiştir. Nano-partikül ilavesi, kanatçık kullanımı ve metal köpükle güçlendirme ısıl iletkenliği artırıcı yöntemlere örnek olarak gösterilebilir [1,2]. Kanatçık kullanımının diğer yöntemlere göre daha yaygın olması ekonomik ve uygulama kolaylığı gibi sebeplere dayanmaktadır. Kanatçıkların pozisyonu ve boyutlarının FDM'lerin erime ve katılaşma performansına etkilerini inceleyen çalışmalar günümüzde mevcuttur. Wang vd. FDM ile çift borulu bir enerji depolama sisteminde farklı kanat dağılımı ve uzunluklarının erime performansına etkilerini incelemişlerdir [3]. Çalışma ile kanat dağılımının erimiş FDM'deki doğal konveksiyon akışını ve şarj süresini etkilediğini ortaya koymuşlardır. Deng vd. ve Kazemi vd'nin yaptığı çalışmalarda da benzer şekilde iki ve üç kanat kullanımı için kanat pozisyonlarının erime performansı üzerine etkileri incelenmiştir [4,5]. Khan ve Khan'ın çalışmasında ise kanat pozisyonları boru yüzeyinde sabit kalmış, ancak borunun kendi ekseni etrafında döndürülüp konumlandırılması ile farklı şarj süreleri elde edilmiştir [6]. Bu çalışmalara benzer şekilde farklı geometri, sayı ve boyutlara sahip kanatların boru yüzeyine uniform ve uniform olmayan şekilde radyal ve eksenel olarak yerleştirilmiş olduğu ve bu yerleşimlerin FDM'nin erime performansına etkilerinin incelendiği birçok çalışma mevcuttur [7].

Bu çalışmada ise literatürdeki çalışmalardan farklı olarak sistemin alt bölgesine farklı açılarda kanatçıklar konumlandırılmış ve bu yerleşim düzenlerinin erime ve katılaşma performansı açısından etkisi birlikte ele alınmıştır. Kanatçıkların sistemin alt bölgesine yerleştirilmesi ile erime neticesindeki doğal konveksiyon akışının artırılması ve şarj (erime) süresinin iyileştirilmesi hedeflenmiştir.

1.1 1.1. Fiziksel ve Matematiksel Model

Sayısal analizlerde kullanılmış olan uniform ve uniform olmayan kanat dağılımına ait modeller Şekil 1'de verilmiştir. Uniform kanat dağılımına sahip olan yapı Model 1, uniform olmayan kanat dağılımına sahip tasarımlar ise Model 2, Model 3 ve Model 4 olarak adlandırılmıştır.



Şekil 1. Kanatlı boru modelleri

Sayısal erime analizleri için entalpi-gözeneklilik yöntemi uygulanmıştır. Sayısal çözüm aşağıda verilen varsayımlar takip edilerek gerçekleştirilmiştir [8,9]:

- Hesaplama alanının iki boyutlu olduğu, akışın zamana bağlı olduğu ve akışkanın sıkıştırılamaz ve Newton tipi olduğu varsayılmıştır.
- Doğal konveksiyon akışı için Boussinesq yaklaşımı kullanılmıştır.
- Viskoz dağılım göz ardı edilmiştir.
- Borunun dış yüzeyinin adyabatik olduğu varsayılmıştır.

Kütlenin korunumu (Denklem 1) ve x ve y eksenleri yönündeki momentumun denklemleri (Denklem 2 ve 3) aşağıda verilmiştir. Denklemler sırasıyla:

$$\frac{\partial \rho}{\partial t} + \frac{\partial(\rho u)}{\partial x} + \frac{\partial(\rho v)}{\partial y} = 0 \quad (1)$$

$$\frac{\partial(\rho u)}{\partial t} + \frac{\partial(\rho u u)}{\partial x} + \frac{\partial(\rho v u)}{\partial y} = -\frac{\partial \rho}{\partial t} + \frac{\partial}{\partial x}\left(\mu \frac{\partial u}{dx}\right) + \frac{\partial}{\partial y}\left(\mu \frac{\partial u}{dy}\right) + uA \quad (2)$$

$$\frac{\partial(\rho v)}{\partial t} + \frac{\partial(\rho u v)}{\partial x} + \frac{\partial(\rho v v)}{\partial y} = -\frac{\partial \rho}{\partial t} + \frac{\partial}{\partial x}\left(\mu \frac{\partial v}{dx}\right) + \frac{\partial}{\partial y}\left(\mu \frac{\partial v}{dy}\right) + vA + \rho g \beta (T - T_m) \quad (3)$$

Denklemlerde ρ yoğunluk, g yer çekimi ivmesi (9,81 m/s2), μ dinamik viskozite, β termal genleşme katsayısı, T sıcaklık, denklemde u ve v ise sırasıyla x ve y yönleri için akışkan hızlarıdır. Denklem 3'ün sağ taraftaki son ifade Boussinesq yaklaşımındaki kaldırma kuvveti etkisini ifade etmektedir. A değeri aşağıdaki denklemle hesaplamıştır [10]:

$$A = -A_{mush} \frac{(1-\lambda)^2}{\lambda^3 + \varepsilon} \quad (4)$$

Denklemde λ sıvı fraksiyonu temsil etmektedir [11].

$$\lambda = \begin{cases} 0 & ; \quad T < T_s \\ (T-T_s)/(T_l-T_s) & ; \quad T_s < T < T_l \\ 1 & ; \quad T > T_l \end{cases} \quad (5)$$

Denklemdeki l ve s alt simgeleri sırasıyla sıvı durumu ve katı durumu ifade etmektedir. A_{mush}, katılaşma sırasında akışkan hızının azaltılmasına ilişkin peltemsi bölge için kullanılan katsayıdır ve bu çalışmada $A_{mush} = 10^5$ olarak alınmıştır. ε sıfıra bölünmeyi önleyecek küçük sayıdır ve ε =0,001 olarak alınmıştır [10].

Enerji denklemi aşağıdaki denklem ile ifade edilmiştir,

$$\frac{\partial(\rho h)}{\partial t} + \frac{\partial(\rho u h)}{\partial x} + \frac{\partial(\rho v h)}{\partial y} = \frac{\partial}{\partial x}\left(k \frac{\partial T}{dx}\right) + \frac{\partial}{\partial y}\left(k \frac{\partial T}{dy}\right) \quad (6)$$

Denklemde k iletimle ısı transfer katsayısıdır ve h entalpidir. h aşağıdaki denklemle hesaplanmaktadır [11].

$$h = \begin{cases} \int_{T_{ref}}^{T} c_p dT & ; \quad T < T_s \\ \int_{T_{ref}}^{T} c_p dT + \lambda H & ; \quad T_s < T < T_l \\ \int_{T_{ref}}^{T_s} c_p dT + \int_{T_l}^{T} c_p dT & ; \quad T > T_l \end{cases} \quad (7)$$

Denklemde Cp özgül ısı kapasitesi, H gizli ısı ve T_{ref} referans sıcaklığıdır (T_{ref} = 298,15 K). T aşağıdaki denklem ile bulunur [12].

$$T = \lambda(T_l - T_S) + T_S \quad (8)$$

N-eikosan FDM, yüksek enerji depolama yoğunluğuna sahip olması ve düşük dereceli bir ısı kaynağından enerji depolamaya uygun olması nedeniyle tercih edilmiştir. N-eikosan FDM'nin termofiziksel özellikleri Tablo 1'de verilmiştir.

Tablo 1. N-eikosan FDM'nin Termofiziksel Özellikleri [13]

Termofiziksel özellikler	Değer
Katılaşma Sıcaklığı (K)	308.15
Sıvılaşma Sıcaklığı (K)	310.15
Sıvı Yoğunluğu (kg/m3)	770
Özgül Isı Kapasitesi (J/kgK)	2460
Gizli Füzyon Isısı (J/kg)	247.600
Isıl İletkenlik (W/mK)	0,1505
Termal Genleşme Katsayısı (1/K)	0,0009
Dinamik Viskozite (kg/ms)	0,00385

İç kanallardaki konveksiyon ısı transfer katsayısı (h_{conv}), Dittus-Boelter korelasyonu (Denklem (9)) ile hesaplanmıştır [14].

$$Nu = 0.023Re^{0.8}Pr^{0.4} \quad (9)$$

h_{conv}, Nusselt (Nu) ve Reynolds sayısını (Re) hesaplamak için aşağıda verilen denklemler kullanılmıştır.

$$Re = \frac{\rho V D_H}{\mu} \quad (10)$$

$$D_H = \frac{4A_c}{p} \quad (11)$$

$$Nu = \frac{h_{konv} D_H}{k} \quad (12)$$

Denklemlerde ρ yoğunluğu, V (m/s) ortalama akış hızını, μ akışkanın viskozitesini temsil etmektedir. Denklem 11'de D_H hidrolik çapı temsil etmektedir. Hidrolik çap hesabında kullanılan A_c, FDM yüzey alanı (878,34 mm^2)'yi, p ise akışkanın temas ettiği ıslak çevre uzunluğudur.

1.2 Sınır şartları

Korunum denklemlerinin çözümlenmesinde FDM'nin ortalama erime sıcaklığı 309.15 K olarak alınmıştır. Ayrıca, başlangıç sınır koşulu olarak, FDM sıcaklığının, yükleme için erime sıcaklığının 1°C altında ve boşaltma için katılaşma sıcaklığının 1°C üzerinde olduğu varsayılmıştır (Denklem (15)). Enerji depolama sisteminin dış yüzeyinin adyabatik kabul edilmiştir (Denklem (13)). Boru iç yüzeyine ise denklemde verildiği gibi taşınımla ısı transferi sınır koşulu uygulanmıştır. İç borudaki ortalama akışkan sıcaklığı, şarj işleminde FDM'nin erime sıcaklığının 20°C üzerinde (329,15 K) ve deşarj işleminde FDM'nin katılaşma sıcaklığının 20°C altında (289,15 K) alınmıştır.

$$|\dot{q}_{iletim}|_{OS} = 0, t(s) = t \quad (13)$$

$$|\dot{q}_{iletim}|_{IS} = h_{konv}(T_{mf}\text{-}T_w), t(s) = t, \text{erime} \quad |\dot{q}_{cond}|_{IS} = h_{conv}(T_w\text{-}T_{mf}), t(s) = t, \text{katılaşma} \quad (14)$$

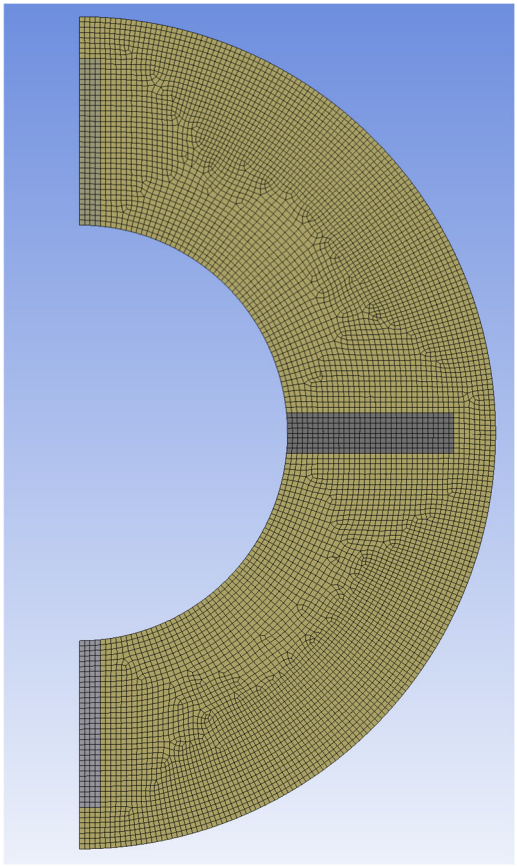
$$\begin{bmatrix} T_{PCM} = 308.15\ K, t(s) = 0, & \text{erime} \\ T_{PCM} = 310.15\ K, t(s) = 0, & \text{katılaşma} \end{bmatrix} \quad (15)$$

Denklemde T_w duvar sıcaklığı, $T_{m,f}$ ortalama akışkan sıcaklığı, h_{konv} konveksiyonla ısı transfer katsayısı, IS iç yüzey ve OS dış yüzeydir.

1.3 Sayısal yöntem

Denklemlerinin sayısal olarak çözümünde sonlu hacimler yöntemi kullanılmış ve sayısal analizler ANSYS-Fluent 2022 R1 ticari yazılımı ile gerçekleştirilmiştir. Basınç-hız çifti için PISO algoritması kullanılmış basınç değerlerinin düzeltilmesinde PRESTO! yöntemi tercih edilmiştir. Momentum ve enerji denklemlerinin ayrıklaştırılması için QUICK şeması, denklemlerin zamana bağlı çözümü için ise birinci dereceden geçişli formül uygulanmıştır.

Sayısal analizler kalıntı değerleri kütlenin ve momentumun korunumu için 10^{-6}'nın, enerjinin korunumu için ise 10^{-8}'in altına düşene kadar devam ettirilmiştir.
Düzgün dağılımlı kanar modeli için örnek ağ yapısı aşağıdaki Şekil 2'de verilmiştir. Hesaplama alanında simetrik koşullar mevcut olduğundan analizler için geometrilerin yarısı modellenmiştir. Kanatlarda dahil tüm hesaplama bölgesinde tetrahedral hücre yapısı kullanılmıştır.



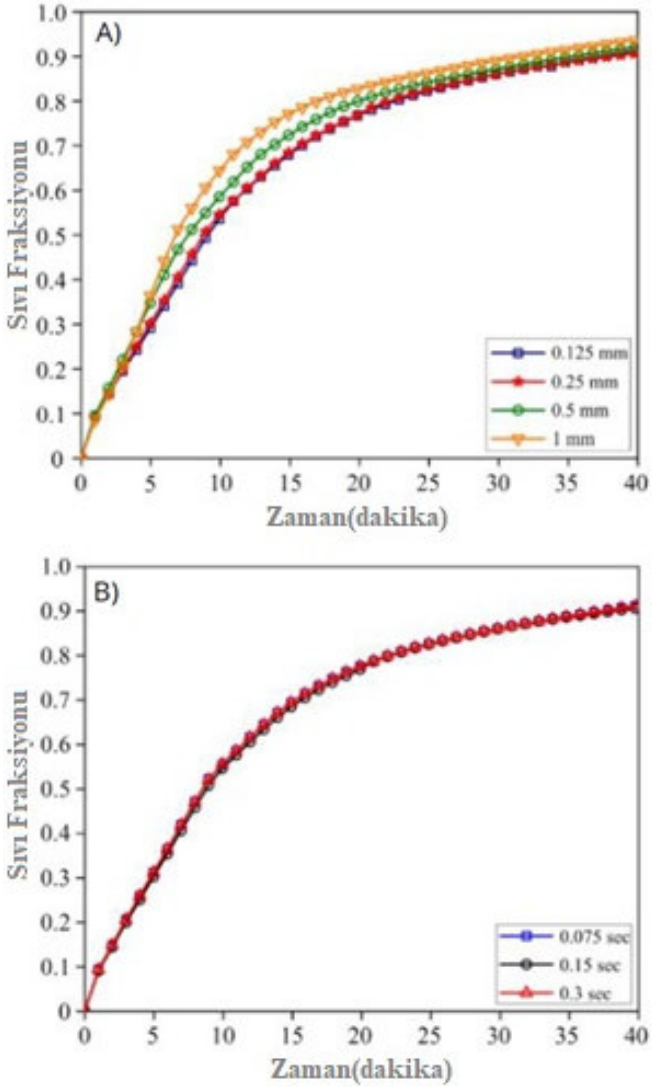
Şekil 2. Hücre yapısı örneği

2. ARAŞTIRMA VE BULGULAR

Bu bölümde çift borulu enerji depolamada kanat dağılım şeklinin FDM'nin erime performansı üzerindeki etkileri sıvı fraksiyonu ve FDM sıcaklığı açısından değerlendirilmiştir. Ancak öncesinde sayısal sonuçların doğruluğunu test etmek için doğrulama analizleri yapılmıştır.

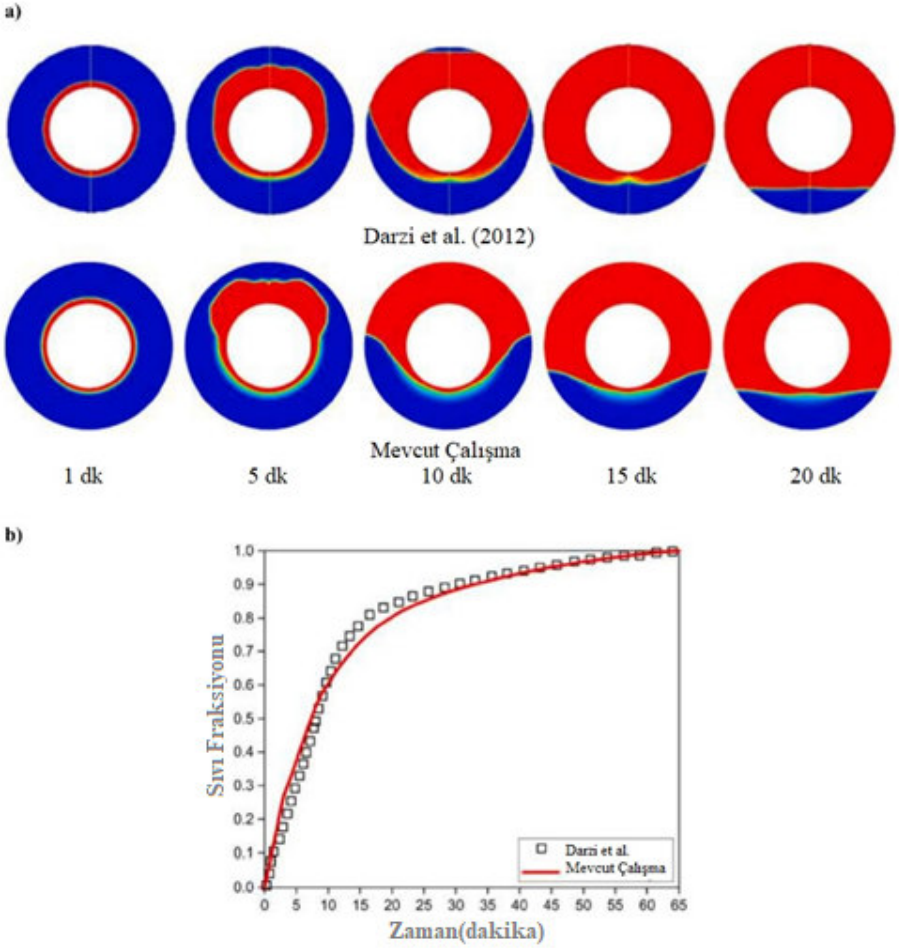
2.1 Sayısal Sonuçların Doğrulanması

Doğrulama işlemleri için öncelikle ızgara boyutu ve zaman adımından bağımsızlık testleri yapılmıştır. Aşağıdaki şekilde görüldüğü gibi, 0,25 mm'den küçük ızgara boyutu ve 0,15 saniyeden küçük zaman adımı için sıvı fraksiyonundaki değişiklik ihmal edilebilir düzeyde kalmıştır. Bu nedenle parametrik analiz için 0,25 mm'lik bir ızgara boyutu ve 0,15 saniyelik bir zaman adımı seçilmiştir.



Şekil 3. Izgara boyutundan (a) ve zaman adımından (b) bağımsızlık testi sonuçları

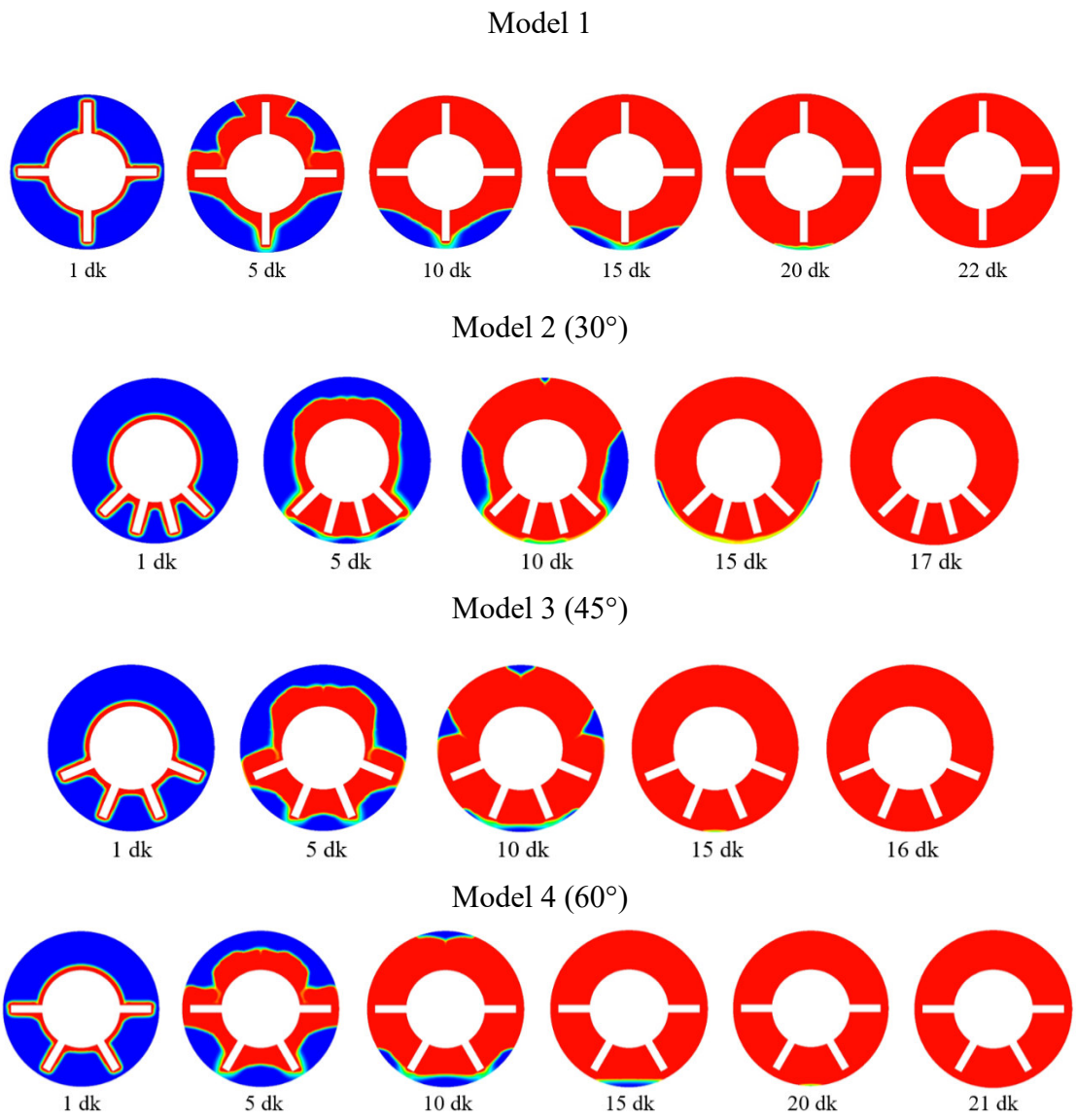
Sıvı fraksiyon konturlarının karşılaştırması Şekil 4a'da verilmiştir. 65 dakikalık erime süresi için sıvı fraksiyon eğrilerinin karşılaştırması ise Şekil 4b'de gösterilmiştir. Şekil 4b'de iki analiz sonucu arasındaki en yüksek fark %6,5 olarak ölçülmüştür. Bu hata oranı, kullanılan sayısal modelin belirli bir erime ve katılaşma periyodu için uygulanabilir olduğunu göstermiştir.



Şekil 4. Sıvı fraksiyonu konturları (a) ve eğrilerinin (b) karşılaştırılması

2.2 2.2. Erime (Şarj) İşleminde Kanat Dağılımının Etkisi

Şekil 5'de erime analizi neticesinde tüm modeller için elde edilen sıvı fraksiyon konturları sunulmuştur. Kanatçıkların sistemin alt bölgesine yerleştirilmesi ile erime neticesindeki doğal konveksiyon akışının artırılması ve şarj (erime) süresinin kısaltılması sağlanmıştır (Model 2, 3 ve 4). Ancak kanatların alt pozisyonda olması durumunda 45°'nin altındaki açı değerinde erimiş FDM'nin kanatlar arasında sıkışması nedeni ile diğer uniform olmayan dağılımlı modellere göre şarj süresinde artış meydana gelmiştir. En düşük şarj süresi Model 3 ile elde edilmiştir (16 dakika).



Şekil 5. Erime periyodu için tüm modellerdeki sıvı fraksiyonu konturları

Yapılan erime analizleri neticesinde yapılan çalışmada, farklı konumlandırılmış kanatçıkların erime sürecin etkileri incelenmiştir. Elde edilen bulgular ışığında sistemde kanatçıkların aşağı bölgede konumlandırılması ısı transferini olumlu yönde etkilemiş ve erime süresinin düşürülmesini sağlamıştır. 100 % erime süreleri Tablo 2'de verilmiştir.

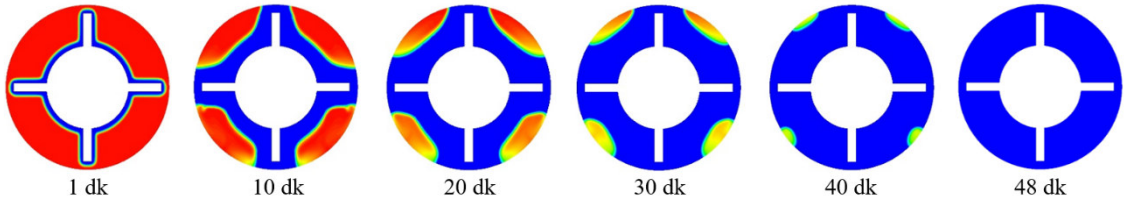
Tablo 2. Modeller için 100% erime süreleri

Model	**100% Erime Süreleri**
Model 1	22 dk
Model 2 (30°)	17 dk
Model 3 (45°)	16 dk
Model 4 (60°)	21 dk

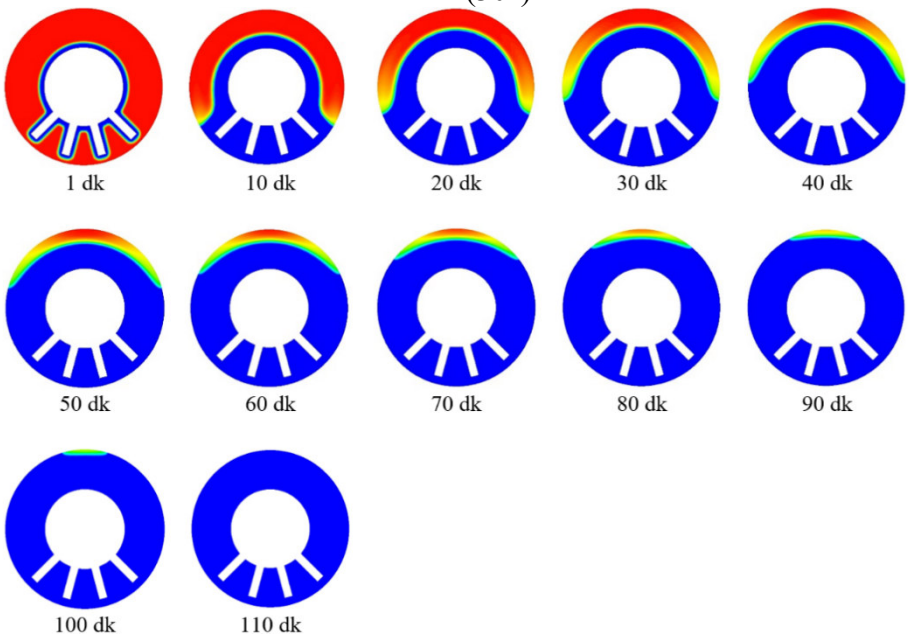
2.3 Katılaşma (Deşarj) İşleminde Kanat Dağılımının Etkisi

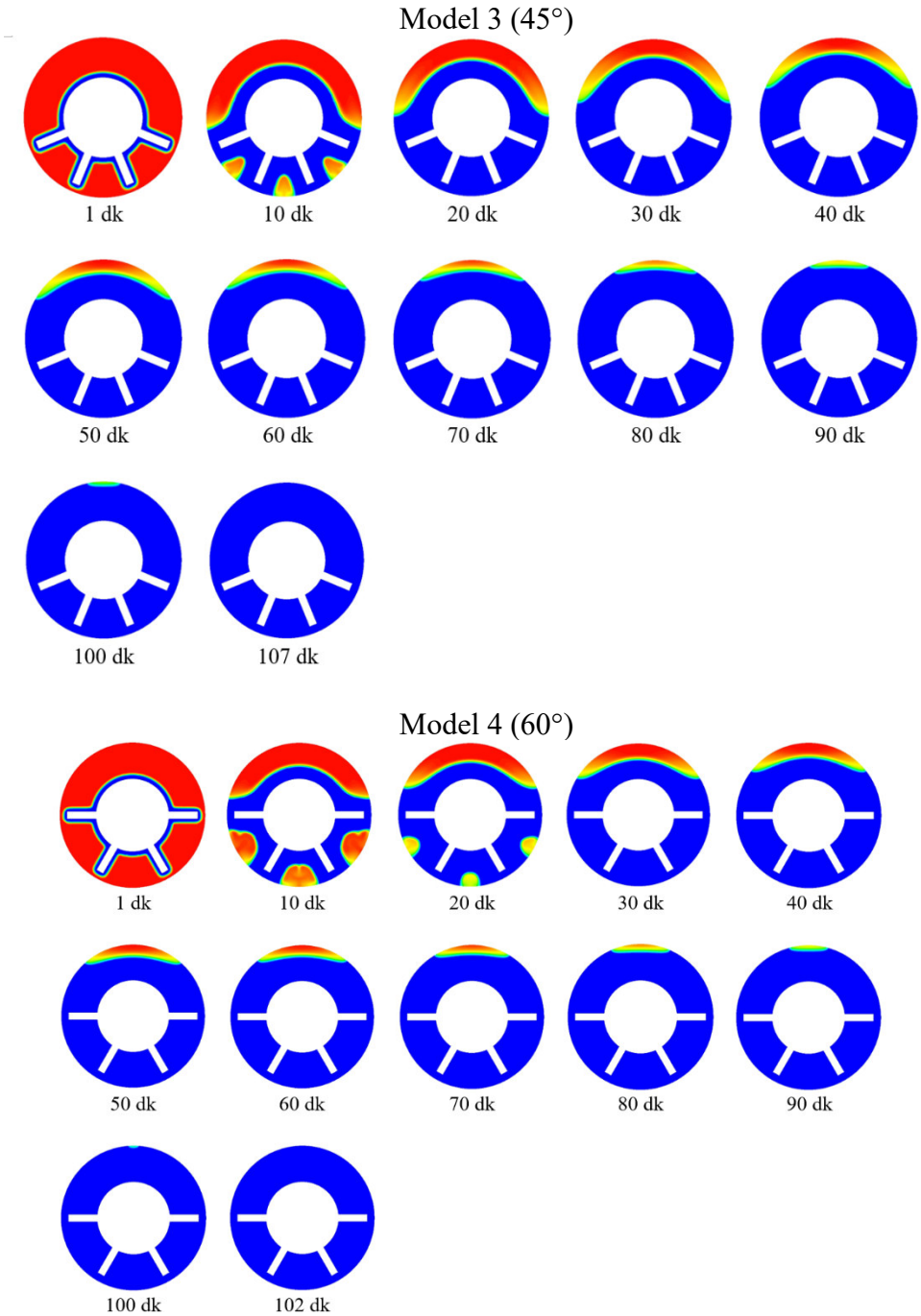
Şekil 6'da tüm modeller için katılaşma sıvı fraksiyonu konturları verilmiştir. Katılaşma işleminin boru yüzeyinden başlaması nedeni ile kanatların düzgün dağılımlı olması deşarj süresini kısaltıcı etki yapmıştır. Uniform kanat yerleşimi ile 48 dakika sonunda 100% katılaşma sağlanırken Model-2, Model-3 ve Model-4 kullanılarak sırası ile 110 dakika, 107 dakika ve 102 dakikada 100% katılaşmaya ulaşılabilmiştir. Tablo 3'de de modeller için elde edilen 100% katılaşma süreleri toplu olarak sunulmuştur.

Model 1



Model 2 (30°)





Şekil 6. Katılaşma periyodu için tüm modellerdeki sıvı fraksiyonu konturları

Tablo 3. Modeller için 100% katılaşma süreleri

Model	**100% Katılaşma Süreleri**
Model 1	48 dk
Model 2 (30°)	110 dk
Model 2 (45°)	107 dk
Model 2 (60°)	102 dk

3. SONUÇ

Bu çalışmada, çift borulu enerji depolamada FDM'nin erime ve katılaşma performansı dört farklı kanat dağılımı için incelenmiştir. Yapılan çalışmada amaç; gizli ısı depolama sistemlerinde kullanılan FDM içerisindeki düşük termal iletkenliklerinden kaynaklanan dezavantajı azaltmak olmuştur. Bunun için belirlenen modellerde aynı sayıda kanatçık kullanarak kanatçıkların konumlarını ve aralarındaki açılarını değiştirilerek erime ve katılaşma süreçleri ayrı ayrı incelenmiş ve değerlendirilmiştir.

Sayısal analizler neticesinde Model 1 ile şarj süresi (100% erime) 22 dakika sürerken Model-2, Model-3 ve Model-4 ile sırası ile 17 dakika, 16 dakika ve 21 dakikalık şarj süreleri elde edilmiştir. Şarj süresindeki en yüksek düşüş Model-3 ile 27.2% oranında sağlanmıştır.

Kanatçıkların üniform olmayan bir yapıda yerleştirilmesi deşarj süresini (100% katılaşma) artırıcı bir etki yapmıştır. Uniform yerleşim ile 48 dakika sonunda 100% katılaşma sağlanırken Model-2, Model-3 ve Model-4 kullanılarak sırası ile 110 dakika, 107 dakika ve 102 dakikada 100% katılaşmaya ulaşılabilmiştir.

Uniform olmayan kanatçık dağılımları ile deşarj sürelerinin artırılması daha uzun süreli enerji salınımı anlamına gelmektedir. Enerji depolama sisteminden yüksek verim alınabilmesi için düşük şarj ve yüksek deşarj süreleri sağlanması daha uygun bir seçenek olmaktadır. Bu nedenle erime için Model-3'ün katılaşma için Model-2'nin enerji depolama sistemi için en uygun kanat yerleşim düzenlerini içerdiği anlaşılmaktadır.

KAYNAKLAR

[1] Choure, B. K., Alam, T., & Kumar, R. (2023). A review on heat transfer enhancement techniques for PCM based thermal energy storage system. Journal of Energy Storage, 72, 108161.

[2] Wu, S., Yan, T., Kuai, Z., & Pan, W. (2020). Thermal conductivity enhancement on phase change materials for thermal energy storage: A review. Energy Storage Materials, 25, 251-295.

[3] Wang, P., Yao, H., Lan, Z., Peng, Z., Huang, Y., & Ding, Y. (2016). Numerical investigation of PCM melting process in sleeve tube with internal fins. Energy Conversion and Management, 110, 428-435.

[4] Deng, S., Nie, C., Wei, G., & Ye, W. B. (2019). Improving the melting performance of a horizontal shell-tube latent-heat thermal energy storage unit using local enhanced finned tube. Energy and Buildings, 183, 161-173.

[5] Kazemi, M., Hosseini, M. J., Ranjbar, A. A., & Bahrampoury, R. (2018). Improvement of longitudinal fins configuration in latent heat storage systems. Renewable Energy, 116, 447-457.

[6] Khan, L. A., & Khan, M. M. (2020). Role of orientation of fins in performance enhancement of a latent thermal energy storage unit. Applied Thermal Engineering, 175, 115408.

[7] Low, Z. H., Qin, Z., & Duan, F. (2024). A review of fin application for latent heat thermal energy storage enhancement. Journal of Energy Storage, 85, 111157.

[8] Mahdi, M. S., Mahood, H. B., Mahdi, J. M., Khadom, A. A., & Campbell, A. N. (2020). Improved PCM melting in a thermal energy storage system of double-pipe helical-coil tube. Energy Conversion and Management, 203, 112238.

[9] Alnakeeb, M. A., Salam, M. A. A., & Hassab, M. A. (2021). Eccentricity optimization of an inner flat-tube double-pipe latent-heat thermal energy storage unit. Case Studies in Thermal Engineering, 25, 100969.

[10] Kadivar, M. R., Moghimi, M. A., Sapin, P., & Markides, C. N. (2019). Annulus eccentricity optimisation of a phase-change material (PCM) horizontal double-pipe thermal energy store. Journal of Energy Storage, 26, 101030.

[11] Yan, P., Fan, W., Yang, Y., Ding, H., Arshad, A., & Wen, C. (2022). Performance enhancement of phase change materials in triplex-tube latent heat energy storage system using novel fin configurations. Applied Energy, 327, 120064.

[12] Yang, X. H., Tan, S. C., & Liu, J. (2016). Numerical investigation of the phase change process of low melting point metal. International Journal of Heat and Mass Transfer, 100, 899-907.

[13] Seddegh, S., Wang, X., & Henderson, A. D. (2015). Numerical investigation of heat transfer mechanism in a vertical shell and tube latent heat energy storage system. Applied thermal engineering, 87, 698-706.

[14] Dittus, F. W., & Boelter, L. M. K. "Heat transfer in automobile radiators of the tubular type." International communications in heat and mass transfer, 12(1), 3-22 ,1985.

[15] Darzi, A. R., Farhadi, M., & Sedighi, K. (2012). Numerical study of melting inside concentric and eccentric horizontal annulus. Applied Mathematical Modelling, 36(9), 4080-4086.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

İKLİMİN ÇEVRESEL AÇIDAN OPTİMUM YALITIM KALINLIĞI ÜZERİNDEKİ ETKİSİ: EMİSYON TÜRLERİ VE YALITIM MALZEMELERİNİN İNCELENMESİ

Assist. Prof. Dr. Ahmet Serhan CANBOLAT
Bursa Uludag University, Faculty of Engineering, Department of Mechanical Engineering
ORCID: 0000-0002-0423-6411

Günümüzde enerji verimliliği ve sürdürülebilirlik, bina tasarımında önemli bir role sahiptir. Özellikle sıcak iklimlerde, binaların soğutma ihtiyacını azaltmak ve enerji tüketimini minimize etmek amacıyla ısı yalıtımı büyük bir öneme sahiptir. Yalıtım malzemelerinin ve kalınlıklarının doğru seçimi, sadece enerji tasarrufu sağlamakla kalmaz, aynı zamanda olumsuz çevresel etkileri de azaltır. Isı yalıtımının, binaların ihtiyaç duyduğu soğutma enerjisi üzerindeki etkisi ve buna bağlı olarak farklı emisyon türleri üzerindeki etkileri hem akademik hem de pratik açıdan önemli araştırma konuları arasında yer almaktadır. Bu bağlamda, çeşitli yalıtım malzemelerinin ve iklim koşullarının, çevresel optimum yalıtım kalınlığına olan etkilerini incelemek, enerji verimliliği ve çevresel sürdürülebilirlik açısından önemlidir. Bu çalışmada da dünya üzerinde yer alan, sıcak iklim koşullarının hâkim olduğu bölgelerde yapılacak olan ısı yalıtım uygulamasının farklı emisyon türleri açısından etkileri incelenmiştir. Çalışmada soğutma derece gün sayısının (CDD), dolayısıyla soğutmak için ihtiyaç duyulan enerjinin çevresel açıdan optimum yalıtım kalınlığına etkisi tespit edilmiştir. Analizlerde yalıtım malzemeleri olarak ekstrüde polistiren (XPS), mineral yünü (MW) ve poliüretan köpük (PUR) kullanılmıştır. Dünya genelinde hepsi sıcak iklim bölgesinde fakat farklı sıcaklık seviyelerinde bulunan Malaga (İspanya), Sao Paulo (Brezilya), Adana (Türkiye), Santiago (Şili), Formosa (Arjantin), Harga (Mısır), Buenos Aires (Kosta Rika), Kuveyt (Kuveyt), Doha (Katar) ve Arizona (ABD) şehirleri farklı iklimlerin çevresel optimum yalıtım kalınlığına etkisini görmek için seçilmiştir. Çevreye yayılan zararlı gazlardan olan CO_2 ve SO_2 miktarları farklı CDD'ye sahip iller için ayrı ayrı hesaplanmış ve her bölge için optimum yalıtım kalınlıkları tespit edilmiştir.
Anahtar Kelimeler: Yalıtımı, Emisyon, Optimizasyon, Sürdürülebilirlik, Soğutma derece gün sayısı.

IMPACT OF CLIMATE ON ENVIRONMENTALLY OPTIMUM INSULATION THICKNESS: EXAMINATION OF EMISSION TYPES AND INSULATION MATERIALS

ABSTRACT
Today, energy efficiency and sustainability play a crucial role in building design. In hot climates, thermal insulation is especially important to reduce cooling needs and minimize energy consumption. Proper selection of insulation materials and thicknesses not only saves energy but also reduces environmental impacts. The effects of thermal insulation on the cooling energy required by buildings and consequently on different types of emissions are among the important research topics both academically and practically. In this context, examining the effects of various insulation materials and climate conditions on the environmentally optimal insulation thickness is important for energy efficiency and environmental sustainability. This study investigates the effects of thermal insulation applications on different types of emissions in regions with hot climate conditions around the world.

The impact of cooling degree days (CDD), and thus the energy required for cooling, on the environmentally optimal insulation thickness has been determined. In the analyses, extruded polystyrene (XPS), mineral wool (MW), and polyurethane foam (PUR) have been used as insulation materials. The cities of Malaga (Spain), São Paulo (Brazil), Adana (Türkiye), Santiago (Chile), Formosa (Argentina), Kharga (Egypt), Buenos Aires (Costa Rica), Kuwait (Kuwait), Doha (Qatar), and Arizona (USA), all located in hot climate regions but with different temperature levels, have been selected to observe the impact of different climates on the environmentally optimal insulation thickness. The amounts of harmful gases emitted into the environment, such as CO_2 and SO_2, have been calculated separately for each region with different CDDs, and optimum insulation thicknesses have been determined for each region.
Keywords: Insulation, Emission, Optimization, Sustainability, Cooling degree days.

INTRODUCTION

Energy efficiency and sustainability have become highly prominent topics in recent times. The primary reasons for this are the rising energy costs and the growing environmental awareness, along with the policies implemented by governments regarding sustainability. In this context, reducing energy consumption in the construction sector, especially in residential buildings, has become crucial. Applying insulation to the exterior walls of buildings is one of the first solutions that come to mind for energy efficiency. Besides its impact on cost, the environmental effects of this application should not be overlooked. In general, there are studies in the literature examining the effect of carbon dioxide (CO_2), the most well-known emission type. Ali et al. [1] discussed the significant role of the building sector in CO_2 emissions and the associated environmental impacts. They outlined the challenges in mitigating CO_2 emissions due to the extensive use of non-renewable energy sources and poor building designs. The authors proposed various strategies, including adopting low-carbon technologies and enforcing strict policies to reduce CO_2 emissions in the construction and operation of buildings. Chou et al. [2] developed a system for evaluating carbon dioxide emissions and environmental costs associated with building construction. They used life cycle assessment (LCA) to simulate CO_2 emissions during different construction phases, including prefabrication and cast-in-place methods. Monte Carlo simulations were employed to estimate the emissions, and these were then converted into monetary values. They aimed to help engineers and architects optimize construction methods to minimize environmental impacts using this approach. Zhu et al. [3] analyzed the embodied carbon dioxide emissions in China's building sector. They used a process-based approach and a disaggregated input-output model to estimate the annual embodied carbon dioxide emissions, found that they account for a significant portion of the total emissions in the sector. The study highlighted the importance of addressing embodied carbon alongside operational carbon to achieve China's carbon emission goals by 2030. Min et al. [4] investigated the impact of CO_2 emissions on building energy efficiency. They discussed how the construction sector, through its energy use and material production, significantly contributes to CO_2 emissions, which exacerbated global warming. The study explored various strategies to reduce these emissions, including the use of sustainable materials, energy-efficient building designs, and green technologies. The research emphasized the importance of reducing both operational and embodied CO_2 emissions to improve overall building energy efficiency and support sustainable development goals.

MATERIAL AND METHOD

In this study, gases released into the atmosphere have been analyzed, with their sources categorized into two main types: operational and embodied emissions. Embodied emissions refer to those indirectly generated during the production, transportation, and installation of insulation materials, while operational emissions stem from the energy used for cooling. Consequently, the study first determines the building's cooling load, followed by the calculation of the amounts of SO_2 and CO_2 emitted into the atmosphere. The cooling load is typically calculated using the degree day method. In the present study, the impact of cooling degree days (CDD), and thus the energy required for cooling, on the environmentally optimal insulation thickness has been examined. In this context, the cities of Malaga (Spain), São Paulo (Brazil), Adana (Türkiye), Santiago (Chile), Formosa (Argentina), Kharga (Egypt), Buenos Aires (Costa Rica), Kuwait (Kuwait), Doha (Qatar), and Arizona (USA), all located in hot climate regions but with different temperature levels, have been selected to observe the impact of different climates on the environmentally optimal insulation thickness. Global map of average annual cooling degree days are presented in Fig. 1 [5].

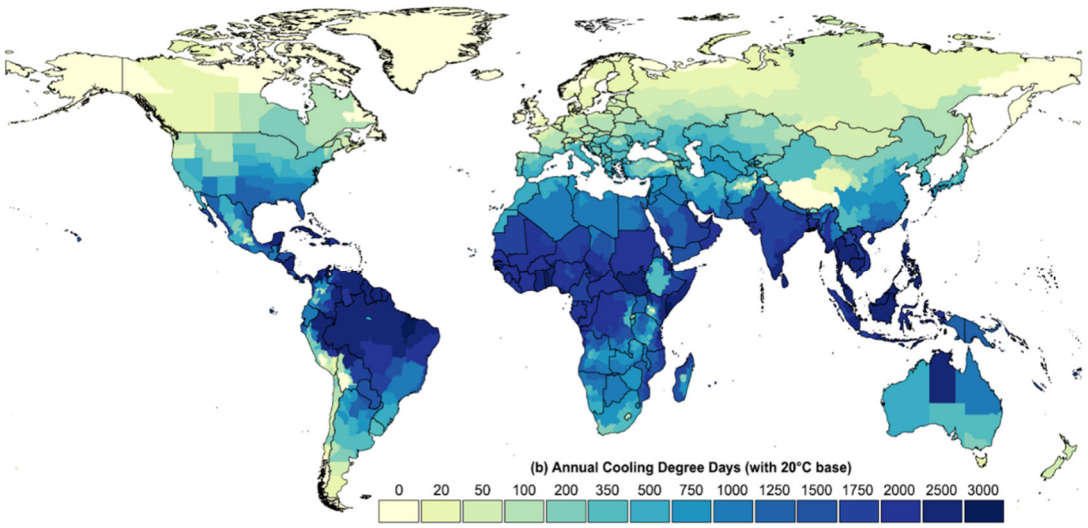


Fig. 1. Annual cooling degree days (CDD) around the world

The cities selected for analysis are divided into two categories as "Substantially Hot Climate Cities" and "Severe Hot Climate Cities" and their cooling degree day values are given in Table 1 [6].

Table 1. Categorization of cities by CDD values.

	Substantially Hot Climate Cities				
	Malaga	São Paulo	Adana	Santiago	Formosa
CDD	705	936	1166	1537	1917
	Severe Hot Climate Cities				
	Kharga	Buenos Aires	Kuwait	Doha	Arizona
CDD	2675	2902	3143	3322	3791

The annual cooling energy requirement of the building can be determined using the following equation.

$$E_{A,C} = \frac{86400\ CDD}{(R_i + R_o + R_w + R_{ins})COP} \quad (1)$$

In this equation, R_o denotes the convective heat resistance on the exterior, R_i represents the convective heat resistance on the interior, R_w refers to the thermal resistance of the uninsulated wall, and R_{ins} corresponds to the thermal resistance of the insulation material. The Coefficient of Performance (*COP*) for the air conditioning system is assumed to be 2.5 [7].

Eq. (2) calculates the amount of harmful gases, such as SO_2 and CO_2, released into the atmosphere as a result of electricity consumption for cooling. In this context, *f* represents the emission factor associated with each gas, including both SO_2 and CO_2. Emissions from insulation material, has been calculated using Eq. (3). Here, $R_{t,w}$ is total wall's thermal resistance of the uninsulated wall.

$$M_{SO_2_CO_2,energy} = \frac{0{,}024\ CDDf_e}{\left(R_{t,w} + \frac{x}{k}\right) COP} \quad (2)$$

$$M_{SO_2_CO_2,ins} = \frac{\rho_{ins} x_{ins} f_{ins}}{N} \quad (3)$$

The total amount of emissions released into the atmosphere from a building can be calculated using Eq. (4). By taking the derivative of Eq. (4) with respect to x and setting it to zero, the insulation thickness that yields the optimal value in terms of environmental impact is determined, as shown in Eq. (5) [8].

$$M_{SO_2_CO_2,total} = \frac{0.024\ CDDf_e}{\left(R_{t,w} + \frac{x}{k}\right) COP} + \frac{\rho x f_{ins}}{N} \quad (4)$$

$$x_{env} = \frac{\sqrt{15}\sqrt{f_{ins}\ f_e\ CDD\ k\ N\ COP\ \rho}}{25 f_{ins} COP \rho} - kR_{t,w} \quad (5)$$

Here *N* is the life of the insulation material (15 years), *ρ* is the density of the material (kg/m^3), and *x* is the thickness (m). The wall consists of 18 cm of reinforced concrete and 4 cm of plaster. Table 2 presents the physical properties of various insulation materials used in the analysis, wall material, plaster and emission factors.

Table 2. Physical properties of wall materials and emission factors [9].

	Density, ρ (kg/m^3)	*Conductivity, k* (W/mK)	*SO_2 Emission factor, f*	*CO_2 Emission factor, f*
XPS	30	0.037	0.01456 kgSO_2/kg	3.83 kgCO_2/kg
MW	55	0.04	0.0075 kgSO_2/kg	1.16 kgCO_2/kg
PUR	40	0.036	0.01928 kgSO_2/kg	4.47 kgCO_2/kg
Reinforced Concrete	2400	2.5	-	-
Plaster	1800	0.87	-	-
Electricity	-	-	0.0000191 kgSO_2/kWh	0.588 kgCO_2/kWh

RESULTS AND DISCUSSION

In the first part of the study, XPS is used as the insulation material and reinforced concrete as the wall material, with both kept constant. The environmentally optimum insulation thicknesses are then determined for cities with varying climates. Fig. 2 shows the insulation thicknesses that minimize SO_2 emissions in cities with substantially hot climate cities. Similarly, Fig. 3 presents the insulation thicknesses that minimize SO_2 emissions in severe hot climate cities. The same analyses are conducted for CO_2 emissions, and the insulation thicknesses that minimize CO_2 emissions in substantially hot climate cities are illustrated in Fig. 4. Fig. 5 depicts the insulation thicknesses that minimize CO_2 emissions in severe hot climate cities.

Fig. 2 and Fig. 3 illustrate the relationship between insulation thickness and SO_2 emissions for cities with substantially hot and severe hot climates, respectively. In substantially hot cities such as Malaga, Sao Paulo, Adana, Santiago, and Formosa, SO_2 emissions increase as insulation thickness rises, with critical insulation thicknesses ranging from 0 cm in Malaga to 1.01 cm in Formosa. This suggests that in these cities, insulation can be increased up to these critical values before a sharp rise in emissions occurs. In contrast, cities with severe hot climates, including Kharga, Buenos Aires, Kuwait, Doha, and Arizona, exhibit higher critical insulation thicknesses, ranging from 1.39 cm in Kharga to 1.87 cm in Arizona.

Fig. 4 and Fig. 5 illustrate the relationship between insulation thickness and CO_2 emissions in various climate conditions. Fig. 4 demonstrates that for cities with substantially hot climates, the optimum insulation thickness (x_{env}) for reducing CO_2 emissions ranges from 12.76 cm in Malaga to 21.76 cm in Formosa. Fig. 5 illustrates that for cities with severe hot climates, the optimum insulation thicknesses (x_{env}) are significantly higher, ranging from 21.9 cm in Kharga to 31.05 cm in Arizona. The findings suggest that in hotter climates, thicker insulation is necessary to minimize CO_2 emissions effectively. As insulation thickness increases beyond these optimum values, CO_2 emissions almost stabilize at minimal levels.

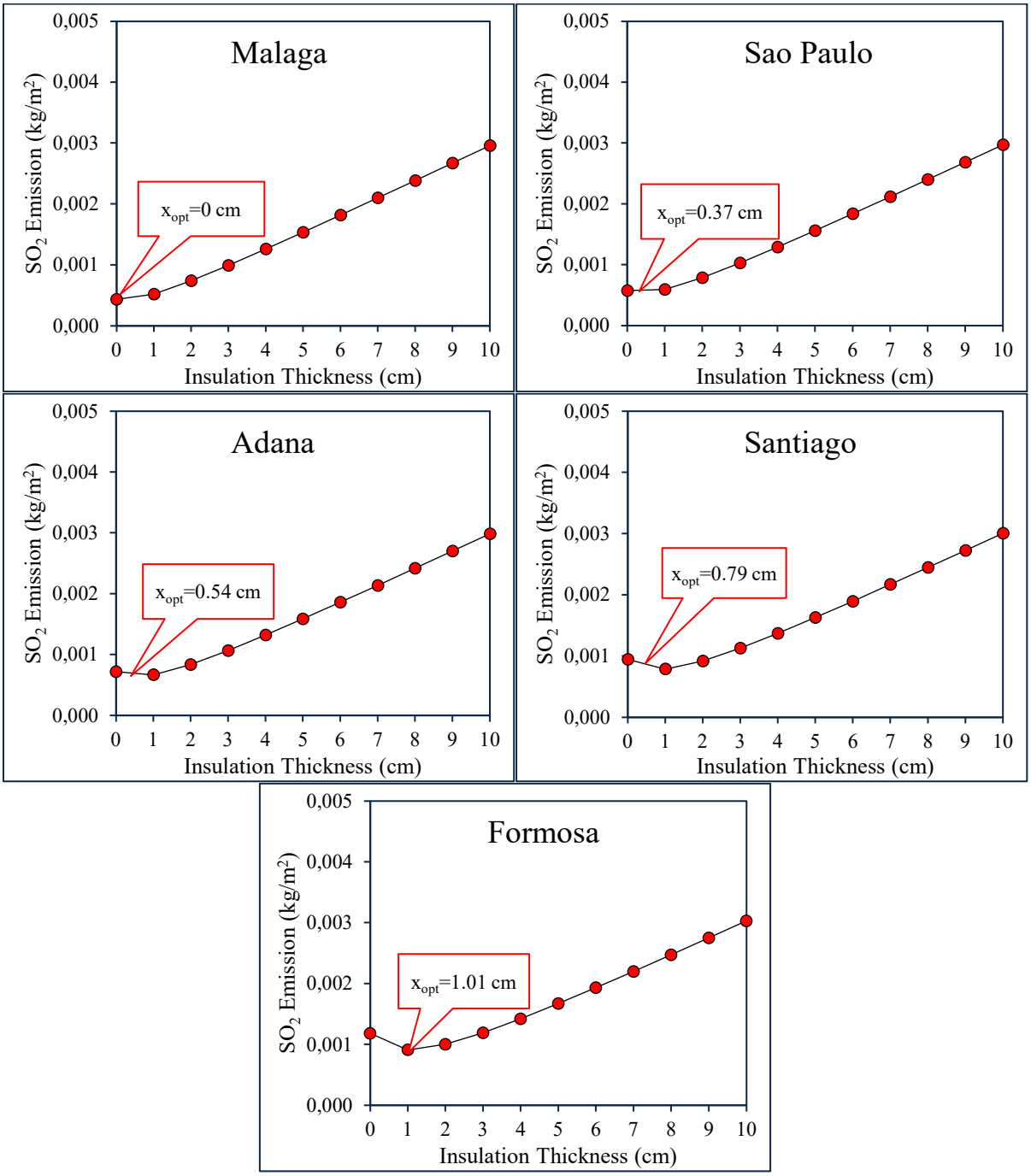


Fig. 2. Total amount of SO_2 released to the atmosphere from energy and insulation depending on insulation thickness for *substantially hot climate cities.*

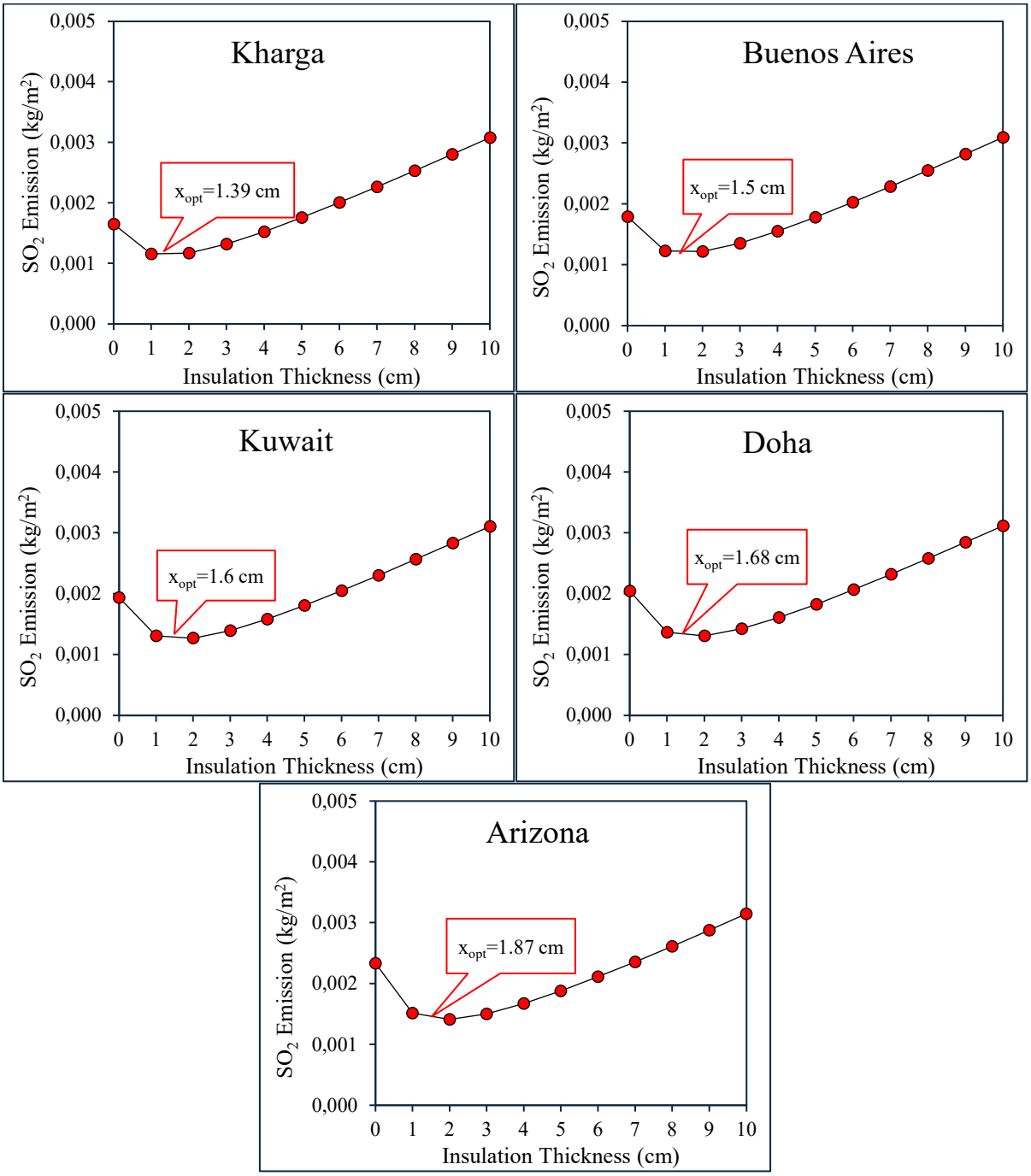


Fig. 3. Total amount of SO_2 released to the atmosphere from energy and insulation depending on insulation thickness for *severe hot climate cities*.

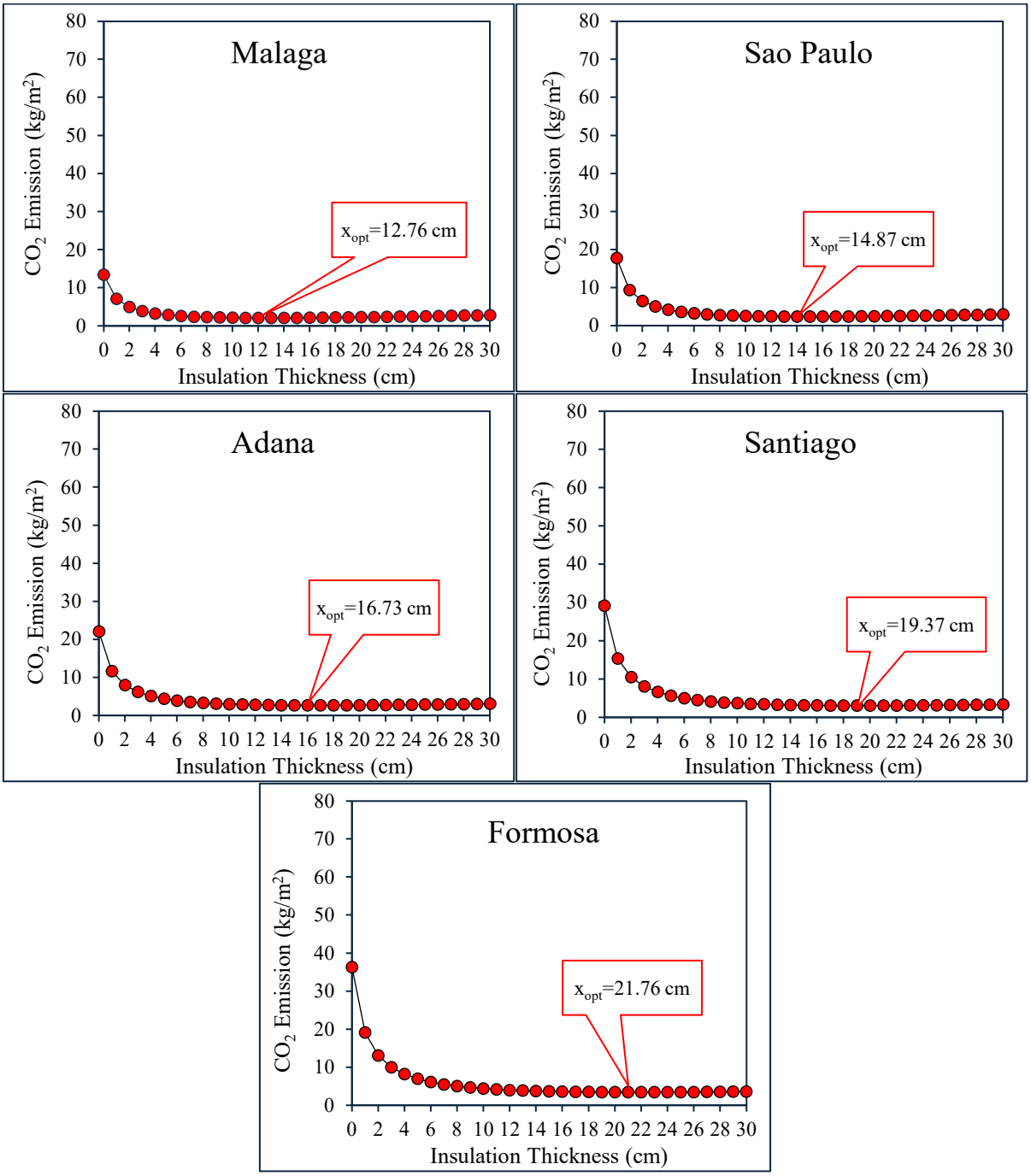


Fig. 4. Total amount of CO_2 released to the atmosphere from energy and insulation depending on insulation thickness for *substantially hot climate cities.*

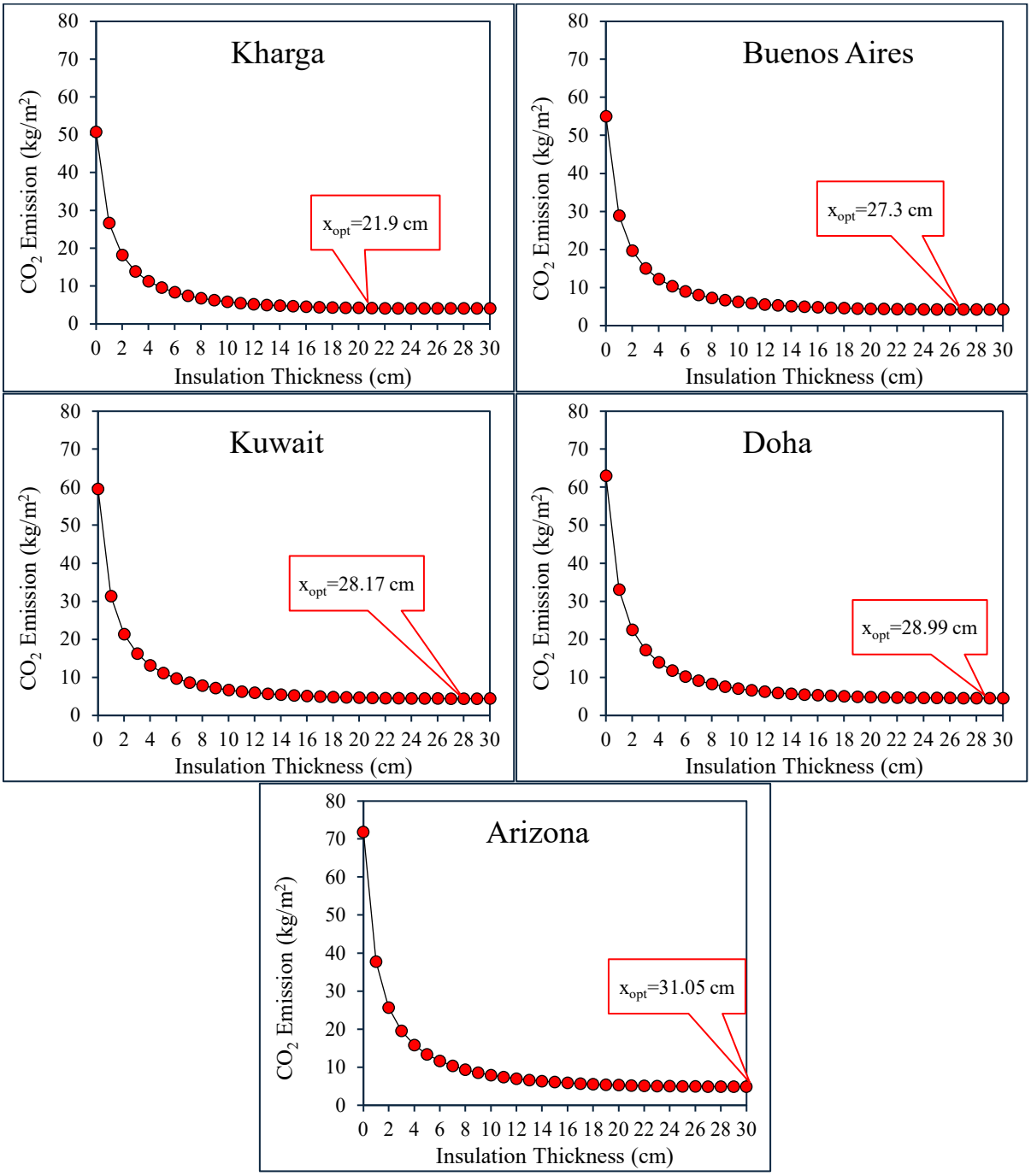


Fig. 5. Total amount of CO_2 released to the atmosphere from energy and insulation depending on insulation thickness for *severe hot climate cities*.

Among the cities examined in the first part of study, the cities with the lowest (Malaga), highest (Arizona) and average (Formosa) cooling energy requirements are used in the other analyses to see the effect of the insulation material. Fig. 6 and Fig. 7 depict the environmental impacts of SO_2 and CO_2 emissions related to the insulation thickness of three materials; XPS, MW, and PUR across three climate zones: Malaga, Formosa, and Arizona. For SO_2 emissions (Fig. 6), as insulation thickness increases from 0 to 10 cm, PUR shows the highest emissions, while XPS and MW exhibit lower and relatively similar trends in all three zones.

For instance, at 10 cm, PUR emits around 0.005 kg/m^2 in all zones, while XPS and MW remain under 0.003 kg/m^2. Conversely, CO_2 emissions (Fig. 7) decrease significantly with increasing insulation thickness, and almost stabilizing beyond a certain point. Notably, the optimum insulation thickness for minimizing SO_2 emissions varies across materials and regions, as shown in Table 3. In relatively low-temperature regions like Malaga, having no insulation at all is found to be the best option in terms of SO_2 emissions. In contrast, the CO_2 optimum thicknesses (Table 4) are much higher, reaching up to 43.67 cm for PUR in Arizona. These results highlight the balance between insulation thickness and environmental impact, with regional variations playing a critical role.

Fig. 8 compares the total CO_2 and SO_2 emissions resulting from energy and insulation for three different insulation materials (XPS, MW, PUR) across three locations (Malaga, Formosa, Arizona). In Malaga, CO_2 emissions are 2.04 kg/m^3 for XPS and 2.49 kg/m^3 for PUR, while MW shows the lowest at 1.6 kg/m^3. SO_2 emissions for all materials in Malaga remain constant at about 0.0004 kg/m^3. In Formosa, CO_2 emissions follow the same trend as in Malaga: PUR > XPS > MW. For SO_2 emissions, XPS and MW are similar at around 0.001 kg/m^3 but increase to approximately 0.0011 kg/m^3 for PUR. In Arizona, PUR has the highest CO_2 emissions at about 5.90 kg/m^3, followed by XPS at around 4.80 kg/m^3, and MW the lowest at approximately 3.80 kg/m^3. SO_2 emissions in Arizona show the same trend as in Formosa: PUR > XPS = MW.

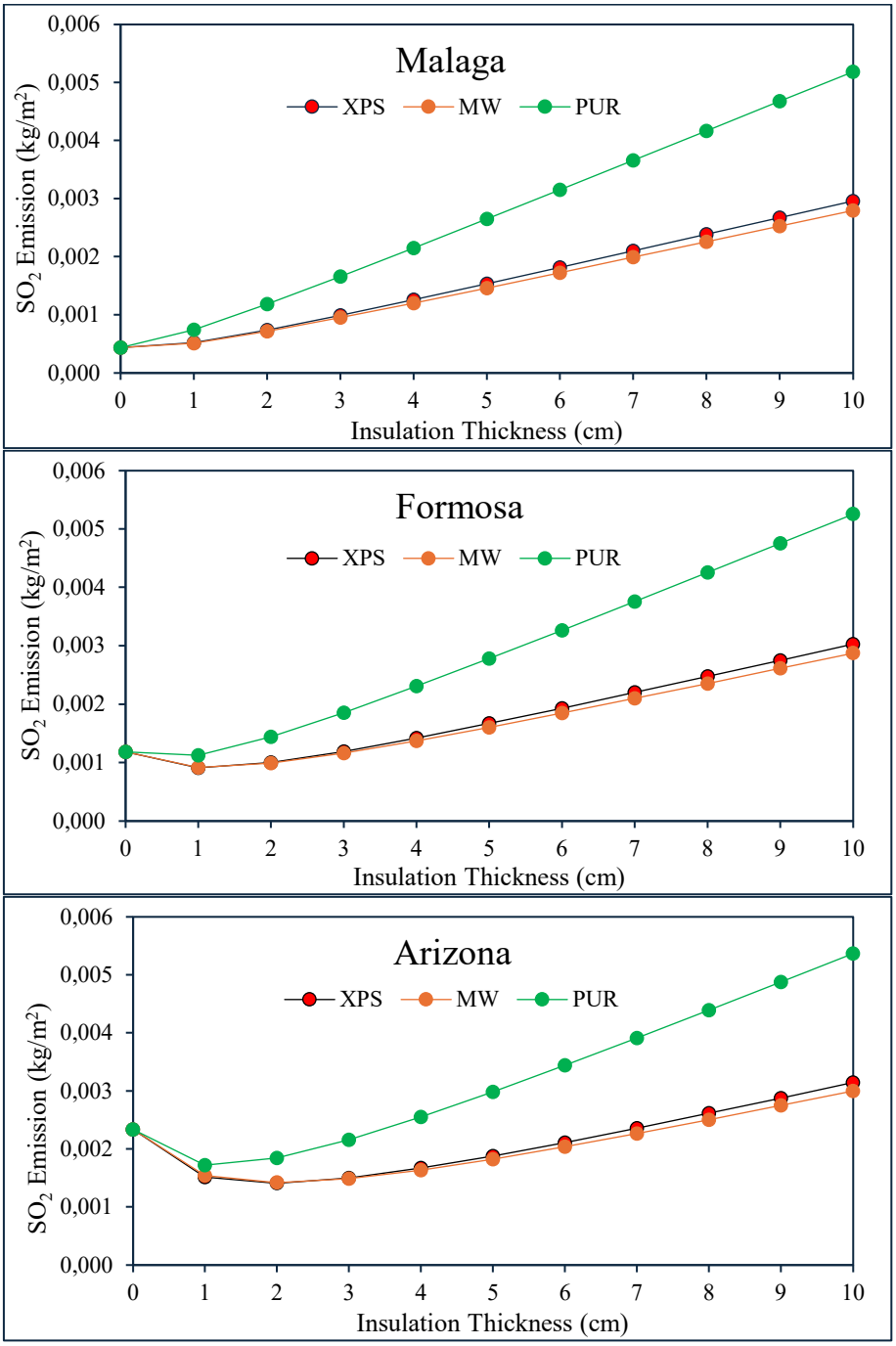


Fig. 6. Total amount of SO_2 released to the atmosphere from energy and insulation depending on insulation thickness for different insulation materials

Table 3. Environmental optimum insulation thickness by insulation material and climate zone.

SO_2	Optimum Insulation Thickness (cm)		
	Malaga	Formosa	Arizona
XPS	0	1.01	1.87
MW	0	1.07	1.99
PUR	0	0.5	1.13

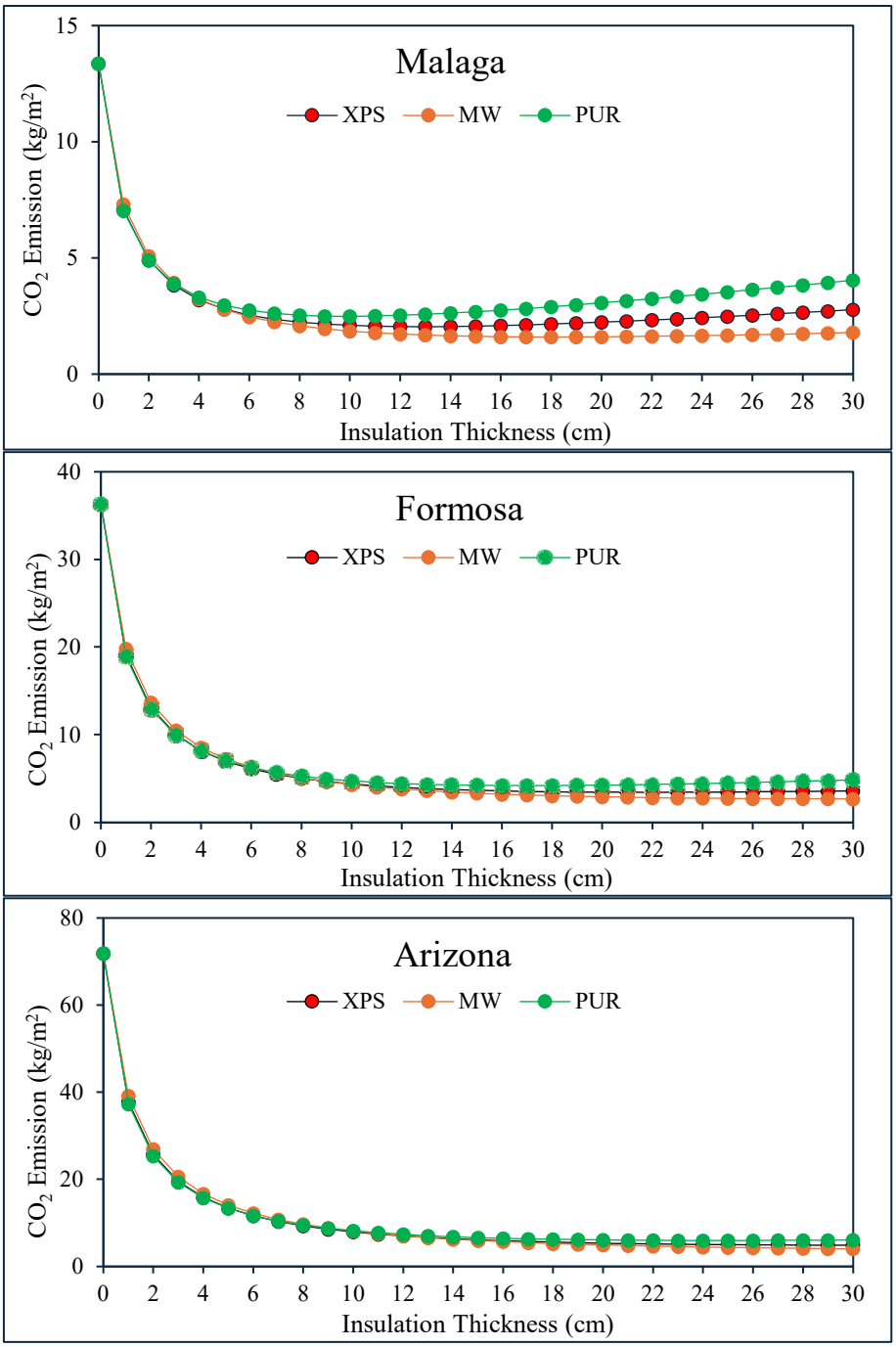


Fig. 7. Total amount of CO_2 released to the atmosphere from energy and insulation depending on insulation thickness for different insulation materials

Table 4. Environmental optimum insulation thickness by insulation material and climate zone.

CO_2	Optimum Insulation Thickness (cm)		
	Malaga	Formosa	Arizona
XPS	12.76	21.76	31.05
MW	18.15	30.71	43.67
PUR	9.89	17.01	24.35

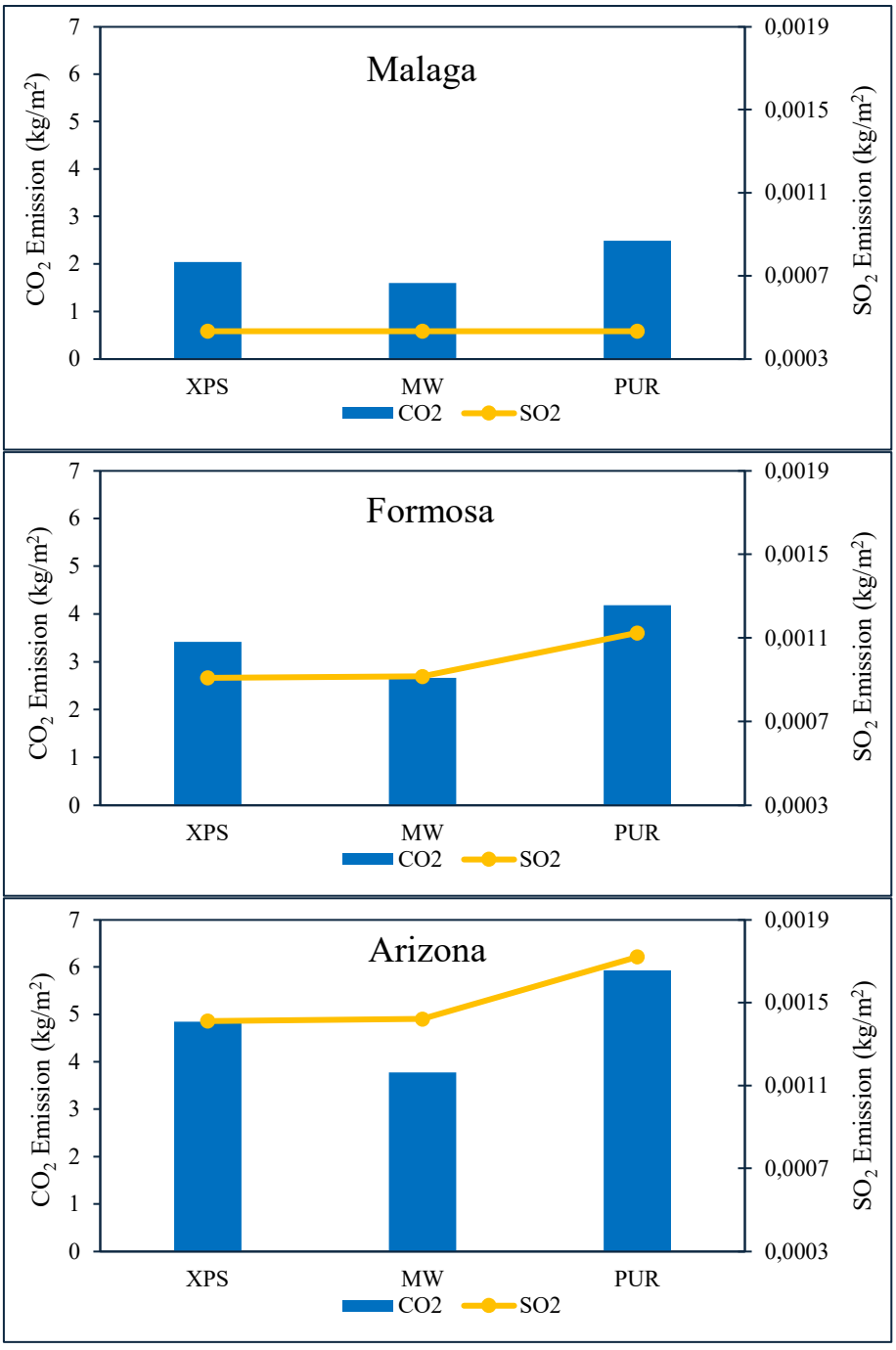


Fig. 8. Comparison of total amount of CO_2 and SO_2 released to the atmosphere from energy and insulation for different insulation materials

CONCLUSION

In this study, the impact of different climate on the environmentally optimal insulation thickness has been determined. Insulation thicknesses that minimize SO_2 and CO_2 are determined for 10 different cities with different climatic conditions. In addition, the effects of different insulation materials on SO_2 and CO_2 emissions are also investigated. Finally, the amounts of SO_2 and CO_2 emitted into the atmosphere in cities with different climates and different insulation materials are presented comparatively.

The conclusions can be summarized as follows:

- With the increase in annual cooling demand, the optimum insulation thickness that minimizes SO_2 emissions also increases. This trend is also observed for CO_2 emissions.
- While it is necessary to determine an optimum insulation thickness in each climate zone to minimize CO_2 emissions, SO_2 emissions become significant in regions with very high temperatures. For example, in Malaga, which has a *CDD* value of 705, not insulating provides the most suitable condition for minimizing SO_2 emissions.
- The optimum insulation thicknesses that minimize CO_2 emissions are greater than those that minimize SO_2 emissions in each climate zone. For example, in Formosa, the insulation thickness that minimizes SO_2 emissions is 1.01 cm, while the insulation thickness that minimizes CO_2 emissions is 21.76 cm.
- When PUR is selected as the insulation material under the same conditions, the insulation thicknesses that minimize emissions are lower for both SO_2 and CO_2.
- However, a quantitative analysis shows that MW should be selected as the insulation material when the goal is to minimize SO_2 and CO_2 emissions into the atmosphere.

REFERENCES

[1] K.A. Ali, M.I. Ahmad, Y. Yusup, Issues, impacts, and mitigations of carbon dioxide emissions in the building sector, Sustain. 12 (2020). https://doi.org/10.3390/SU12187427.

[2] J.S. Chou, K.C. Yeh, Life cycle carbon dioxide emissions simulation and environmental cost analysis for building construction, J. Clean. Prod. 101 (2015) 137–147. https://doi.org/10.1016/j.jclepro.2015.04.001.

[3] W. Zhu, W. Feng, X. Li, Z. Zhang, Analysis of the embodied carbon dioxide in the building sector: A case of China, J. Clean. Prod. 269 (2020) 122438. https://doi.org/10.1016/j.jclepro.2020.122438.

[4] J. Min, G. Yan, A.M. Abed, S. Elattar, M. Amine Khadimallah, A. Jan, H. Elhosiny Ali, The effect of carbon dioxide emissions on the building energy efficiency, Fuel. 326 (2022) 124842. https://doi.org/10.1016/j.fuel.2022.124842.

[5] I. Staffell, S. Pfenninger, N. Johnson, A global model of hourly space heating and cooling demand at multiple spatial scales, Nat. Energy. 8 (2023) 1328–1344. https://doi.org/10.1038/s41560-023-01341-5.

[6] Weatherbase. Available online. www.weatherbase.com (Accessed 15 July 2023).

[7] M. Ozel, Determination of optimum insulation thickness based on cooling transmission load for building walls in a hot climate, Energy Convers. Manag. 66 (2013) 106–114. https://doi.org/10.1016/j.enconman.2012.10.002.

[8] A.S. Canbolat, An integrated assessment of the financial and environmental impacts of exterior building insulation application, J. Clean. Prod. 435 (2023) 140376. https://doi.org/10.1016/j.jclepro.2023.140376.

[9] D. Anastaselos, E. Giama, A.M. Papadopoulos, An assessment tool for the energy, economic and environmental evaluation of thermal insulation solutions, Energy Build. 41 (2009) 1165–1171. https://doi.org/10.1016/j.enbuild.2009.06.003.

EVALUATION OF THE QUALITY OF A RELAXING HERBAL FOOT BALM FORMULATION

Fouzia Benoudjit
Research Unit of Materials, Processes and Environment, M'hamed Bougara university
Laboratory of coatings, Materials & Environment, M'hamed Bougara University

Sarra Deraï
Faculty of Sciences, Department of Chemistry, M'hamed Bougara University

Hasna Elamrani
Faculty of Sciences, Department of Chemistry, M'hamed Bougara University

Abstract
The growing consumer demand for natural-based cosmetic and parapharmaceutical products is driven by an increasing awareness of the potential negative impacts of synthetic chemicals on health and the environment. This trend has led to a surge in the development of natural topical formulations, including foot creams and balms. Consumers are particularly interested in these products due to their perceived safety, efficacy, and the additional benefits of natural ingredients such as herbals and their extracts. Among these, relaxing foot formulations have gained significant attention as they offer not only basic hydration and protection but also therapeutic properties that help alleviate foot fatigue and discomfort. This study aimed to comprehensively characterize a commercially available relaxing herbal foot balm formulation. The objective was to evaluate the physico-chemical and organoleptic properties of this plant-based product. Various tests were conducted, including sensory examination, pH measurement, refractive index, zeta potential, and rheological evaluations. The results showed that the studied foot balm was an oil-in-water emulsion, with a homogeneous droplet size distribution. The slightly acidic pH of 6 fell within the skin's physiological range making it suitable for regular use. The high zeta potential value (> 30 mV) confirmed the emulsion's stability, indicating a long shelf life and consistent performance. The rheological analysis revealed non-Newtonian behavior, classifying the balm as pseudoplastic or shear-thinning, which facilitates its spreadability and ease of topical application. These comprehensive evaluations of the physical, chemical, and textural characteristics provided valuable insights into the performance, stability and potential of the product. The findings will also guide the future development of more effective and consumer-friendly cosmetic and parapharmaceutic formulations based on natural ingredients, meeting the increasing market demand for safe and natural personal care products.
Keywords: herbal foot balm, characterization, quality evaluation, rheology, stability.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

ARTIFICIAL SWEETENERS IN FOOD AND THEIR IMPACT ON THE BODY: A REVIEW

Artenisa Hoxha
Department of Industrial Chemistry, Faculty of Natural Sciences

Glejdis Hajdini
Department of Chemistry, Faculty of Natural Sciences, University of Elbasan

Armela Mazrreku
Department of Chemistry, Faculty of Natural Sciences, University of Elbasan

Marilda Osmani
Department of Chemistry, Faculty of Natural Sciences, University of Elbasan

Belinda Hoxha
Department of Chemistry, Faculty of Natural Sciences, University of Elbasan

Abstract
Artificial sweeteners have become integral components of the modern diet, frequently used as substitutes for sugar to reduce calorie intake and manage blood sugar levels. This review provides a comprehensive examination of the current scientific understanding of artificial sweeteners, focusing on their metabolic effects, influence on gut microbiota, and associations with chronic diseases. Despite their widespread use and regulatory approval, the long-term health impacts of these sweeteners remain a subject of significant research and debate.
The review begins by categorizing the most commonly used artificial sweeteners, including aspartame, sucralose, saccharin, and stevia, detailing their chemical compositions and sweetness compared to sugar. It then explores the metabolic effects of artificial sweeteners, highlighting their dual role in weight management and blood sugar control. While they are often recommended for weight loss and diabetes management, some studies suggest that they may paradoxically contribute to weight gain and affect glucose metabolism. The influence of artificial sweeteners on gut microbiota is a growing area of interest. Research indicates that sweeteners like saccharin and sucralose can alter gut bacteria's composition and function, potentially leading to metabolic disorders, inflammation, and immune system changes. These findings underscore the need for further research to understand the clinical implications fully.
The review also examines the associations between artificial sweeteners and chronic diseases, including cardiovascular disease, cancer, diabetes, and neurological disorders. Observational studies have suggested potential links between sweetener consumption and increased risk of these conditions, although causality has not been established. Regulatory agencies such as the FDA, EFSA, and WHO have conducted extensive reviews, concluding that artificial sweeteners are safe at recommended intake levels. However, continuous monitoring and updated research are essential.
Overall, artificial sweeteners offer a viable low-calorie alternative to sugar, beneficial for individuals seeking weight management and blood sugar control. Nevertheless, their long-term health effects are complex and not entirely understood. This review highlights the importance of moderation in consumption and the need for ongoing scientific investigation to ensure consumer safety and well-being.
Keywords: artificial sweeteners, influence, body sugar control

EFFECT OF SALINE SOLUTIONS ON GEOPOLYMERS WITH VARYING NAOH CONCENTRATIONS

H. El harouachi
Mohammed Premier University, Molecular Chemistry, Materials and Environment Laboratory (LCM2E), Multidisciplinary Faculty of Nador (FPN)

M. Elgettafi
Mohammed Premier University, Molecular Chemistry, Materials and Environment Laboratory (LCM2E), Multidisciplinary Faculty of Nador (FPN)

M. Loutou
Mohammed Premier University, Molecular Chemistry, Materials and Environment Laboratory (LCM2E), Multidisciplinary Faculty of Nador (FPN)

ABSTRACT
Geopolymer materials have garnered significant attention as eco-friendly alternatives to conventional construction materials. This study investigates the response of Schlamm-based geopolymers to varying concentrations of sodium hydroxide NaOH (8-14M) when exposed to saline solutions. Geopolymers were synthesized using Schlamm as a precursor material and subjected to different NaOH concentrations to create a range of geopolymers with distinct properties. The specimens were then immersed in saline solutions to simulate real-world conditions. The effects of saline exposure on the mechanical, chemical, and microstructural properties of the geopolymers were analyzed by (XRF, XRD, SEM and compressive strength). Results indicate that the interaction between NaOH concentration and saline solution significantly influences the geopolymer performance. This research contributes to a better understanding of the durability and suitability of Schlamm-based geopolymers in saline-rich environments, offering insights for their potential applications in coastal and marine construction projects
Keywords: Geopolymer,Saline solutions,Schlamm,Geopolymers,NaOH concentrations, Compressive strength

A NOVEL HETEROCYCLIC COMPOUND AS AN EFFECTIVE CORROSION DEFENDER FOR CARBON STEEL IN ACIDIC MEDIUM

Youssef ADNAN
Laboratory of Organic and Physical Chemistry, Faculty of Science, Ibn Zohr University

Noureddine IDLAHOUSSAINE
Laboratory of Organic and Physical Chemistry, Faculty of Science, Ibn Zohr University

Brahim EL IBRAHIMI
Laboratory of Organic and Physical Chemistry, Faculty of Science, Ibn Zohr University
Faculty of Applied Sciences, Ait melloul, Ibn Zohr University

Nada Kheira SEBBAR
Faculty of Applied Sciences, Ait melloul, Ibn Zohr University
Laboratory of Heterocyclic Organic Chemistry, Faculty of Sciences, Mohammed V University in Rabat

Hassan OUACHTAK
Laboratory of Organic and Physical Chemistry, Faculty of Science, Ibn Zohr University
Faculty of Applied Sciences, Ait melloul, Ibn Zohr University

Abdelaziz AIT ADDI
Laboratory of Organic and Physical Chemistry, Faculty of Science, Ibn Zohr University

ABSTRACT
This study explores the effectiveness of a new heterocyclic compound called Y5 in protecting carbon steel in a 1 M HCl solution. By employing various methods like PDP, EIS, DFT, and MC simulations, the research assesses Y5's efficiency. The findings reveal that Y5 provides up to 85% protection at a concentration of 5.10^{-3} M, show casing its potential as a strong corrosion inhibitor. The study highlights the synthesis of Y5 via the Schiff base method, supported by spectral data analysis. Techniques such as electrochemical studies, UV-visible spectroscopy, and surface analyses (SEM/EDX) were used to evaluate the protective agent's performance. Results indicate that Y5 acts as a mixed-type inhibitor, adhering to the Langmuir adsorption isotherm, which suggests a mainly chemisorption-based mechanism. The protection efficiency increased with temperature, indicating versatility in different environments. Theoretical studies, including DFT and MC simulations, confirmed the experimental results, providing insights into the molecular interactions and adsorption mechanisms. SEM and EDX analyses demonstrated the formation of a protective layer with Y5.
Keyword: heterocyclic compound, PDP, EIS, corrosion, inhibition

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

OPTIMIZATION OF MULTI-STAGE MICELLAR-ENHANCED FLOCCULATION PROCESS FOR REMOVAL OF LEVOFLOXACIN HEMIHYDRATE IN WASTEWATER

Fiza Bukhtawar
Government College University Faisalabad

Associate Professor Dr. Muhammad Usman
Department of Chemistry, Government College, University Faisalabad

Associate Professor Dr. Atta Ul Haq
Department of Chemistry, Government College, University Faisalabad

Associate Professor Dr. Muhammad Saeed
Department of Chemistry, Government College, University Faisalabad

Atif Saleem
The Schazoo Pharmaceutical Laboratories Pvt Ltd.

ABSTRACT
This study aims to optimize a multi-stage micellar flocculation process to eliminate the persistent antibiotic Levofloxacin Hemihydrate (LH) in water sources by using a micellar flocculation process with multiple stages. This process provides superior efficiency compared to conventional methods by utilizing an eco-friendly anionic surfactant and a multivalent salt for flocculation. It was found that 0.020 mol/L soap concentration achieved an 85 % LH removal rate at room temperature in a one-minute contact time. Micellar structure changes and re-solubilization decreases removal efficiency as soap concentration increases. Increasing pH levels results in higher removal efficiency. The adsorption mechanism was studied using Langmuir, Freundlich, Temkin, Dubinin- Radushkevich, and Frenkel-Halsey-Hill isotherm models, along with pseudo-first order and second-order models, film diffusion and intraparticle diffusion models of adsorption kinetics. The Langmuir and Temkin models fitted the adsorption isotherm better than other models, with an R^2 of 98.13 % and 97.29 % respectively. The pseudo-second-order kinetic model best fits the experimental data of the MEF process with an R^2 of approximately 99.39 %. Thermodynamic assessments indicate that at lower temperatures spontaneous events occur and that the process is exothermic.
Keywords: Biobased soap, Multivalent salt, Levofloxacin hemihydrates, Kinetics aspects, Thermodynamics.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

ANTIBIOTICS SUSCEPTIBILITY PATTERN AND BETA-LACTAMASE PRODUCTION BY *Staphylococcus aureus* ISOLATED FROM LOCALLY PRODUCED YOGHURT SOLD ALONG TANKE ROAD, ILORIN, NIGRRIA

MAJEKODUNMI RACHEAL ADEDAYO
Department Of Mıcrobıology, Faculty Of Pure And Applıed Scıences, Kwara State Unıversıty

EMEKA NGELE
Department Of Mıcrobıology, Faculty Of Pure And Applıed Scıences, Kwara State Unıversıty

TITILAYO ELIZABETH ADESOKAN
Department Of Mıcrobıology, Faculty Of Pure And Applıed Scıences, Kwara State Unıversıty

ABSTRACT
The production of Beta-Lactamase by *Staphylococcus aureus* and *Escherichia coli* against commonly used antibiotics is linked to their ability to acquire and disseminate antimicrobial-resistant determinants in food and the environment. Food like milk and milk product such as yoghurt may serve as reservoir for antibiotic-resistant bacteria. This study determined the antibiotic susceptibility pattern and beta-lactamase production by *Staphylococcus aureus* and *Escherichia coli* isolated from locally produced yoghurt. Ten (10) locally produced yoghurts were collected randomly within Ilorin metropolis. Bacterial isolation was carried out on samples; the isolates were characterized and identified using standard microbiological methods. Antibiotics susceptibility testing using beta-lactam based antibiotics such as Amoxicillin-Clavulanate (30µg), Cefotaxine (30µg), Ceftriazone (30µg), Ceftazidime (30µg), and Cefepime (30µg) on Mueller Hinton agar was done according to standard method. *Escherichia coli* was not detected in all the samples (0%) but 40 % of the samples were contaminated with *Staphylococcus aureus*. The total staphylococcal count ranged from 2.00 to 4.00 x 10^1 CFU/ml. The isolated *Staphylococcus aureus* were 100 % resistant to Amoxicillin-Clavulanate, 75 % resistant to Ceftriazone and Ceftazidime and 25% resistant to cefepime and Cefotaxine. One of the *Staphylococcus aureus* isolated was resistant to all the five antibiotics used (100%) while one was susceptible to 4 (80 %) of the antibiotics. Results from this study indicate *Staphylococcus aureus* contamination in the locally produced yoghurt samples and the ability of the isolates to produce beta-lactamase enzyme as indicated by their resistance to the beta-lactam based antibiotics used.
Keywords: *Staphylococcus aureus*, Antibiotic Resistance, Yoghurt, Beta-Lactamase, Antibiotics

INTRODUCTION
Antibiotics are produced commonly by soil microorganisms and probably represent a means by which organisms in a complex environment, such as soil, control the growth of competing microorganisms. Microorganisms that produce antibiotics are useful in preventing or treating disease includes the bacteria and the fungi (Lancelot, 2022).
Antibiotics produce their effects through a variety of mechanisms of action. A large number work by inhibiting bacterial cell wall synthesis; these agents are referred to generally as β-lactam antibiotics.

Antibiotics that inhibit the synthesis of the cell wall have a specific effect on the organism. The result is an alteration in the cell wall and shape of the organism and eventually the death of the bacterium (Halawa *et al*., 2022).

The menace of antibiotic resistance is a global challenge with grave impact on global health, the ripple effect is increase morbidity and mortality, increase in cost of treating infections, increase in number of days in hospital admission, and a gross reduction in the national economy (Biondo, 2023).

Bacterial pathogens can acquire genes and mutations that mediate resistance to antibiotics. In some cases, bacteria may acquire multiple mechanisms of resistance to the same antibiotic, and in multidrug resistant bacteria, they acquire resistance to multiple classes of antibiotics, the first mechanisms of resistance to be discovered was resistance to penicillin (a β-lactam antibiotic) (Tooke *et al*., 2019). Penicillin resistant strains of *Staphylococcus aureus* were found to have acquired an enzyme known as a β-lactamase (originally known as a penicillinase).

β-lactamases are a family of enzymes (there are thousands of different versions) found in many bacterial pathogens. β-lactamase enzymes target a part of β-lactam antibiotics known as the β-lactam ring, this is found in all β-lactam antibiotics. The β-lactamase enzyme breaks this ring open, preventing the antibiotic from binding to their target. They have different activities, meaning some will work against specific members of the β-lactam family, while others will not. The Carbapenemases are the most notorious because they break down all members of the β-lactam family of antibiotics, including carbapenems, severely limiting treatment options (Nikol *et al*., 2022). Bacteria can acquire enzymes that chemically modify the target of the antibiotic in the bacteria by adding additional chemical groups. Other type of enzyme acts by chemically modifying the antibiotic itself, preventing it from binding to its target site. An example of this is aminoglycoside-modifying enzymes such as N-acetyltransferases, which add an additional acetyl group (CH_3CO) to aminoglycoside antibiotics such as kanamycin, hence, stops it from binding to the ribosome, and the bacteria becomes resistant. There are many different types of these enzymes which have different activities against antibiotics including aminoglycosides, tetracyclines, phenicols and lincosamides (Castanheira, 2021).

A common mechanism of acquiring resistance by bacteria is by modifying the target of the antibiotic during mutation. This is a common mechanism for resistance to penicillin (Acharya *et al*., 2019).

Another mechanism of resistance is to gain an additional copy of the gene that encodes a protein that still retains activity in the presence of the antibiotic. This is how the pathogen *Staphylococcus aureus* becomes resistant to most β-lactam antibiotics such as penicillin. Methicillin-resistant *Staphylococcus aureus* (MRSA), which is the name given to *S. aureus* that is resistant to β-lactam antibiotics, becomes resistant by gaining an extra copy of penicillin binding protein, which is the target of β-lactam antibiotics. This additional version known as penicillin binding protein, (PBP) can still function in the presence of β-lactam antibiotics. Bacteria can also overproduce the target of the antibiotics, meaning there is an excess of the protein target of the antibiotics compared to the antibiotic itself. Some bacterial species are intrinsically resistant to some antibiotics via reduced permeability and efflux pumps (Siddiqui and Koirala, 2023).

Beta-lactam antibiotics are typically used to target a broad spectrum of Gram-positive and Gram-negative bacteria. Beta-lactamases produced by Gram-negative bacteria are usually secreted, especially when the antibiotics are present in the environment.

The two types of beta-lactamases: Serine beta-lactamases (SBLs) and Penicillin Binding Protein (PBP) work on the basis of the two basic mechanisms of opening the β-lactam ring (Furniss *et al*., 2022).

Plasmids responsible for ESBL production frequently carry genes encoding resistance to other drug classes (for example, aminoglycosides). Therefore, antibiotic options in the treatment of ESBL-producing organisms are extremely limited (Wikipedia, 2022).

Foodborne illness occurs when a pathogen is ingested with food and establishes itself (and usually multiplies) in the human host, or when toxigenic pathogens establishes itself in a food product and produces a toxin, which is then ingested by the human host. Thus, foodborne illness is generally classified into: foodborne infection and foodborne intoxication. In foodborne infections, the time from ingestion until symptoms occur is much longer than that of foodborne intoxications (Thomas, 2017).

Bacteria are the most common cause of foodborne diseases and exist in a variety of shapes, types and properties. Some pathogenic bacteria are capable of spore formation and thus, highly heat-resistant (e.g. *Clostridium botulinum, C. perfringens, Bacillus subtilus, B. cereus*). Some are capable of producing heat-resistant toxins (e.g. *S. aureus, C. botulinum*). Most pathogens are mesophilic with optimal growth temperature range from 20 °C to 45 °C. However, certain foodborne pathogens (i.e. psychrotrophs), such as *Listeria monocytogenes*, and *Yersinia enterocolitica* are capable of growth under refrigerated conditions or temperatures less than 10 °C (CDC, 2020).

Staphylococcus aureus is found in the environment and is also found in normal human flora, located on the skin and mucous membranes (most often the nasal area) of most healthy individuals. *S. aureus* does not normally cause infection on healthy skin; however, if it is allowed to enter the bloodstream or internal tissues, these bacteria may cause a variety of potentially serious infections. Transmission is typically from direct contact. However, some infections involve other transmission methods (Taylor and Unakal, 2023). Beta-lactamase enzymes are produced by both Gram-positive and Gram-negative bacteria. This has led to many antibiotics (Beta-lactam antibiotics) less effective against these microorganisms; thereby increasing the number of resistance strains of bacteria in food we consume most especially yoghurt.

Locally produced yogurt is a readily available and ready to eat dairy product within Ilorin metropolis and easily accessible. The need to ascertain the hygienic and quality of these products is key to living a healthy life within the community where these products are manufactured and sold (Eberechuckwu *et al*., 2023). Most of these dairy products are suitable medium for the growth of pathogenic food borne microorganism like *S. aureus, E. coli*, *Salmonella* spp*, Shigella* spp etc. These organisms have developed resistance against some known antibiotics which lead to spread of resistance strain of bacteria across the population.

Yoghurt is a food produced by bacterial fermentation of milk (Eberechuckwu *et al*., 2023). The bacteria used to make yogurt are known as yogurt cultures. Fermentation of sugars in the milk by these bacteria produces lactic acid, which acts on milk protein to give yogurt its texture and characteristic tart flavor. Cow's milk is the milk most commonly used to make yogurt. Milk from water buffalo, goats, ewes, mares, camels, and yaks are also used to produce yogurt. The milk used may be homogenized or not. It may be pasteurized or raw. Each type of milk produces substantially different results. Yoghurt is one of the most popular fermented dairy products around the world (Taiwo *et al*., 2018). Yoghurt products are characterized by smooth texture, suitable viscosity, good flavour, and fermentation acidification. These properties have recently been considered as an important factor for yoghurt starter selection (Oyetunji and Adebisi, 2018).

Both species are converting lactose into lactic acid. This study therefore aimed at examining the antibiotic susceptibility pattern and Beta-Lactamase Production by *Staphylococcus aureus* and *Escherichia coli* isolated from locally produced yoghurt.

MATERIALS AND METHODS

Sample Collection

Ten samples of locally produced yoghurts were collected along Tanke road in Ilorin and transported aseptically on ice-pack (Styrofoam ice chest) to the laboratory for immediate analysis. The temperature and pH of the samples were taken using simple milk forthing thermometer with a large dial and a stainless steel shaft at the point of sample collection.

Serial Dilution

Ten fold serial dilutions were carried out on the yoghurt samples using sterile distilled water. Isolation was done using pour plate technique in Manittol salt agar, Eosin methylene blue and MacConkey agar. The plates were incubated for 24 and 48 hours at 37^0C. Discrete colonies appearing on the plates were counted with the aid of a colony counter and recorded. Subculturing was done to obtain pure culture and isolates were maintained on slants at 4^0 C for further research (Torrenos-Fernandez *et al*., 2023).

Colonial and Biochemical Characterization of Isolates

Isolates were characterized based on the colonial morphology and biochemical tests. Reaction to Gram staining, colonial appearance on plate, and biochemical tests such as catalase, indole, coagulase, oxidase and others were done using standard methods.

Catalase Test

A loop full of the inoculum was transferred unto a clean grease-free slide and 3 % hydrogen peroxide was added in which an observation was made. Catalase producing organisms produces effervescence of gas formation that shows the organism is catalase positive while weak or no effervescence indicates catalase negative (Chanchal *et al*., 2019).

Indole Test

A sterilized test tubes containing 4 ml of tryptophan broth was inoculated aseptically by taking the growth from 18 to 24 hrs old culture and was incubated at 37 °C for 24-28 hrs. 0.5 ml of Kovac's reagent was added to the broth culture. Then presence or absence of ring was observed. Formation of a pink to red color ("cherry-red ring") in the reagent layer on top of the medium within seconds of adding the reagent show positive result while no colour change even after the addition of the reagents shows negative result (Chanchal *et al*., 2019).

Oxidase Test

Filter paper was soaked with 1 % tetramethyl-p-phenylenediamine, using the inoculating loop, small inoculum was streaked on the part of the paper containing the reagent. Observation was made: Development of a deep purple-blue/blue color indicates oxidase production within 5-10 seconds, which signify positive to oxidase while no purple – blue colour indicate negative result (Chanchal *et al*., 2019).

Citrate Test
Tube containing citrate medium was incubated with small amount of bacteria at 37 ºC for 24 hrs. Positive result indicates growth in citrate with colour change from green to blue. No growth and colour change means there was no citrate utilization (Chanchal *et al*., 2019).

Urease Test
The surface of a urea agar slant was streaked with a portion of a well-isolated colony or slant inoculated with 1 to 2 drops from an overnight brain-heart infusion broth culture. The cap was loosely locked and incubated at 35-37 °C in ambient air for 48 hrs to 7 days. After seven day the result was checked. Development of an intense magenta to bright pink color in 15 min to 24 hrs, is positive urease while no color change is negative to urease (Chanchal *et al*., 2019).

Coagulase Test
A drop of physiological saline was placed on a slide. With the loop, a portion of the isolated colony was emulsified in the saline, a drop of human plasma in the suspension was made, and mix gently. It was incubated at 37 ^{0}C for 4 hrs, and then extended for 24 hrs. It was the examined. Positive reaction shows that the plasma coagulate and the coagulate remains stable, while negative result shows that plasma does not coagulate (Chanchal *et al*., 2019).

Voges–Proskauer (VP) Test
Using organisms taken from an 18-24 hrs pure culture, 0.2 ml of 40 % KOH and then 0.6 ml of alpha-naphtol were added. Observed pink-red color at the surface within 30 min indicate positive result, no colour change means negative result (Chanchal *et al*., 2019).

Methyl Red (MR) Test
The medium was prepared and allowed to stand at room temperature. Using organisms taken from a 24 hrs old pure culture, the medium was incubated aerobically at 37 ^{0}C for 24 hrs. After 24 hrs of incubation, aliquot 1ml of the broth was added to a clean test tube, the remaining broth was re-incubated for an additional 24 hrs. Then, 2 to 3 drops of methyl red indicator was added to the aliquot. Observation for red color immediately was made which signify positive to MR and yellow colour indicates negative result (Chanchal *et al*., 2019).

Sugar Fermentation Test
With a straight inoculation needle, the top of a well-isolated colony was touched. TSI was inoculated by first stabbing through the center of the medium to the bottom of the tube and then streaking the surface of the agar slant. The cap was left on loosely and incubated at 35 °C -37 °C in ambient air for 18 to 24 hrs (Umeh *et al*., 2017).

Antibiotic Susceptibility Test to Screen for Beta-lactamase Production
Standardizing the Bacterial Suspension using McFarland Standard
This was done by comparing the turbidity of 18 hours old broth culture of the isolate to the turbidity of 0.5 McFarland standard. This provides an optical density comparable to the density of a bacterial suspension of about 1.5x 10^{8} colony forming units (CFU/ml) (Alka *et al*., 2022).

Antibiotic Susceptibility Pattern and Beta-lactamase Production Test

Using spread plate method, 0.1 ml of the bacterial suspension was aseptically transferred using sterile pipette to the solidified Mueller Hinton agar (MHA). Sterile swab stick was used to inoculate the MHA plate with the swab by starting from the top, carefully swabbing from side to side down to the bottom of the plate. This step was done three times after each rotation of the plate (usually 60 degrees) to cover the whole MHA plate with evenly swabbed inoculum. Disc diffusion method was used, the addition of antimicrobial disks on inoculated MHA plates was done manually using sterile forceps placing each disk within equal distances from other disks. Antibiotics used are: Amoxicillin-Clavulanate 30 µg, Cefotaxine 30 µg, Ceftriazone 30 µg, Ceftazidime 30 µg, and Cefepime 30 µg. Each disk was pressed towards the surface of the agar to ensure that disk displacement will not occur during incubation. The plates were incubated at 37 ^{0}C for 24 hrs (Jorgensen, 2015).

RESULTS

Total Colony Count

There were no growths on EMB plate for detection of *Escherichia coli.* On MacConkey agar plate there were no growth on samples B, 1, 3 and 5 respectively, while other samples had growth on them, the highest growth was found in sample H ($7.0X10^{1}$ CFU/ml) and the lowest count was obtained in sample W ($1.1X10^{1}$CFU/ml). There was no *Staphylococcus aureus* isolation, from samples B, H, 1, 3, 4, and 5 respectively but samples M, W, T and 2 had staphylococcal growth. Sample T had the highest number of growth with total colony count of $4.0x10^{1}$ CFU/ml while sample W had the lowest number of growth of $2.0x10^{1}$CFU/ml. The result is presented in Table 1.

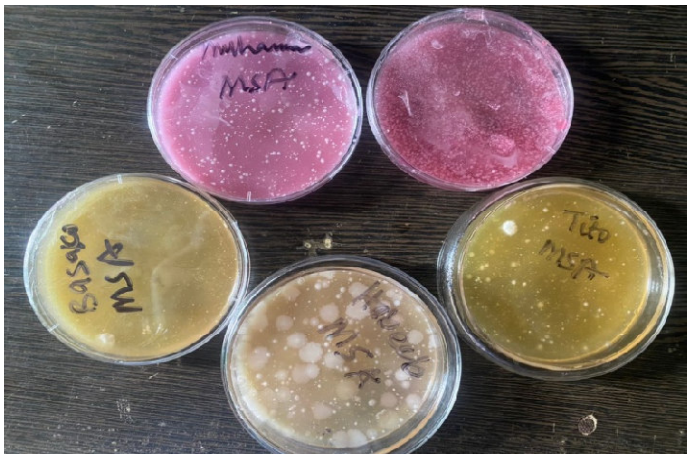


Plate 1: Isolates Growth on Agar Medium

Table 1: Total Bacterial Count

SAMPLES	Total coliform count (x 10^1 (cfu/ml)	*Escherichia coli* (X 10^1(cfu/ml)	*Staphylococcus aureus* (X 10^1(cfu/ml)
M	4.0	NG	3.0
B	NG	NG	NG
W	1.1	NG	2.0
T	2.0	NG	4.0
H	7.0	NG	NG
O	NG	NG	NG
MO	6.0	NG	3.0
L	NG	NG	NG
Y	3.0	NG	NG
D	NG	NG	NG

KEY
NG: No growth,
Yoghurt samples: M: Momar, B: Bossos, W: Wondu, T: Toyo, H: Hollos, O: Oyop, MO: Moor, L: Lozan, Y: Yodau, D: Dome

Biochemical Characteristics and Gram's Reaction of Bacteria Isolates

Four staphylococcal organisms were isolated from the yoghurt samples, the isolates were cocci and in clustered arrangement. All were positive to oxidase, catalase, citrate, urease, coagulase, methyl red, Voges Proskauer and sugar fermentation (glucose, sucrose and lactose) but negative to indole production. The result is presented in Table 2.

Table 2: Biochemical Characteristics and Gram's Reaction of Bacteria Isolates

BIOCHEMICAL TESTS	**ISOLATES**			
	M	**W**	**T**	**2**
Oxidase	Positive	Positive	Positive	Positive
Catalase	Positive	Positive	Positive	Positive
Citrate	Positive	Positive	Negative	Positive
Urease	Positive	Positive	Positive	Positive
Indole	Negative	Negative	Negative	Negative
Coagulase	Positive	Positive	Negative	Positive
Methyl Red	Positive	Positive	Positive	Positive
Voges Proskauer	Positive	Positive	Negative	Positive
Sugar Fermentation				
Glucose	Positive	Positive	Positive	Positive
Sucrose	Positive	Positive	Positive	Positive
Lactose	Positive	Positive	Positive	Positive
Gram Staining				
Gram's Reaction	Positive	Positive	Positive	Positive
Probable Organisms	*Staphylococcus aureus*	*Staphylococcus aureus*	*Staphylococcus aureus*	*Staphylococcus aureus*

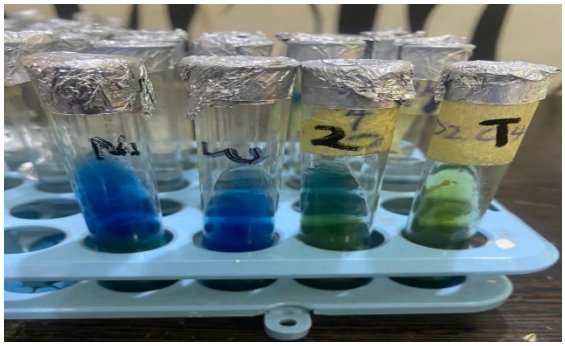


Plate 2: Biochemical Reactions of Isolates

Antibiotic Susceptibility Pattern and Beta-lactamase Production

The isolates were found to be resistant to the Amoxicillin-Clavulanate, Ceftriaxone, Ceftazidime and Cefepime. This shows that these organisms produced beta-lactamase against these antibiotics. The result is presented in Table 3.

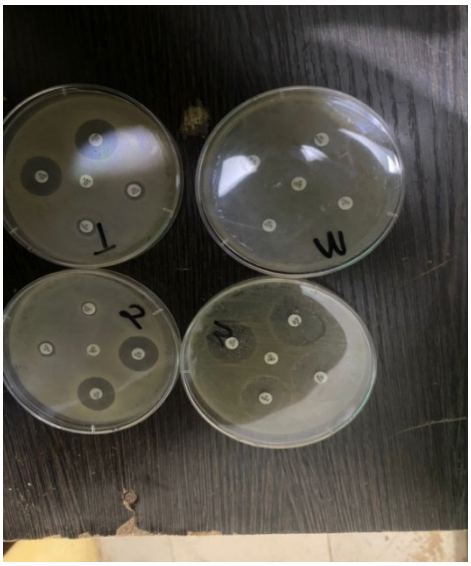


Plate 3: Antibiotic Susceptibility Pattern of Isolates on MHA

Table 3: Antibiotic Susceptibility Pattern and Beta-lactamase Production by Isolates

	ANTIBIOTICS DISCS Zones of Inhibition (mm)				
ISOLATES	**AMC**	**CRP**	**CFG**	**CZX**	**CFX**
Staphylococcus aureus (1)	**No Zone**	**8.67-R**	**No Zone**	**18.0 - S**	**19.33 - I**
staphylococcus aureus (2)	**No Zone**	**No Zone**	**No Zone**	**No Zone**	**No Zone**
Staphylococcus aureus (3)	**No Zone**	**9.0-R**	**8.38-R**	**20.30 -S**	**20.00 - I**
Staphylococuccsaureus (4)	**No Zone**	**22.67-S**	**23.33-S**	**26.67-S**	**26.00-S**

KEY
R: Resistance
S: Susceptible
I- Intermediate

ANTIBIOTICS
Amoxicillin-Clavulanate (AMC)
Cefotaxine (CFX)
Ceftriaxone (CRP)
Ceftazidime (CFG)
Cefepime (CZX)

DISCUSSION

The Yoghurt samples that were examined were found to be highly contaminated with food borne *Staphylococcus aureus*. Out of the ten samples that were worked on, only four of them were free from microbial contaminant. The high level of contamination could be as a result of the poor hygiene during production, surrounding environment where it was produced and distribution of the product. The result from this study is similar to the report by Endrias *et al*. (2022).

Staphylococcus aureus is a normal flora of the human body found on the skin, upper respiratory tract also soil and water. *S. aureus* is also colonizer of mucous membranes, and gastrointestinal tract, carried by up to 80% of the population. Nasal carriage of *S. aureus* is most common, and increases with health care exposure, diabetes, dialysis, drug use (John, 2022). Moreso, People who carry *Staph* can contaminate food if they don't wash their hands before touching it. If food is contaminated with *Staph*, the bacteria can multiply in the food and produce toxins that can make people ill. *Staph* bacteria are killed by cooking, but the toxins are not destroyed and will still be able to cause illness. Foods that are not cooked after handling, such as sliced meats, puddings, pastries, and sandwiches, milk and milk products (yoghurts) are especially risky if contaminated with *Staphylococcus aureus* (CDC, 2022). High level of *Staphylococcus aureus* in samples of Yoghurt indicates poor quality of locally processed Yoghurt with attendant nutritional risk which renders it clinically unfit for human consumption. The presence of *Staphylococcus aureus* in human body can cause toxin-mediated foodborne diseases (food poisoning), skin infection, wound infection, nausea and if found in the blood; bacteremia. This finding is similar to the report of Endrias *et al*. (2022).

Furthermore, Coliform bacteria were found to be present in most of the samples which also indicates that these dairy products may have been exposed to unsanitary conditions. Coliforms are defined as aerobic or facultatively anaerobic, Gram-negative, non-sporeforming rods capable of fermenting lactose to produce gas and acid within 48 h at 32–35 °C. Most bacterial genera that comprise the coliform group (e.g. *Escherichia, Klebsiella, and Serratia*) are within the family Enterobacteriaceae, while at least one genus with strains recognized as coliforms, *Aeromonas*, is in the family Aeromonadaceae. The presence of coliforms has long been thought to indicate fecal contamination, however, recent discoveries regarding this diverse group of bacteria indicates that only a fraction are fecal in origin, while the majority are environmental contaminants (Lamye *et al*., 2017). Further study was carried out to check if the *Escherichia coli* were among the coliforms found in the sample, the result showed that no *E. coli* was found in the samples. Therefore, this shows that contamination of these products was from the environment and not of fecal origin. This report is similar to the findings by Lamye *et al*. (2017).

Analysis of antibiotic susceptibility and beta-lactamase production shows that *Staphylococcus aureus* was found to be resistance to the antibiotics used. This shows that the isolated *Staphylococcus aureus* could have produced beta-lactamase enzyme that resist the action of beta-lactam ring in the antibiotics. These types of antibiotics cannot be used for treating infection or diseases caused by consuming contaminated locally produced yoghurt. This will lead to the spread of antibiotic resistant *Staphylococcus aureus* within the locality where the yoghurts are sold. Furthermore, during the analysis of the yoghurt samples from the Ilorin metropolis, it was discovered that those ones sold along the street were more contaminated than those sold in shops under controlled temperature and good hygienic environment. This finding is also similar to the report of Nkeiruka *et al*. (2022). The manufacturers and sellers of this yogurt should adopt good hygiene practice in order to avoid contaminating this product with *Staphylococcus aureus* and other microorganisms.

CONCLUSION

Staphylococcal food poisoning is of major concern in public health programs worldwide. Results clearly indicated that some of the locally produced yoghurts sold along the streets of Ilorin are contaminated with *Staphylococcus aureus and coliform bacteria.* Human and environmental sources could be incriminated in the contamination of dairy products. Resistant strain was also isolated from some of the collected yogurt products which possess a serious health challenge in the treatment of *Staphylococcus aureus related infection within a community*. There is a high risk of food poisoning associated with the consumption of those dairy products. We can say that good hygiene and manufacturing practices along each step of the yoghurt production chain are of great importance and necessary to eliminate the dissemination of potentially pathogenic *Staphylococcus aureus and other pathogenic microorganism* in the community. Thus, more measures focusing on hygienic practices, good storage, clean environment and transportation are required to reduce contamination by *Staphylococci.*

RECOMMENDATIONS

Good hygiene and manufacturing practices are of great importance and necessary to eliminate the dissemination of potentially pathogenic *Staphylococcus aureus* in the community. More so, the environment and the equipment used should be kept clean. Furthermore, the regulatory bodies should ensure that standard manufacturing procedures and production of high quality products are observed. However, as much as possible, yoghurt sold along the road side should be avoided because of poor handling and storage, as refrigeration temperature is the best temperature for the storage of yoghurt.

REFERENCES

Acharya, K. P. and Trevor, W. R. (2019). Antimicrobial resistance in Nepal. *Front. Med*. Vol. 6, pp. 105–109. DOI:10.3389/fmed.2019.00105

Alka, J., Prasad, K.D.V. and Yarlagadda (2022). Antibacterial activity of 3D versus 2D TiO2 nanostructured surfaces to investigate curvature and orientation effects in Current Opinion in Biomedical Engineering

Biondo, C. (2023). Bacterial antibiotic resistance: the most critical pathogens. *Pathogens*, Vol. 12 (1), 116–214. doi:10.3390/pathogens12010116

Castanheira, M. (2021). "Extended-spectrum β-lactamases: an update on their characteristics, epidemiology and detection". *Journal of Antimicrobial Chemotherapy*. Vol. 3 (3): dlab092. doi:10.1093/jacamr/dlab092. PMC 8284625. PMID 34286272.

CDC (2020). "Foodborne Germs and Illnesses".

Chanchal, M., Tasmina, T., Mohammad, J.S. and Ahsan, H. (2019). Biochemical and molecular identification of antibiotic-producing bacteria from waste dumpsite soil. Vol. 2(3):120, DOI: 10.5455/jabet.2019.d34

Eberechukwu, A.U., Sunday, O.E., Ahamefula, A.A. and Chioma, E.U. (2023). Quality assessments of yoghurts produced from local plant raw materials {*Cajanus cajan* (fiofio), *Vignia ungiculata* (akidi oji) and *Vignia subterranean* (okpa)}, *African Journal of Food Science and Technology*. Volume 14, Issue 2.

Endrias, Z.G., Addisu, B.A., Bizunesh, M.B., Kebede, A.K., Nega, D.T., Lencho, M.M. and Edilu, j.s. (2022). Isolation and Identification of *Staphylococcus aureus* from Milk and Milk Products, Associated Factors for Contamination, and Their Antibiogram in Holeta, Central Ethiopia, *Vet Med Int*. 2022: 6544705. doi: 10.1155/2022/6544705, PMCID: PMC9106507PMID: 35574151

Furniss RCD, Kaderabkova N, Barker D, Bernal P, Maslova E, et al. Breaking antimicrobial resistance by disrupting extracytoplasmic protein folding. Elife. 2022;11:e57974. doi: 10.7554/eLife.57974. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

Halawa, E.M., Mohamed, F.W., Al-Rabia, M.W., Ali, B., Nehal, A.N., Mohamed, A., Rada, O., Liana, F., Ahmed, M., El-Nablaway, M. and Ahmed, A. (2024). Antibiotic action and resistance: updated review of mechanisms, spread, influencing factors, and alternative approaches for combating resistance, *Front. Pharmacol*., Volume 14 - 2023 | https://doi.org/10.3389/fphar.2023.1305294

John, C., Lam, M.D. and William, S.M.D. (2022). The Golden Grapes wrath-*Staphylococcus aureus*, Bacteremia: *a clinical review 2022*doi: *https://doi.org/10.1016/jamjmed. 2022.09017*

Jorgensen, J., Pfaller, M., Carroll, K., Funke, G., Landry, M., Richter, S. and Warnock, D. (2015). Manual of clinical microbiology. *Antimicrobial Susceptibility Testing Systems*. (72):pp. 1274-1278

Lancelot, T.H. and Salman, A.W. (2022). Antibiotic Chemical compound.*https://www.britannica.com/editor/theeditors-of-encyclopaedia-britannica/4419*

Nikol, K., Manasa, B.R., Christopher, D.F., Diego, G., Tracy, P. and Despoina, A.I.M. (2022). The biogenesis of β-lactamase enzymes Microbiology (Reading). Vol. 168(8): 001217. doi: 10.1099/mic.0.001217, PMCID: PMC10235803PMID: 35943884

Oyetunji, O. and Adebisi, K. (2018). Assessment of the functional quality and safety of yoghurts produced with starter cultures obtained from selected commercially sold yoghurts. *Potravinarstvo*. 12. 10.5219/952.

Siddiqui, A.H. and Koirala J. (2023). Methicillin-Resistant *Staphylococcus aureus*. In: StatPearlsTreasure Island (FL): StatPearls Publishing; https://www.ncbi.nlm.nih.gov/books/NBK482221/

Taiwo, O.S. *et al*. (2018). *IOP Conf. Ser*.: Earth Environ. Sci. 210 012019

Taylor, T.A and Unakal, C.G. (2023). *Staphylococcus aureus* Infection. In: StatPearls Treasure Island (FL): StatPearls https://www.ncbi.nlm.nih.gov/books/NBK441868/

Thomas, B. (2017). Food borne pathogen, *AIM Microbiol* 2017;3(3):529-563 doi: 10.3934/microbiol.2017.3.529 PMID 31294175

Tooke, C.L., Hinchliffe, P., Bragginton, E.C., Colenso, C.K., Hirvonen, V.H.A., *et al*. (2019). β-lactamases and β-lactamase inhibitors in the 21st century. *J Mol Biol.* Vol. 431:3472–3500. doi: 10.1016/j.jmb.2019.04.002.

Terrones-Fernandez, I., Casino, P., López, A., Peiró, S., Ríos, S., Nardi-Ricart, A., García-Montoya, E., Asensio, D., Marqués, A.M., Castilla, R., Gamez-Montero, P.J. and Piqué, N. (2023). Improvement of the Pour Plate Method by Separate Sterilization of Agar and Other Medium Components and Reduction of the Agar Concentration, *Microbiol Spectr*. Vol. 11(1): doi: 10.1128/spectrum.03161-22.

Umeh, S.O., Okafor, U. and Agwuna, L. (2017). Yeasts from Local Sources: An Alternative to the Conventional Brewer's Yeast. *World Wide Journal of Multidisciplinary Research and Development*. Vol. 3, pp. 191-195.

Wikipedia (2022). *Yogurt. en.wikipedia.org/wiki/yoghurt*

Wikipedia (2022). Beta-lactamase, https://www.wikipedia.org/wiki/beta-lactamase.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

FERMENTATIVE PROPERTY AND BACTERIOCINOGENIC ACTIVITY OF LACTIC ACID BACTERIA ISOLATED FROM 'NUNU' AN INDIGENOUS NIGERIAN BEVERAGE

MAJEKODUNMI RACHEAL ADEDAYO
Department Of Microbiology, Faculty Of Pure And Applied Sciences, Kwara State University

GRACE OLUWASEUN FAMOROTI
Department Of Microbiology, Faculty Of Pure And Applied Sciences, Kwara State University

ABSTRACT
Lactic acid bacteria (LAB) are microorganisms widely dispersed in many environments that have shown desirable characteristics for the food, pharmacy, cosmetics, veterinary, and agricultural industries and have been employed for their fermentative properties, and multi-functional capacities. The main objective of this study was the study on fermentative activity and antibacterial potential of crude bacteriocin from Lactic acid bacteria (LAB) isolated from "nunu" against selected foodborne pathogenic bacteria. LABs were obtained from commonly sold "nunu", characterized and identified using standard methods. The isolates were used singly and in combination to ferment milk and the product were subjected to physicochemical and organoleptic analysis. Crude bacteriocin extracted from the isolates was screened for antibacterial potency against *Escherichia coli, Staphylococcus aureus* and *Pseudomonas aeruginosa.* The isolates obtained were identified as Lactobacillus species 1 and 2, physicochemical parameters of fermented milk showed moisture content of 69.56 to 72.36 %, Ash content of 0.96 to 1.55 %, CHO content of 22.64 to 26.67 %, Calorific value of 447.33 to 485.2kj/100, lipid content of 0.09 to 0.13 %, crude protein of 2.06 to 3.92 % while the titratable acidity ranged from 4892.4 to 7232.4 mg/l. The crude bacteriocins were potent against the tested bacteria though more effective against *E. coli*. The growth inhibitions zones ranged from 8-20 mm for *Lactobacillus* sp1 while it was 12-19mm for Lactobacillus sp2. In conclusion, lactic acid bacteria isolated were able to ferment milk and the crude bacteriocin was potent against the bacteria tested.

INTRODUCTION
Animal products have an important economic and cultural value in Africa. In Sahelian countries, they occupy the second place in terms of global trade (FAO, 2022). The dairy sector in particular is an important sector in these countries because it constitutes a strategic lever for reaching food security, gender equity and reducing poverty (FAO, 2019). Fermented dairy foods play an essential role in tackling issues of poverty, malnutrition, and hunger among African consumers (Fagunwa and Olanbiwoninu, 2020). These foods also enhance food security, sustainable development, and economic growth in Africa such as through the provision of employment opportunities, contribution to empowerment initiatives for unemployed women, opportunities for scaling up of traditional food processing techniques, and distribution of resultant products (Akinsemolu, 2018).
Fermented milk products are classified into two groups. Group One: Bacterial lactic acid fermentation: (i) Fermentation by mesophilic bacteria (acidified milk, buttermilk, filmjolk, and langfil), (ii) fermentation by thermophilic and mesophilic bacteria (Nunu and Yogurt).

Group Two: Fungal and bacterial lactic acid fermentation: Fermentation by bacteria as well as fungi, e.g., alcoholic milk (Acidophilus yeast milk, Koumiss, and kefir) and moldy milk (Villi). Milk product varieties depend on the type of milk and starter culture used, sugars, and aromatic compounds (Ghosh *et al*., 2019). Notable starter cultures used for manufacturing numerous fermented milk products include lactic acid bacteria, proprionibacteria, surface-ripening bacteria, and yeasts, and molds. Dairy starter cultures are unique, and their major role is fermenting lactose by producing lactic acid. This acid is responsible for developing the characteristic body and texture of the fermented milk product, thus contributing to the overall flavor of the product and consequently enhancing preservation. Lactic acid starter cultures also produce diacetyl, acetaldehyde, and acetic acid which aids in flavor and aroma development of the final product (Hati *et al*., 2013).

In fermented foods, LAB have been known to display antimicrobial activities through production of various metabolites, including lactic acid, hydrogen peroxide, and bacteriocins. Lactic acid bacteria (LAB) are microorganisms widely dispersed in many environments that have shown desirable characteristics for the food, pharmacy, cosmetics, veterinary, and agricultural industries. LAB have been used from ancient times owing to their fermentative properties, but they are also extensively studied lately for the multi-functional capacities, which include enzymatic and metabolite production, which are of importance in the food industry. Lactic acid bacteria (LAB) are a wide group of gram-positive, nonspore-forming, catalase negative, and aerotolerant bacteria that includes a large number of genera (rods and cocci), (Mulaw *et al*., 2019). Lactic acid bacteria (LAB) have the ability to produce a number of desirable substances that can improve the flavor, texture, nutritional value, and shelf life of foods (Garavand *et al*., 2022). Antimicrobial and antioxidant properties and some health benefits of LAB including effects on lowering blood pressure, reducing serum cholesterol levels, and stimulating the immune system have been well-reported (Dan *et al*., 2019). Apart from the production of vitamins and short-chain fatty acids, most recently, LAB is gaining more attention because of their organic acid production, which also has different therapeutic applications such as being anti-obesity and anti-diabetic (Garavand *et al*., 2023). The majority of LAB have well-established protect systems (Toe *et al*., 2019).

Globally, more than 1,000,000 people die because of antibiotic resistant pathogens. If solutions are not found, number of death due to antibiotic resistant pathogens might be elevated to ten million by 2050. Developing new drugs and its characterization is a complex process, expensive, and requires a long period of time (Hashempour Baltork *et al*., 2019). Currently, searching for new antimicrobials to combat the risks of antimicrobial resistance is the prioritized concern of the WHO (Conno *et al*., 2020). Therefore, researchers and scholars around the world are devoted to finding and exploring an effective and alternative biological antimicrobial agent to control and eradicate the burden of Foodborne pathogenic bacteria (Ali, 2010). Antibiotic treatment not only affects pathogenic bacteria but also nontargeted commensal intestinal microbial communities were disturbed and led to intestinal microbiota dysbiosis; mainly antibiotic-associated diarrhoea is one of the intestinal problems (Jernberg *et al*., 2007). So, using bacteriocin from fermented to fight pathogenic organism will be an alternative to antibiotics.

MATERIALS AND METHODS

Sample Collection

Nunu samples from which microorganisms were isolated was collected from retailers at a locations within Ilorin, Kwara State. The samples were aseptically collected in pre-sterilized bottles and stored on ice until transported to the laboratory.

The samples were refrigerated at 4^0C and analysed within 24hours of collection. Also, Dano powdered milk samples for the production of milk were purchased and taken to Microbiology Laboratory, Central Research Lab, Ilorin for further analyses

Isolation of LAB from Nunu samples

Nunu sample, 1 ml was mixed with 9 ml of sterile distilled water and serially diluted to 10^5. Aliquots, 0.1 ml from the $10^{-4}$and 10^{-5}diluents were inoculated onto Nutrient and MRS agar plates. The plates were incubated at 37ºC. After growth, distinct colonies were sub-cultured to obtain pure cultures which were transferred onto agar slants and stored at 4ºC.

Subculturing

Nutrient agar was prepared following the manufacturer's instruction. Sub culturing was done using the streak method on the prepared nutrient agar surface. The viable colonies were sub-cultured by picking them from McCartney bottles with a flamed and cooled wire loop. It was streaked on Nutrient agar plate and incubated at 37°C for 24hours. A new nutrient agar was prepared sterilize and 15ml was decanted into a sterile plate. Distinct colony from the subculture was picked using inoculating loop and streaked on the newly prepared plate then incubated for 24 hour to obtain pure isolate. These freshly sub-cultured organisms were stocked and preserved in a refrigerator for further tests which were transferred into sterile Tryptic Soy Agar (TSA) slants in McCartney bottles and kept in the refrigerator to serve as a stock culture for subsequent test during identification (Fawole and Oso, 2007).

Characterization of Isolates

Organisms isolated from Nunu sample were characterized and identified using biochemical tests

Fermentation with isolates

Preparation of inoculum

The inoculum for the fermentation was prepared by growing the lactic acid bacteria isolates in MRS broth at 37ºC for 24 hours. The inoculums were prepared as single and mixed cultures. The mixed cultures were prepared by combining the organisms equally (v/v). All inoculums were standardized to 0.5 McFarland prior to use for fermentation (Saliu *et al.,*2020).

Fermentation of fresh milk

Fresh powder milk, 100 ml each was placed in 250 ml of five Erlenmeyer flasks and pasteurized at 65ºC for 30 minutes by placing the flasks in water bath. After pasteurization, the flasks were immediately cooled to 28±2ºC. Each 5 flasks were inoculated with 5 ml of the inoculum and incubated at 28±2ºC without shaking, for 24 hours. Control was set up by incubating 100 ml of unpasteurized and un-inoculated milk sample (Saliu *et al.,*2020).

Proximate Analysis of Fermented Milk by isolated LAB

Determination Moisture Content

This method is based on moisture evaporation. Here the aluminium dishes were washed dried in oven and in desiccators for cooling. The weight of each dish was taken. 5.0 g of ground samples of were weighed into a sterile aluminium dish, weight of the dish and weight of undried sample (in duplicate) were taken. This was transferred into an oven set at 80°C for 2 h and at 100°C for 3 h respectively. This was removed and cooled in desiccators. Then the weight was measured using a measuring scale balance. It was transferred back into the oven for another one hour and then reweighed. The process continued until a constant weight was obtained. The difference in weight between the initial weight and the constant weight gained represents the moisture content.

Calculation: The loss in weight multiplied by 100 over the original weight is percentage moisture content.

Moisture Content (g/100 g) = loss in weight (W2-W3) x 100
(W2-W1)
Where W1= initial weight of empty crucible, W2= weight of crucible + sample before drying, W3 = final weight of crucible + sample after drying.
% Total solid (Dry matter) (%) = 100- moisture (%)

Ash Content

The ash represents the inorganic component (minerals) of the sample after all moisture has been removed as well as the organic material. The method is a destructive approach based on the decomposition of all organic matter such that the mineral elements may be lost in the process. Twenty grams (20 g) of each of the samples were weighed into a clean dried and cooled platinum crucible. It was put into a furnace set at 550 °C and allowed to blast for 3 h. It was then brought out and allowed to cool in desiccators and weighed again.
Calculation: Percentage weight is calculated as weight of ash multiplied by 100 over original weight of the samples used.
Ash content = Weight of ash x100.
Weight of original sample used
Loss in weight (W3-W1)
(W2-W1) x 100
Where W1 = weight of empty crucible, W2 = weight of crucible + sample before drying and or ashing, W3 = weight of crucible + ash.

Lipid Content

The method employed was the soxhlet extraction technique. 15 g of the samples were weighed and carefully placed inside a fat free thimble. This was covered with cotton wool to avoid the loss of sample. Loaded thimble was put in the Soxhlet extractor, about 200 ml of petroleum ether was poured into a weighed fat free soxhlet flask and the flask was attached to the extractor. The flask was placed on a heating mantle so the petroleum ether in the flask refluxed. Cooling was achieved by a running tap connected to the extractor for at least 6hrs after which the solvent was completely siphoned into the flask. Rotary vacuum evaporator was used to evaporate the solvent leaving behind the extracted lipids in the soxhlet. The flask was removed from the evaporator and dried to a constant weight in the oven at 60°C. The flask was then cooled in a desiccator and weighed. Each determination was done in triplicate. The amount of fat extracted was calculated by difference.
Ether extracts (100g) dry matter = Weight of extracted lipids x100
Weight of dry sample

Protein

1.0g of the sample was weighed and transferred to the digestion flask. 3.4g of potassium sulphate and 0.4g of copper sulphate was added alongside 5ml concentrated sulfuric acid. The flask was placed in an inclined position and heated until frothing ceased. The mixture in the flask was cooled and 45ml of distilled water added and mixed. Thereafter, anti-bumping material was added and the content of the flask carefully poured into a distillation flask. 5M NaOH was added to the content and this was immediately distilled and the distillates collected into 10ml of 1M HCl containing 5 drops of mixed indicator solution. The excess acid was titrated with 1M NaOH solution until a color change is observed.
Percentage N= (ml of standard acid x molarity-ml of NaOH x M) x 1.4007g Test portion
Crude Protein General Factor = 6 .25 e.g meat=N x 6.25, Milk=N x 6.38

Carbohydrate

Available carbohydrate (%) = 100- (protein (%) + Moisture (%) + Ash (%) + Fibre (%) + Fat (%).

Energy or Caloric Value (KJ/100g) = (Protein X 16.7) + (Lipids X 37.7) + (Carbohydrate X 16.7)

Total Titrable Acid

10g of sample was weighed and dissolved in 100ml of distilled water. After 20min, the sample was filtered and 25ml of the filtrate was used for titration with 0.01M NAOH with phenolphthalein as indicator. The amount of TTA in the sample was calculated as follows-:

$$\frac{0.1 \times (ABS) \times 90000}{25}$$

Antibacterial Assay of Crude Bacteriocin produced by Isolated LAB

Bacteriocin was extracted from LAB that had highest growth inhibition by growing them first in 1 litre MRS broth and incubating for 72hours at 30ºC under anaerobic conditions (Ogunbanwo *et al.,* 2003). Extract was obtained by centrifuging the culture at 12,000 rpm for 15 minutes to pellet down the cells. The pH of cell-free cultured supernatant was adjusted to 6.5 with 1M NaOH. Then, catalase (1mg/ml) was added to remove hydrogen peroxide from the supernatant (Daba *et al.,* 1991). The supernatant was filtered through a 0.45 µm pore size membrane and the protein was precipitated using 80 % (w/v) saturated ammonium sulphate. The mixture was stirred for 1hour, after which it was stored at 4oC. After precipitation, the mixture was centrifuged at 16,000rpm at 4oC for 30 min, and pellet was stored at 4ºC. The pellet was further separated from impurities by dissolving 1ml in distilled water in an Eppendorf tube and centrifuging at 10,000 rpm for 10 minutes at 4ºC. The supernatant was discarded and the pellet containing bacteriocin was washed with deionized water, dispensed into another Eppendorf tubes, and centrifuged once again at 10,000 rpm for 15 minutes at 4ºC to pellet down the proteins. After discarding the supernatant, the pellet was dissolved in 500 µl of 0.1M sodium phosphate buffer (pH 7.0) and the total volume was made up to 2 ml. The sample was then loaded in a pre-treated dialysis tubing cellulose membrane (18-20 length) and dialyzed in a 3 litre 0.1M sodium phosphate buffer (pH 7.0) for 2 hours, following which the buffer was changed and the sample further dialyzed overnight at 4ºC. After 24 hours dialysis, the sample was reloaded in Eppendorf tubes and centrifuged at 10,000 rpm at 4ºC for 30 minutes and then stored at -20ºC.

The crude bacteriocin samples were dispensed into Eppendorf tubes and centrifuged at 12,000 rpm for 15 mins at 4ºC to pellet down the cells. The supernatant was poured into a 50 ml capacity beaker in an ice pack at a temperature of 4ºC and 15g of ammonium sulphate ($(NH4)_2SO4$) in dry form was measured and dissolved in the supernatant. The mixture was stirred for 1 hour and stored at 4ºC for 24 hours. The stirring was carefully done to prevent foaming that may lead to protein denaturation (Hensy *et al.,* 1994).

Bacteriocinogenic Screening

The primary screening was conducted to establish combined effect of antimicrobial compounds. Antimicrobial activity of lactic acid bacteria was conducted by using agar well diffusion antimicrobial assay (Balouiri *et al*., 2016). The pathogenic indicator bacterial strains (*E. coli*, *S. aureus*, *Ps. aeruginosa*) were inoculated into a test tube containing 5mL of nutrient broth and incubated at 37°C for 24 h with aeration (shaking at 180 rpm) to obtain active cultures. The entire surfaces of each nutrient agar plate were swabbed with indicator bacteria by using sterile cotton swabs or spread with sterilized glass spreader (Lelise *et al*., 2014). Four wells of 6mm diameter were made using core borer. Then, 100 microliters of LAB isolates of overnight culture in nutrient broth was added into the wells. The inoculated media were placed inside an anaerobic candle jar and incubated for 24 hours at 37°C. After incubation, the plates were observed for a zone of inhibition (ZOI) around the well.

The diameter of the inhibition zone was measured in mm by using meter rule and a clear zone of 1mm or more was considered as positive inhibition (1). The diameter (in mm) of the zone of growth inhibition around each well was evaluated considering the total zone minus the diameter of the Pasteur pipette tips (Mbawala *et al*., 2013).

Organoleptic Assessment of the Fermented Milk

Samples of the product were evaluated using hedonic method and overall acceptability by a panel of five individuals who are very familiar with fermented milk. They were served coded samples of the product and were asked to compare for appearance/colour, taste, texture, aroma/smell, mouthfeel, after taste, and overall acceptability using a 5-point hedonic scale (5 – like extremely to 1- dislike extremely) (Appendix) described by Omola *et al.,* (2014).

Results

Colonial Morphology and Biochemical Characteristics of Lactic acid Bacteria Isolated

Two Lactic acid bacteria were isolated. The two isolates were Gram positive rod, isolate A was motile while the isolate B was non motile. They were citrate, indole, catalase, coagulase oxidase and urease negative. The isolates were identified as *Lactobacillus* species 1 and 2. Result is presented in Table 1

Morphological and Biochemical Characteristics of Tested Foodborne Pathogens

The characteristics of the tested Foodborne pathogens are as presented in Table 2. Isolate 1 was cocci in clusters, Gram positive, non-motile, endospore, urease, H_2s and Gas production and oxidase negative, catalase, coagulase, citrate, gelatin and urease positive. Isolate 2 was rod in shape, Gram Negative, motile, endospore, catalase, oxidase, coagulase, indole, citrate, VP, Gelatin, urease, starch and H_2S Negative. catalase, citrate and Gas production positive. Isolate 3 produced bluish green pigment and was catalase, oxidase, citrate, and urease positive, they were confirmed as *Staphylococcus aureus, Escherichia coli* and *Pseudomonas aeruginosa*.

Physicochemical Composition of Fermented Milk Produced.

The moisture content of fermented milk samples ranged from 68.30 to 71.00 %, the ash content ranged from 1.39 to 1.55 %, the Lipid content ranged from 0.12 to 0.24 %, the crude protein ranged from 2.06 to 2.53, the TTA content ranged from 4892.40 to 6428.40 mg/ml while the CHO content ranged from 26.70 t0 24.70 %, and the calorific value ranged from 464.46 to 510.80. The result is presented in Table 3.

Table 1: Colonial Morphology/Biochemical Characteristic of *Lactobacillus* spp Isolated

Isolates	Citrate	Indole	Catalase	Grams Reaction	Motility	Coagulase	Oxidase	VP	Gas production	Urease	H2S	MR	Probable organisms
Isolate A	+	-	+	+	+	-	-	+	-	-	-	-	*Lactobacillus* sp.
Isolate B	-	-	-	+	-	-	-	-	-	-	-	-	*Lactobacillus* sp.

Table 2: Colonial Morphology/Biochemical Characteristics of Testted Foodborne Pathogens

Characteristics	Organism 1	Organism 2	Organism3
Shape	Cocci	Bacilli	Bacilli
Cell arrangement	Irregular/ Clusters	Single	Single
Pigmentation	-	-	+
Gram reaction	+	-	-
Motility	-	+	+
Endospore	-	-	-
Catalase	+	+	+
Oxidase	-	-	+
Coagulase	+	-	-
Indole	-	-	-
Citrate	+	-	+
MR	-	+	-
VP	+	-	-
Gelatin	+	-	-
Urease	+	-	+
Starch	-	-	-
H_2S	-	-	-
Gas production	-	+	-
Probable Identity of Bacterial Isolates	*S. aureus*	*E. coli*	*P. aeruginosa*

Table 3: The Physicochemical Composition of Fermented Powder Milk

Samples	Moisture (%)	Ash (%)	CHO (%)	Calorific Value Kj/100g	Lipid (%)	Crude Protein (%)	TTA mg/ml
OGA	71.00	1.49	24.71	464.46	0.24	2.53	5450.00
OGB	69.30	1.55	26.92	490.11	0.15	2.06	4892.40
OGC	68.30	1.39	26.70	510.80	0.22	3.37	6428.40
Ctrl	72.71	0.99	15.90	594.80	7.41	2.96	5054.20

Key: OGA – Milk fermented with *Lactobacillus* sp1 only
OGB - Milk fermented with *Lactobacillus* sp2 only
OGC- Milk fermented with *Lactobacillus* sp1 and 2
Ctrl- Uninoculated milk

The Organoleptic Properties of Fermented Milk

The organoleptic score of the fermented milk samples ranged from 61.0 to 66.8 %. The highest score was in sample OGC while the least score was in sample OGA. Result is presented in Table 4

Antibacterial activity of Bacteriocin from Isolated *Lactobacillus* species against tested Foodborne Pathogens

The crude bacteriocin from the two species of *Lactobacillus* isolated was potent against the tested foodborne pathogens. The antibacterial potency as evident by the clear zones of no growth was highest against *Escherichia coli* than *S. aureus* and *P. auriginosa*. The result is presented in Figures 1 and 2.

Table 4: The Organoleptic Properties of Fermented Milk

Fermented Milk	Smell	Colour	Taste	Consistency	Total Score (%)
Sample OGA	7.5	7.7	6.5	8.8	61.0
Sample OGB	7.4	7.6	7.0	8.7	61.4
Sample OGC	8.7	8.0	7.2	9.5	66.8

Key: OGA – Milk fermented with *Lactobacillus* sp1 only
OGB - Milk fermented with *Lactobacillus* sp2 only
OGC- Milk fermented with *Lactobacillus* sp1 and 2
Ctrl- Uninoculated milk

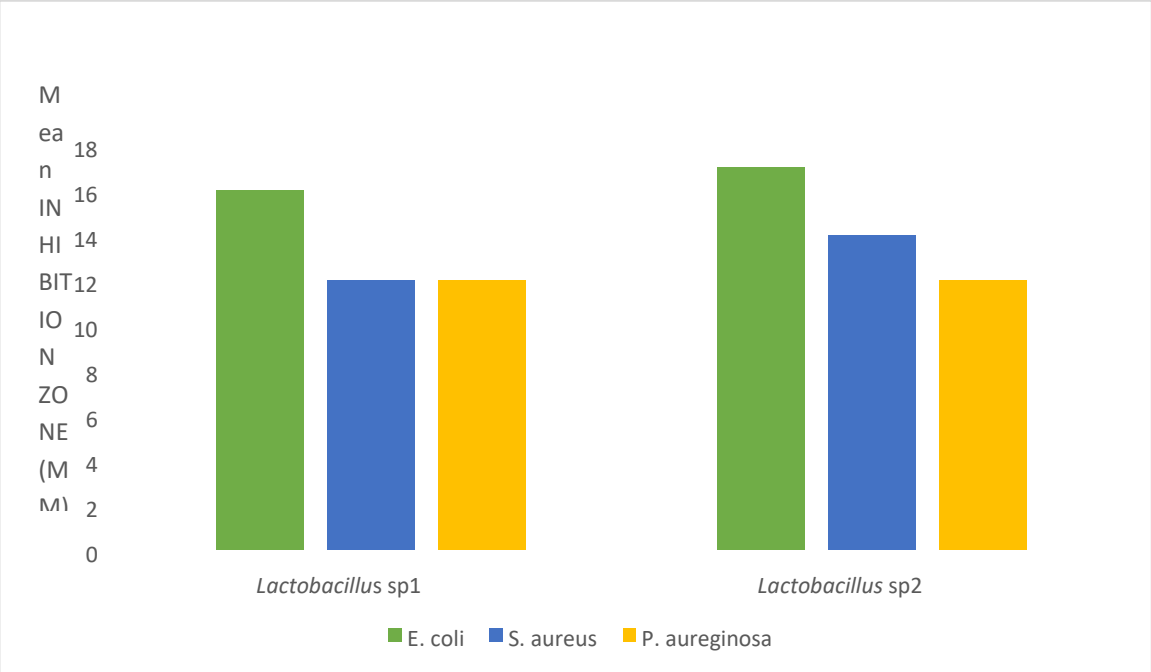


Figure1: Inhibition Zones (mm) of Crude Bacteriocin from *Lactobacillus* sp1 Isolated against Tested foodborne Pathogens

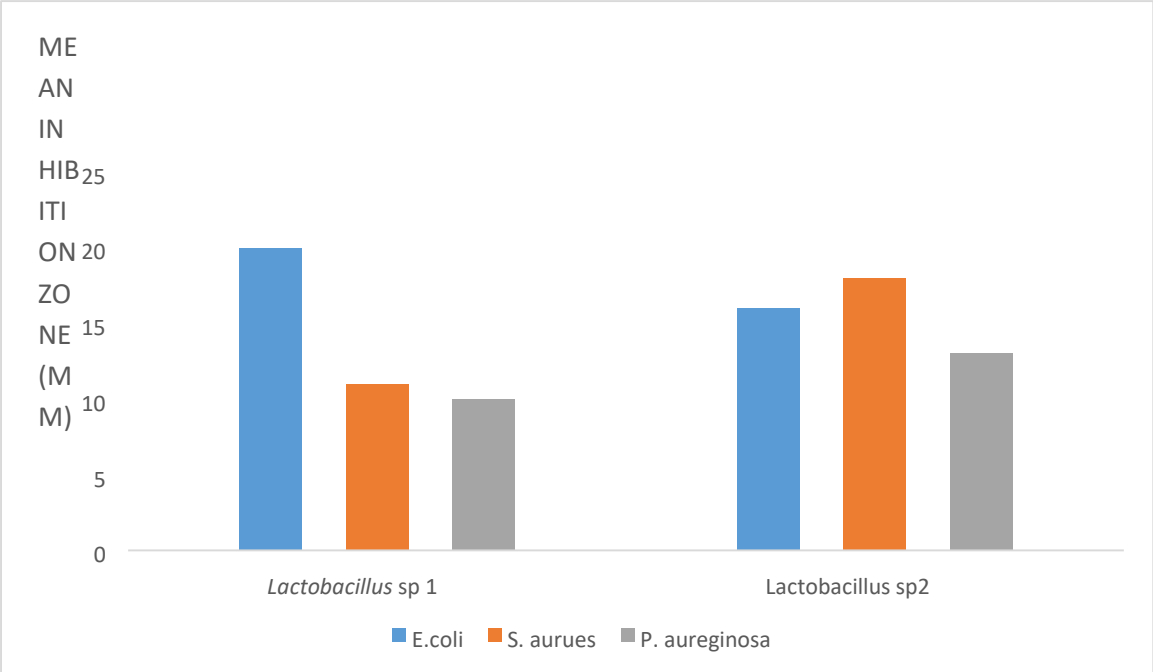


Figure 2: Inhibition Zones (mm) of Crude Bacteriocin from *Lactobacillus* sp2 Isolated against Tested foodborne

DISCUSSION

In this study, *Lactobacillus* spp were isolated, identification of the LAB was performed through morphological characteristics. Besides, other biochemical tests and all of the LAB were identified to its generic level in that Lactobacillus spp. were found as whitish, small to large size, the circular margin on MRS media. the lactic acid bacteria isolated from nunu samples in this study are among those that are commonly found in milk products where they play important roles in its fermentation for improved flavor and shelf quality (Akabanda *et al.,* 2010; Okiki *et al.,* 2018), These results corroborates with the findings of Yusuf, *et al.,* (2020).

The result of the proximate analysis of the fermented milk obtained in this study, revealed the corresponding Moisture values for fermented milk to be 68.30% for the combined starter culture while highest and least value were recorded for sample C and D with 71.00% and 69.30% respectively, Ash content; 1.39 (combined starter culture) as observed with least value while sample D had the highest value with 1.55%, for the CHO; 24.71 % for sample C while sample C+D had 26.70%, sample C recorded the least Calorific value with 464.46 kj/100, in which Sample C + D had 510.80kj/100 as the highest, Also, Lipid % for sample D was the least with 0.15 % while 0.22 % was the value of sample C+D the highest value, The crude protein % for sample D had 2.06 while Sample C had 2.53 %, it was observed that the combined starter culture was 3.37%.

Sensory analysis showed varying degrees of acceptability for milkfermented with the different starter cultures in relation to their sensory attributes such as taste, texture, and overall acceptability. Generally, Milk fermented with lactic acid bacteria starter cultures, either single or combined, showed improved acceptability as compared to the spontaneously fermented Milk. However, Fermented Milkproduced with single starter culture of *Lactobacillus* Spp Aorand *Lactobacillus* Spp B or combined starter cultures of *Lactobacillus* Spp Aand *Lactobacillus* Spp Bshowed significantly higher overall acceptability.

LAB is also known to relate the formation of texture, taste and flavor of dairy products, and to function as probiotics (Terzic´-Vidojevic´*et al*. 2020 and 2021).Texture properties such as viscosity, smoothness, hardness, cohesiveness, stickiness and elasticity of FM thus formed influence consumers' product choices (Han *et al*. 2016; Mudgil. *et al*. 2017).LABs with these organoleptic functional properties are considered for the starter cultures. This is implemented by carefully selecting LAB strains that will express the desired properties, maintain a perfect natural and healthy product (Ravyts *et al.,* 2012; Bintsis, 2018). Ravyts *et al.,* (2012) recorded that several lactobacilli and streptococci possesses these functional properties. They contribute in the development of the organoleptic properties due to their carbohydrate metabolism.

In this present study, Titratable acidity (TTA) obtained for the fermented milk sample C was mg/l 6428.40 mg/l, they were higher than the control with 5054.2mg/l. The mean titratable acidity fell between 1.34 – 1.50% while the range is from 0.732.17, which is higher than 0.08-0.13 obtained by Egwaikhide *et al.* (2014). The high percentage of acid present in milk samples at any time indicates the age of the milk and possible contamination of the milk (Wanjala *et al*., 2017). Wanjala *et al*. (2017) suggested that high acidity may indicate high microbial and enzyme activity in the samples, which may results from lack of adherence to the cold chain in the distribution channels and the long duration taken from the source to market

Milk is known as one of the natural habitats of lactic acid bacteria which are normally regarded as safe but can also be contaminated by other milk spoilage organisms found in the wash water, equipment used during the milking process, the environment or on the personnel at the point of the milking and handling process (Sansanwal and Ahlawat 2017). Fermented milk are considered to be safer than that of raw milk, however, *Escherichia coli and Staphylococcus aureus* were reported as the most common foodborne pathogens that are present in many foods and able to survive in milk and fermented milk products during the past decades (Kivanc and Yapici, 2019). This could be as a result of inadequate pasteurization. Based on the result of secondary screening of LAB, the higher antagonistic activity of of LAB isolate against *S. aureus* and *E. coli* was 14*:*12 ± 1*:*6mm and 13*:*5 ± 2*:*1mm, respectively. As observed here, the present study result showed a good inhibition zone against *S. aureus* when compared to the study conducted in Gondar town by Lelise *et al*. (2018) and in Ngaoundere, Cameron, by Mbawala *et al*. (2013), who reported 12*:*3 ± 1*:*6mm and 4*:*5 ± 0*:*1mm as the maximum inhibition zone of LAB against *S. aureus,* respectively. The finding of this study also reflects a goodinhibition zone against E. coli when compared with studies conducted in Cameron (Mbawala *et al*.2013)and Malaysia (Hamid and N. F. Amysya, 2020), which reported 4*:*5 ± 0*:*1mm and 1*:*3 ± 0*:*5mm as the maximum inhibition zone of lactic acid bacteria against *E. coli*. Among the indicator/test bacteria, *Staphylococcus aureus* was highly sensitive to LAB isolates followed by *E. coli and Pseudomonas*species. It was indicated that the highest sensitivity of S. aureus to the antimicrobial effect of LAB is due to the reason that antimicrobial compounds are effective for related genera, as indicated by Timothy *et al*. (2021). Based on secondary screening, CFS of LAB isolates was heat resistant at various temperatures. This might be due to the thermostable nature of LAB bacteriocins (2022). This finding is also supported by another study conducted in Egypt by Pato *et al*. (2021), which indicated that bacteriocin is resistant to high temperature. This is because they are proteinaceous in nature and have low molecular weight with diversified

The antimicrobial activity of LAB is important because these bacteria must be able to inhibit and kill the growth of potentially pathogenic bacteria in fermented products as well as in the intestinal environments.

The antibacterial effect of these bacteria can be attributed to metabolites such as organic acids, hydrogen peroxide, diacetyl, ethanol, phenols, and protein compounds that they produce during growth. The most common antimicrobial compounds reported to be produced by probiotic bacteria include bacteriocins, hydrogen peroxide, and organic acids (especially lactic and acetic acids). These metabolites, together with help of competitive exclusion mechanism, in which probiotic compete with harmful bacteria for adhesive receptors and nutrients, could destroy and prevent colonization of pathogens in the body. The antimicrobial activity against Gram-positive pathogens is primarily due to the bactericidal effect of protease-sensitive bacteriocins, whereas the antagonistic effects against Gram-negative pathogens could be due to the production of hydrogen peroxide and organic acids (Yazgan *et al*., 2021). Bacteriocin of *Lactobacillus*Sppwas found to have antimicrobial potential against methicillin resistant *Staphylococcus aureus* (Nawaz *et al*., 2009).

However, studies concerning bacteriocins produced by LAB have received an increasing interest because of the potential use of bacteriocins as food preservatives and bacteriocins are supposed to act only on closely related species, which limits their application as a good preservative (Cleveland *et al*., 2001). In contrast, this study revealed that bacteriocins produced by *Lactobacillus* Spp have broad spectrum activity against Gram positive and Gram negative bacteria (*Paeruginosa*). It showed a good antagonistic activity against these potent food spoilage organisms, which shows its efficacy and potential application as a natural food preservative. Adesokan *et al.*, (2009) recorded a similar result against *P. aeruginosa,S. aureus*, and *E. coli*. Todorov *et al.* (2012) also obtained similar results in the case of bacteriocin produced by *Lactobacillus* sppwhich inhibited the growth of *Pseudomonas* and *Staphylococcus* species.The study of Stanojevic-Nikolic *et al*. (2015) assessed the effect of lactic acid on the development of pathogens. It was demonstrated that lactic acid is more efficient towards Gram-positive than Gram-negative bacteria, and, with the increase in the acid, the efficacy at which the development of pathogenic microflora is inhibited increases. Bacteriocins also contribute to the inhibition of microorganism development. In the study of (Mangalanayaki*et al*., 2010), the efficacy of the action of nisin synthesized by Lactobacillus spp and Streptococcus pyogenes strains towards pathogens, i.e., *Pseudomonas aeruginosa,* and *Staphylococcus aureus,* was assessed. The effect of nisin was more pronounced towards Gram-negative bacteria, which is linked to the structure of their cellular membrane.

REFERENCES

Akinsemolu, A. A. (2018).The role of microorganisms in achieving the sustainable development goals. *Journal of Clean Production*; 182, 139–155 https://doi.org/10.1016/j.jclepro.2018.02.081

Balouiri, M. M. Sadiki, and S. K. Ibnsouda, (2016). “Methods for in vitro evaluating antimicrobial activity: a review,” *Journal of Pharmaceutical Analysis,* vol. 6, no. 2, pp. 71–79 https://doi.org/10.1016/j.jpha.2015.11.005

Barzegar H, Alizadeh Behbahani B, Falah F. (2021). Safety, probiotic properties, antimicrobial activity, and technological performance of Lactobacillus strains isolated from Iranian raw milk cheeses. *Food Science Nutrition*; 9:4094–4107 *Food Science Nutrition*; 9:4094–4107 **https://doi.org/10.1002/fsn3.2365**

Bintsis, T. (2018). Lactic acid bacteriaas starter cultures: An update in their metabolism and genetics. *Aims Microbiology*; 4: 665–684. doi: 10.3934/microbiol.2018.4.665 Egwaikhide,P.A, Malu, P.S, Lawal, U, Adelagun, R.O, and Andrew, C. (2014) Physicochemical and microbiolgical analysis of fermented cow milk (*Nono*) consumed within Kaduna town, North West Nigeria. *Food Science and Quality Management;* 29; 44-49.

Fagunwa, O. E. and Olanbiwoninu, A. A. (2020). .Accelerating the sustainable development goals through microbiology: some efforts and opportunities. *Access Microbiology*; 1;000112https://doi.org/10.3390/microorganisms9030640

Fawole, M.O. and Oso, B.A. (2007). Laboratory Manual of. ISSN 1597-6343 Published by Faculty of Science, Kaduna State University

Garavand, F., Daly, D.F.M., Gomez-Mascaraque, L. (2022). Biofunctional, structural, and tribological attributes of GABA-enriched probiotic yoghurts containing *Lacticaseibacillus paracasei* alone or in combination with prebiotics. *International Dairy Journal*; 129, 105348. https://doi.org/10.3390/microorganisms9030640

Garavand, F., Daly, D.F.M., Gomez-Mascaraque, L. (2023). The consequence of supplementing with synbiotic systems on free amino acids, free fatty acids, organic acids, and some stability indexes of fermented milk. *International Dairy Journal*;137, 105477. https://doi.org/10.3390/microorganisms9030640

Ghosh, T., Beniwal, A., Semwal, A. and Navani, N.K. (2019). Mechanistic insights into probiotic properties of lactic acid bacteria associated with ethnic fermented dairy products. *Frontier Microbiology*; 10, 1–19.https://doi.org/10.3390/microorganisms9030640

Hamid T. H. T. A. and Amysya, N. F. (2020)"Lactic acid bacterium with antimicrobial properties from selected Malay traditional fermented foods," *International Journal of Life Sciences and Biotechnology*, vol. 4, no. 1, pp. 13–24, https://doi.org/10.3390/microorganisms9030640

Han X, Yang Z, Jing X, Yu P, Zhang Y, Yi H, & Zhang L. (2016). Improvement of the texture of yogurt by use of exopolysaccharide producing lactic acid bacteria. *Biomedical Research International.* 2016: 1945675. dx.doi.org/10.1155/2016/7945675

Hati, S., Mandal, S., and Prajapat, J.B. (2013) Novel Starters for Value Added Fermented Dairy Products. *Current Resource Nutrition Food Science Journal*; 1, 83–91. https://doi.org/10.3390/microorganisms9030640

Hensyl, W. R., Williams and Wilkins. (1994). Bergey's Manual of Systematic Bacteriology, 9th Edition. 45-47

Jernberg, C. S. Lofmark, C. Edlund, and Jansson, J. K. (2007). "Longterm ecological impacts of antibiotic administration on the human intestinal microbiota," The ISME Journal, vol. 1, no. 1, pp. 56–66. https://doi.org/10.3390/microorganisms9030640

Mbawala, A. P., Mahbou, Y., Mouafo, H. T., and Tatsadjieu, L. N. (2013). "Antibacterial activity of some lactic acid bacteria isolated from a local fermented milk product (pendidam) in Ngaoundere, Cameroon," *The Journal of Animal & Plant Sciences*, vol. 23, pp. 157–166

Mulaw, G., Sisay Tessema, T. Muleta, D. and Tesfaye, A. (2019). "In vitro evaluation of probiotic properties of lactic acid bacteria isolated from some traditionally fermented Ethiopian food products," *International Journal of Microbiology,* vol., Article ID 7179514, 11 pages, 2019 https://doi.org/10.1155/2019/7179514

Ravyts, F., Vuyst, L. D. and Leroy, F. (2012). Bacterial diversity and functionalities in food fermentations. *Engineering in Life Sciences,* 12(4), 356 - 367.https://doi.org/10.1002/elsc.201100119

Salla, A. (2017). Review of the Livestock/Meat and Milk Value Chains and Policy Influencing them in West Africa; Food and Agriculture Organization of the United Nations: Rome, Italy; The Economic Community of West African States: Federal Capital Territory, Nigeria,; Available online: https://www.fao.org/3/a-i5275e.pdf

Toe, C.J., Foo, H.L., Loh, T.C., Mohamad, R., Abdul Rahim, R., Idrus, Z. (2019). Extracellular Proteolytic Activity and Amino Acid Production by Lactic Acid Bacteria Isolated from Malaysian Foods. *International Journal of Molecular Science*; 20, 1777.https://doi.org/10.3390/ijms2007177

Yazgan, H., Kuley, E., Güven Gökmen, T., Regenstein, J.M. and Özogul, F. (2021) The antimicrobial properties and biogenic amine production of lactic acid bacteria isolated from various fermented food products. *Journal of Food Process and Preservation*; 45, e15085.https://doi.org/10.1111/jfpp.15085

ACCOUNTING DATA AS A SOURCE FOR DECISION-MAKING IN IT COMPANIES WITHIN SUSTAINABLE DEVELOPMENT

Serhii Lisovyi
SESE the "Academy of Financial Management"

ABSTRACT
Under modern conditions of conducting business activities, there is a necessity to ensure the transparency and social orientation of the business model. The lack of clearly formulated moral values in society intensifies the contradictions between the tasks arising from the relentless development of human civilization and the main challenges business entities face, especially in achieving the Sustainable Development Goals (SDGs) and implementing the concept of corporate social responsibility.
The study's objective is to investigate and evaluate the impact of principles and norms of morality on creating the prerequisites for improving the accounting and analytical support for the management of IT enterprises in the context of sustainable development.
Adhering to ethical principles in the activities of economic agents from various institutional sectors of the economy promotes the development of responsible and sustainable entrepreneurship at both national and global levels. IT enterprises are recommended to integrate indicators that reflect their contribution to achieving the Sustainable Development Goals (SDGs) into their business process management system. The calculation and disclosure of relevant indicators in reporting necessitate the development of accounting and analytical support.
Solving the problem of forming a quality information base for decision-making in IT enterprises under sustainable development conditions will facilitate the development of their operational efficiency and increase tax revenues to Ukraine's State Budget. A promising direction for scientific study is the further improvement of organizational and methodological support for accounting and control of the efficiency of business process management in IT enterprises.
Keywords: IT enterprises, business processes, moral and ethical principles, Sustainable Development Goals, accounting and analytical support.

HYBRID BLOCKCHAIN SOLUTIONS FOR SUPPLY CHAIN MANAGEMENT: ENHANCING SECURE AND TRANSPARENT TRACEABILITY WITH ADVANCED PRIVACY MEASURES

Bahijjah Abdallah
Department of Computer Science, Federal Polytechnic Kabo

Abstract
Supply Chain management is increasingly reliant on blockchain technology to address challenges related to transparency, security, and traceability. However, conventional public blockchains encounter limitations in privacy and scalability, impeding their widespread adoption. This paper proposes a novel approach: hybrid blockchain solutions tailored for supply Chain management. Leveraging a combination of public and private blockchains, this hybrid model aims to maintain the integrity and transparency of transactions while integrating advanced privacy measures. Through a thorough review of existing blockchain-based supply chain solutions, this research identifies limitations and explores opportunities for improvement. The theoretical framework presented emphasizes the importance of data partitioning, permissioned access, and consensus mechanisms customized for supply chain environments. This study contributes to the ongoing discourse on blockchain technology's application in supply chain management, providing insights into the potential benefits of hybrid block chain solutions in achieving secure and transparent traceability.
Keywords: Hybrid Block Chain, Supply chain management, Traceability, Privacy measures, Transparency.

COMPUTATIONAL MODEL FOR AN ORGANIZED CRIME PREDICTION IN SOUTH-EAST NIGERIA

Okafor, Chidozie Raymond Patrick
Department of Computer Science, Faculty of Sciences, Alvan Ikoku Federal University of Education Owerri

Nwanga, Emeka Mathew
Department of Information Technology, School of Information & Communication Technology, Federal University of Technology

Abstract
This study developed computational model for organized crime prediction in South-East Nigeria due to the current wave of insecurity, terror agenda and all forms of criminalities in the region. This became imminent due to the ineffectiveness of the currently used non-technological methods of tackling organized crime in the region. Guided by this, the research determined the layers of criminal actors in an organized crime network, identified their parameters of mathematical importance, developed mathematical model for an organized crime prediction, simulated sequences of the computational model and validated the model performance. These were engineered in order to fuel sound computational background in the area of Criminal Forensics (CF) and Computational Criminology (CC). Sequencing the behavioral understanding and characterization of organized crime network actors, stochastic/dynamic differential equations, Python programming and Google Artificial Intelligence (AI) tools were used. A sample size of one thousand, nine hundred and five (1,905) crime data for the period of 2010 – 2022 within the South-East scope was also used. The study developed computational model using mathematical models which were driven by Python programs with achieved confusion matrix as follows: prediction accuracy of 94%, precision of 93%, sensitivity of 95%, specificity of 93% and misclassification of 6%. Further validations using F-Score measurement showed a 94% accuracy level. In addition, the study uncovered that crime network activities were carried out at different timeframes, with night having the highest percentage of seventy-six point six percent (76.6%) and attack statistics of one thousand, four hundred and fifty-seven (1457), followed by day with thirteen point eight percentage (13.8%) and attack statistics of two hundred and sixty-three (263) and lastly by evening with nine-point seven percent (9.7%) and attack statistics of one hundred and eighty-five (185). Equipped with these discoveries, the research concluded that the intrinsic parameters which were key to developing the mathematical model of the criminal actors in an organized crime network were timeframe of action (ToA), crime target and crime location.
Keywords: Organized Crime Network, Criminal Actors, Ganglords, Timeframe of Action, Computational Model, Crime Prediction.

INTERNET of THINGS (IoT) AND ITS ROLE IN ENSURING BUILDING SAFETY IN NIGERIA

Onatere-Ubrurhe, Joyce Ogheneruona
Department of Technology Education, Alvan Ikoku Federal University of Education,

Ubrurhe, Ogheneochuko
Department of Information Systems and Technology, Delta State University of Science and Technology

Chrisjoy Tobechukwu Ugworji
Department of Technology Education, Alvan Ikoku Federal University of Education

Chima Uchegbu
Department of Technology Education, Alvan Ikoku Federal University of Education

ABSTRACT
The Internet of Things (IoT) offers a substantial potential to enhance building safety by leveraging advanced technologies and applications. This research explores the role of IoT in enhancing building safety within the Nigerian context, incorporating a comprehensive analysis of existing literature and case studies from both Nigeria and global best practices. An analysis of the literature indicates that the progression of IoT, including the integration of 5G networks and artificial intelligence, has resulted in enhanced real-time monitoring and predictive capabilities, ultimately leading to significant improvements in areas such as fire detection, structural health monitoring, and security systems. Case studies from Lagos, Tokyo, and New York illustrate successful implementations of IoT, showcasing enhancements in safety outcomes and operational efficiency. Nevertheless, challenges such as high costs, technological constraints, and regulatory obstacles hinder the widespread adoption of IoT in Nigeria. To address these challenges, the research suggests investment in advanced technologies, the development of supportive regulatory frameworks, promotion of public awareness and training for industry stakeholders. This research underscores the transformative potential of IoT in the realm of building safety, emphasizing the necessity for targeted strategies to tackle existing challenges and leverage on international best practices.
Keywords: Internet of Things (IoT), Building Safety, Real-time Monitoring, Structural Health Monitoring, Regulatory Barriers, Nigeria.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

ROUTING ALGORITHMS FOR LINK DISCONTINUITY AND OPTIMAL DATA DELIVERY IN VEHICULAR AD-HOC NETWORKS: A REVIEW

Assistant Professor Dr. Jogendra Kumar
Department of Computer Science and Engineering, G.B.Pant Institute of Engineering and Technology

Abstract
Vehicular Ad-hoc Networks (VANETs) are essential for facilitating communication between vehicles and infrastructure, enhancing road safety and managing traffic more effectively. Nonetheless, the high mobility of vehicles results in frequent disruptions in network connectivity, impacting the reliability and efficiency of data transmission. This review examines various routing algorithms designed to address the issue of link discontinuity and ensure optimal data delivery within VANETs. The review covers a range of routing protocols, including proactive, reactive, hybrid, and geographic methods. Proactive protocols, such as OLSR and DSDV, maintain up-to-date routing tables but encounter significant control message overhead. Reactive protocols like AODV and DSR establish routes as needed, minimizing overhead but introducing delays. Hybrid protocols, including ZRP, strive to balance overhead and latency, while geographic protocols such as GPSR rely on location data to enhance routing efficiency but require accurate positioning. Recent advancements in routing algorithms are also discussed, including link prediction methods and adaptive route selection techniques. These innovations aim to mitigate the effects of link interruptions by anticipating potential failures and adjusting routes in real-time based on current network conditions. The review assesses the effectiveness of these algorithms using performance metrics such as Packet Delivery Ratio (PDR), End-to-End Delay, Routing Overhead, and Link Break Rate. It evaluates different routing strategies in various traffic scenarios—urban, highway, and mixed conditions—and provides insights into their strengths, limitations, and areas for future research. This review delivers a thorough examination of existing and emerging routing algorithms, offering valuable insights to advance routing solutions in VANETs for improved communication reliability and efficiency.
Keywords: Link Discontinuity, SUMO Simulator, VANET, RTTM, Routing Protocols.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

DESIGNING A SCENARIO TO ENHANCE THE PERFORMANCE OF THE AODV ROUTING ALGORITHM FOR LINK DISCONTINUITY IN VEHICULAR AD-HOC NETWORKS

Assistant Professor Dr. Jogendra Kumar
Department of Computer Science and Engineering, G.B.Pant Institute of Engineering and Technology

Abstract
Vehicular Ad-hoc Networks (VANETs) are critical for enabling effective communication between vehicles and infrastructure, thereby improving traffic management and enhancing road safety. However, the rapid movement of vehicles within VANETs often causes frequent disruptions in network connectivity, posing challenges for conventional routing protocols like Ad hoc On-Demand Distance Vector (AODV). This study introduces a scenario aimed at improving AODV's performance by integrating it with a real-time traffic management system to address these connectivity challenges. The proposed approach involves simulating the AODV protocol in a VANET environment that incorporates live traffic management data. This setup seeks to dynamically refine routing decisions based on real-time traffic conditions and vehicle dynamics, which enhances route stability and reduces interruptions. The simulation encompasses a range of traffic conditions—urban, highway, and mixed environments—utilizing advanced mobility models and current traffic data inputs. Key elements of this scenario include the use of real-time traffic information to forecast and mitigate potential link failures. It also features adaptive routing strategies that adjust paths according to real-time traffic congestion and vehicle density, thus improving the algorithm's response to link disruptions. The enhanced AODV protocol is evaluated through metrics such as Packet Delivery Ratio (PDR), End-to-End Delay, Routing Overhead, and Link Break Rate. The objective of this study is to illustrate how integrating real-time traffic management with AODV routing can enhance performance amidst frequent link discontinuities. The findings offer insights into improvements in network reliability and efficiency, emphasizing the benefits of more robust and adaptive routing solutions for VANETs. This research underscores the significance of combining real-time traffic management with routing algorithms to effectively address link discontinuity challenges and advance vehicular communication systems.
Keywords: SUMO Simulator, VANET, RTTM, AODV,MAODV.

IMAGE PROCESSING USING PYTHON

Mrs.A.Rajeswari
G.Venkataswamy Naidu College,Kovilpatti
ORCID: 0009-0005-7906-5089

ABSTRACT
Python has become more and more popular for image processing because of the availability of robust libraries like scikit-image, OpenCV, and Pillow (PIL). In this study, common tasks and procedures such as picture enhancement, restoration, segmentation, feature extraction, and pattern recognition are highlighted. An overview of digital image processing techniques implemented in Python is presented. We go over the benefits of using Python for image processing, such as its ease of use, adaptability, and rich library support. We show how Python may be used to efficiently and successfully carry out a variety of image processing tasks through code examples and demos. Furthermore, we showcase the various fields in which digital image processing finds use, such as multimedia, computer vision, remote sensing, and medical imaging.
Keywords: Image Processing, Python, OpenCV

DYNAMIC RESOURCE MANAGEMENT IN DVB-RCS2 SYSTEMS: AI-BASED OPTIMIZATION STRATEGIES

Meryem Romaissa DJELLOULI
Meryem Romaissa DJELLOULI, Telecommunications and Digital Signal Processing Laboratory

Sid Ahmed CHOUAKRI
Sid Ahmed CHOUAKRI, Telecommunications and Digital Signal Processing Laboratory, Djillali Liabes

Abdelkrim GHAZ
Abdelkrim GHAZ, Communications Networks Architecture and Multimedia Laboratory, Djillali Liabes

ABSTRACT
This paper proposes an innovative method based on reinforcement learning for the optimization of satellite communication systems, specifically DVB-RCS2 combined with Multi-Frequency Time Division Multiple Access (MF-TDMA). The methodology involves simulating the system, where multiple users share time slots and frequencies within a Q-learning framework. The model uses a Q-table to determine optimal actions (time and frequency slot allocations) based on channel usage. Users are modeled using DVB-RCS2 waveforms, which are generated and modulated on specific frequencies. Over the course of 1,000 simulation episodes, DVB-RCS2 system parameters are adjusted to optimize channel utilization through artificial intelligence, with improvements in the Q-table leading to more efficient management of time slots and frequencies. The results, validated through the analysis of modulated signals, indicate a significant improvement in channel efficiency.
Keywords: Satellite communication, AI, DVB-RCS2, MF-TDMA, Q-learning

THE EXAMINATION of PAPER ASH as FORENSIC EVIDENCE

Melisa Nur SAYMA
Uskudar University, Institute of Addiction and Forensic Sciences
ORCID: 0009-0007-8962-2293

Assist. Prof. Soner KIZIL
Uskudar University, Institute of Addiction and Forensic Sciences
Uskudar University, Faculty of Engineering and Natural Sciences, Department of Forensic Science
ORCID: 0000-0003-3405-1212

Abstract
Papers appear in different forms in daily life and in the criminal world. Various letters; ransom and suicide letters, forgery of documents, forgery of checks and notes, forgery of banknotes, destruction of documents by physical or chemical processes in order to hide information, scribbles or attempts to destroy the document by burning are among the subjects of forensic document examination.
The aim of this study is to compare the ashes of different types of paper as forensic evidence. In this study, 19 different A4 office papers, 2 office papers with colored and black and white prints, 3 notebooks of the same brand with striped checkered and blank pages, stone paper, greaseproof paper, 5 various cardboard samples and 5 different colored office papers, 1 striped blue colored office paper were used. A total of 40 samples were studied. A literature study was conducted on the papers and the differences of office papers were investigated. The samples were captured using VSC 8000 under different of light sources. A special setup was prepared and incineration was performed. The VSC8000 device and a macroscope were used for image acquisition. The structural analysis of paper ash were investigated by using FTIR. The VSC8000 device gave data about office papers suitable for comparison.
We thank the Scientific and Technological Research Council of Turkey-TUBITAK for the support of this work through Grant **1919B012222871** (2209-A University Students Domestic Research Projects Support Program)
Keywords: Forensic chemistry, chemical analysis, paper ash, crime scene.

PERSONS PROMOTING THE IMPLEMENTATION OF CIVIL JUSTICE IN THE CIVIL PROCEEDINGS OF THE REPUBLIC OF MOLDOVA

Dr Associate Professor ARSENI Igor
Comrat State University, Republic of Moldova, Faculty of Law, Department of Private Law
ORCID: 0000-0002-9560-0011

Abstract
The relevance and necessity of the study of this topic is that on the basis of the conducted research a comprehensive idea of the system of subjects of civil proceedings has been formulated, in particular about persons assisting in the administration of justice in civil proceedings. The criteria for inclusion of the named elements in this system have been defined, namely, regulation of procedural status by the rule of law, civil procedural connection with the court and participation in the consideration and resolution of the case. The criteria for delimitation of subjects within the group of participants in civil proceedings have also been identified: presence/absence of interest in the outcome of the case and the target orientation of the activity.
Keywords: persons promoting the administration of justice, civil process, foreign countries, judge.

INTRODUCTION

The study of the system of subjects of civil proceedings is of interest due to the fact that the norms of the Civil Procedure Code of the Republic of Moldova (hereinafter referred to as the Civil Procedure Code of the Republic of Moldova), devoted to the regulation of the procedural status of participants in civil proceedings, do not allow the formation of a unified system of these subjects, as well as the determination of the scope of their powers. The system of subjects of civil proceedings has not received proper regulation; in particular, the concept and legal status of "other participants in the process" remained outside the scope of regulatory regulation.

In addition, individual norms regulating the status of an expert, specialist, translator and witness are dispersed across various chapters of the Code of Civil Procedure of the Republic of Moldova. The position of the secretary of the court session has been fragmentarily regulated.

This is due not only to the peculiarities of legislative technology, but also to the lack of uniformity in the development by scientists and the application by courts of general jurisdiction of such concepts as "parties", "persons participating in the case", "persons assisting in the administration of justice", "representative", etc.

The correct determination of the composition of participants in the consideration and resolution of each civil case is a guarantee of a complete and timely trial, as well as the effectiveness of judicial protection of violated or disputed rights and legitimate interests of interested parties. This is due to the fact that each subject in civil proceedings, when endowed with a certain procedural status, receives a scope of rights and obligations, on the conscientious implementation of which the making of a legal and informed decision in the case depends.

The goal of civil proceedings, enshrined in the Civil Procedure Code of the Republic of Moldova, can be achieved only with clear legislative recognition of the procedural position of each participant in civil proceedings.

The issues raised in the research topic are of particular importance in the light of the modernization of civil procedural legislation. The presence of these problems indicates a real need to develop a comprehensive scientific understanding of the system of entities that contribute to the implementation of justice in civil cases.

METHOD

The methodological basis of the research is made up of general scientific and private scientific, general legal and special scientific methods. In particular, the methods of analysis, synthesis, induction and deduction, modeling allowed to select criteria and form a system of subjects of civil litigation. Empirical methodology have compiled observations and descriptions, through which the characteristics of each subject of civil litigation were given, and their procedural status was determined. The systematic approach allowed to consider the procedural position of the subjects of civil procedural legal relations in their relationships and interactions and build a logical system. The work also used legal methods, such as formal-dogmatic, historical-law and comparative-law, analysis of the law-enforcement practice of courts of general jurisdiction in order to develop the main directions for the improvement of the civil procedural legislation in terms of regulating the legal position of the participants in civil litigation.

RESEARCH AND FINDINGS

It is necessary to define criteria for characterizing participants in civil proceedings. It was previously established that the system of subjects of civil proceedings includes the court and participants in civil proceedings. The main criterion included in this system is the normative regulation of procedural status.

It should be noted that participants in civil proceedings are understood as persons taking part in the consideration of the case and contributing to the administration of justice, which has traditionally developed in the study of civil proceedings.

In order to include these persons in the group of “participants in civil proceedings”, it is necessary to have criteria characterizing them. The main criterion is the status of their relationship with the court in civil proceedings. The use of the term “relationship” seems more correct than the term “legal relationship”. According to the Russian language dictionary, a relationship is a connection between persons that arises as a result of communication and contact; The connection is interdependent, conditional, general. In a general philosophical sense, the concept of “relationship” is a general concept of the concept of “connection,” since “relationships are a general concept that includes all connections.”

Thus, in the context of civil proceedings, civil judicial relations can be defined as direct or indirect interaction between the court and participants in civil proceedings in the process of considering and resolving a case to achieve the goal of civil proceedings. More precisely, the totality of civil judicial relations between the court and various participants in the trial constitutes a civil judicial relationship.

In addition, it is necessary to characterize other participants in civil proceedings. By the term “other participants in civil proceedings” we mean participants who are an integral part of the subject system, who are not interested in the outcome of the case, but are directly involved in the consideration and resolution of the case on the merits and have a certain focus of activity.

Fedulova S.N. regarding the issue of the legal category “assistants in the administration of justice”, noted that they are a separate group of subjects of civil procedural relations.

However, being an important and major subject of civil proceedings, “assistants of the judge” (Rechtspfleger) did not find proper legal regulation, and the legislator could only derive presumptions regarding these subjects from a number of provisions. [6, pp.17-18]

The Civil Procedure Code does not directly indicate who is the person facilitating the administration of justice or another person, i.e. a participant who is not interested in the outcome of the case, in other words, there is no single legally defined term. Traditionally, in the theory of civil procedure, the term “persons assisting in the administration of justice” is used to refer to witnesses, experts, specialists, translators, attorneys and court clerks. However, we do not believe that all of the listed entities assist the court only in the administration of justice. [12, p.127]

Thus, persons contributing to the administration of justice are subjects who are not interested in the outcome of the case, but influence the course of the trial by performing certain functions aimed at the accurate and timely consideration and resolution of cases, establishing the circumstances of the case and making a fair decision.

As mentioned above, persons assisting the court are participants in civil proceedings who are not interested in the outcome of the case and exercise procedural rights and perform procedural duties in order to assist the court in establishing the circumstances of a particular case and making a legally sound decision. Such persons are proposed to include experts, specialists and witnesses, taking into account their direct contact with the court.

The first subject whose procedural position you need to pay attention to is ***the expert.*** In the science of civil procedure, there are various characteristics of a given participant. [11, pp.35-38; 4, p.173] In general, however, we can conclude that an expert in civil proceedings is a subject who has special knowledge, has no legal interest in the outcome of the case, is endowed with a certain range of rights and obligations in accordance with the Civil Procedure Code and is appointed by the court to examine the circumstances of the case.

According to part (1) of Art. 148 of the Code of Civil Procedure of the Republic of Moldova, in order to clarify issues that arise during the consideration of a case that require special knowledge in the field of science, art, technology, craft and other areas, the court, at the request of one of the parties or another participant in the process, and in cases provided for by law - on its own initiative, appoints examination. Acts of audit or departmental inspection available in the case, as well as written opinions of a specialist cannot replace the expert’s opinion and do not exclude the need to conduct an examination on the same issue. [2]

The concept of “special knowledge” is a controversial issue in civil procedural law. This is due to the fact that this concept has not received legislative support. Legislation recognizing the applicability of special knowledge does not disclose this concept. [3, p.204] A, analysis of Part (1) of Art. 148 of the Code of Civil Procedure of the Republic of Moldova allows us to come to the conclusion that special knowledge includes knowledge in various fields of science, technology, art, and craft.

The development of a unified concept of “expertise” is complicated by the diversity of issues that can be considered and resolved in civil proceedings. If we exhaustively list the various spheres of social life (science, technology, arts and crafts), we can get an idea of the different types of expertise. However, in the field of civil law research, there is a dispute about whether law (legislation) can be the subject of examination. As already noted, most proceduralists (for example, A.T. Bonner, M.K. Treushnikov) distinguish between the special knowledge necessary to clarify the factual circumstances of the case through examinations and legal knowledge.

This means that knowledge in the field of law does not belong to the specialized knowledge on which expert knowledge is based. Moreover, part (1) of Art. 148 of the Code of Civil Procedure of the Republic of Moldova also does not include legal knowledge among those that can be used when conducting an examination.

M.K. speaks categorically on this issue. Treushnikov, noting that in civil proceedings there is a presumption "judges know the law", therefore, to study the rules of law, their research, discovery, i.e. For knowledge of legal issues, expertise in civil proceedings cannot be assigned. Experts are "witnesses of fact ." [15, p.213]

On the other hand, the absence of such provisions in the Civil Procedure Law of the Republic of Moldova excludes the participation of experts in resolving legal issues. This means that legal issues when considering and resolving civil cases must be decided by the courts independently.

The position that an expert can give answers on the basis of special knowledge and examination only on questions of facts, but not the rights of E.R. Rossinskaya considers it outdated, since, in her opinion, an expert can be involved as a specialist when considering cases in the Constitutional Court [13, pp.12-13], which allows him to be involved in participation in the consideration of other cases. So, in particular, according to Art. 32 of the Law of the Republic of Moldova "Code of Constitutional Jurisdiction" No. 502 of June 16, 1995,[10] norms have been established for calling an expert to give an opinion on issues related to the case under consideration.

We believe that the concept of "special knowledge" cannot and should not include issues of law for the following reasons:

- firstly, it is not possible to distinguish between issues of law as "complex" or "simple", because in each specific civil dispute, the rules of law can be assessed differently;

- secondly, the Civil Procedure Code of the Republic of Moldova enshrines the possibility of applying the analogy of law *and the analogy of law in the presence of gaps;*

- thirdly, judicial discretion presupposes the judge's ability to evaluate each situation taking into account the specific circumstances of the case through the individual application of the law;

- fourthly, if the expert is given the opportunity to resolve legal issues (questions of law), then his conclusion must be made binding for the courts, which is in principle impossible due to the principle of judicial independence.

M.K. Treushnikov noted that experts are endowed with the procedural rights necessary to fulfill their duties. An expert acting as a subject of civil procedural legal relations bears procedural responsibilities. The expert is obliged to conduct research and draw informed conclusions on the questions posed by the court. All other responsibilities arise from the expert's obligation to conduct expert research and draw conclusions. [15, p.222]

From the above analysis we can conclude that "the expert is a participant and mediator in civil proceedings, and in order to obtain any type of evidence in court, the legislator has assigned responsibilities to the expert, first of all, and the rights of the expert are aimed at creating the most favorable conditions for him to perform his duties ". [5, pp.349-350]

The next subject in the group of persons assisting the court is ***a specialist.*** The inclusion of a specialist in the group of persons assisting the court is determined by his purpose of activity in civil proceedings - providing consultations, explanations and providing direct technical assistance to the court during various procedural actions (examination of evidence, interrogation of witnesses, appointment of an examination, etc.).

In the science of civil procedural law, the attitude of scientists towards the figure of a specialist, as well as towards his consultation, is ambiguous.

A.T. Bonner, characterizing the procedural position of a specialist, indicates that this subject is involved in the process to give advice, explain or provide direct technical assistance to the court in simpler situations (than an expert). [1, p.424] And, in continuation, the author notes that the specialist does not provide the court with evidentiary information, however, the results of the work performed by him in some cases can become evidence, and in others form the prerequisites for obtaining evidence. For example, in the case of a specialist's participation in the selection of samples for examination. And, therefore, in certain cases, the information contained in the consultation or explanation of a specialist can be used as the basis for a court decision, and here the specialist's opinion has evidentiary value.

In turn, O.V. Isaenkova, proposes to make changes and enshrine in the civil procedure law specialist consultation as a possible source of evidence. At the same time, the scientist points out in this case the need to consolidate the possibility of bringing to criminal liability for refusal to give consultation or for giving knowingly false advice by a specialist. [7, p.131]

We believe that O.V.'s proposal Isaenkova regarding the possibility of giving a specialist's consultation evidentiary force will not allow distinguishing between the procedural position of a specialist and an expert in civil proceedings. It seems that the existence of two subjects (an expert and a specialist) as independent ones is quite justified and reflects the specifics of their activities.

Let us note that the Code of Civil Procedure of the Republic of Moldova does not determine the procedural status of a specialist, but only establishes his duties: to appear in court, answer questions, give advice and explanations, provide technical assistance.

We believe that a specialist, just like an expert, has certain rights and these rights should be reflected in the Civil Procedure Code of the Republic of Moldova, at least in the most general form.

And finally, the third subject in the group of persons assisting the court is ***the witness.*** A witness, like an expert, is "a source of judicial evidence (testimony), but unlike an expert, he does not conduct any research, but becomes a carrier of information about the facts as a result of a combination of circumstances, as a result of the fact that he gets into some kind of relationship with the perceived facts. " [15, p.189-190]

The main duty of a witness, which characterizes him as a special subject, in civil proceedings is the duty to give truthful testimony regarding the circumstances relevant to the case. Let us note that the Code of Civil Procedure of the Republic of Moldova does not contain a definition of witness testimony, despite the fact that it contains Article 132, which is called "Witness Testimony".

We believe that witness testimony is, in any case, information about the circumstances of the case reported by the witness. At the same time, dividing them into certain types has not only theoretical, but also practical significance. In particular, when the court evaluates certain testimony, it is necessary to take into account: 1) the psycho-emotional and physical state of the person; 2) the presence of certain relationships with other participants in civil proceedings.

We believe that the concept of a "witness," his general rights and obligations, as well as the concept of "testimony of witnesses" should be enshrined in a separate article of the Code of Civil Procedure of the Republic of Moldova, located in the chapter "Other participants in civil proceedings."

The next group of persons contributing to the administration of justice are participants assisting interested parties. We included ***a representative and a translator*** among them due to the fact that they have no interest in the outcome of the case, they influence the course of legal proceedings by performing certain functions in order to assist interested parties, entering into indirect civil procedural communication with the court. Both the translator and the representative provide assistance to interested parties through their own interpretation of the information. So, the translator carries out the translation, i.e. conveys certain information by means of another language, and the representative conveys information between the interested person and the court through legal terminology, i.e. also carries out a kind of "translation". This is precisely the indirect connection between these subjects (representative and translator) with the court.

The main debatable issue of the institution of representation, on which procedural scientists have not come to a consensus, remains the question of the procedural position of judicial representatives. Namely, whether judicial representatives are persons participating in the case, or persons promoting justice, or is this an independent category of participants in the process. This issue has not been finally resolved at the legislative level. [9, p.94]

The next subject in the group of persons assisting interested parties is ***the translator.*** The necessity and validity of the participation of an interpreter in the consideration and resolution of individual civil cases is not questioned.

The main purpose of the translator's participation in civil proceedings is to implement and comply, through his professional activities in legal proceedings, with the provisions of one of the principles of industry legislation - the principle of the language of civil proceedings. The description of the procedural position of the translator must be carried out as a result of the implementation with his help of this fundamental requirement of the law. [8, pp.40-50]

At the moment, the Code of Civil Procedure of the Republic of Moldova does not fully regulate the procedural position of the translator in civil proceedings. So, in Art. 199 of the Code of Civil Procedure of the Republic of Moldova establishes the procedure for explaining the rights to the translator, as well as the rights and obligations of this subject, while the Code of Civil Procedure of the Republic of Moldova does not contain requirements for the translator and the translation. From this we can conclude that the translator must know the language of the proceedings and the language spoken by the person participating in the case who does not speak the language of the proceedings, while the degree of proficiency in the language of the proceedings by the person participating in the case does not matter to the court and it is assumed that the translator speaks the language of legal proceedings as a native speaker. [6, p.18]

The secretary of the court session is the subject of civil procedural legal relations, since he interacts with the judge on the basis of the norms of the Code of Civil Procedure of the Republic of Moldova, and as a general rule, for the emergence of civil procedural relations, the existence of rules of law and legal personality is necessary.

Analysis of the presented positions allowed us to come to the conclusion that the following positions exist that determine the procedural status of the celmb assistant: these are persons with organizational powers; these are subjects of procedural legal relations that are not related to the participants in the process; These are participants in the process who assist the court. The definition of an assistant as a subject of a procedural legal relationship, not related to the participants in the process, seems to be inaccurate, because the subjects of a procedural legal relationship are always the court (the main and obligatory subject) and other participants. And finally, when defining an assistant judge as a participant in the process assisting the court, the use of the wording "assisting the court" is not fully justified.

The assistant does not assist the court in administering justice, because its activities do not include any powers related directly to the administration of justice.

The assistant judge, as well as the secretary of the court session, are subjects of civil proceedings, since all their activities are carried out within the framework and according to the rules of the civil procedural form, enshrined in the Code of Civil Procedure of the Republic of Moldova.

It is most correct, in our opinion, to use the formulation "ensuring the activities of the court" or "ensuring the progress of legal proceedings", since the activities of an assistant judge have an organizational origin, which follows from the essence of his functions. We believe that this conclusion is also applicable to the procedural position of the secretary in the court hearing, because it has similar functions and purpose of activity.

Thus, the assistant judge and the secretary of the court session constitute a group of persons ensuring the progress of civil proceedings on the following grounds: the purpose of their participation in the consideration and resolution of a specific civil case is to ensure the normal course of proceedings; they have no legal interest in the outcome of the case, otherwise they may be challenged; they enter into civil procedural legal relations with the court. Here it is necessary to talk about service-auxiliary relations, the same as, for example, those that arise between the court and persons assisting the court; they have a special set of rights and obligations, which allows us to talk about them as independent subjects of civil proceedings.

CONCLUSION

Thus, having considered the procedural status of persons assisting the court, we can conclude that the definition of their concepts (experts, specialists, witnesses), their rights and obligations, as well as the results of their activities (conclusions, consultations, testimony) must be included in a separate chapter of the Code of Civil Procedure . It should be noted that all other rules governing the activities of experts, specialists and witnesses are placed in separate chapters, which do not need to be placed in one chapter in the current edition of the Code of Civil Procedure, since they determine the specifics of the activities of these participants at certain stages of the civil process.

REFERENCES

1. Bonner A.T. Traditional and non-traditional means of proof in civil and arbitration proceedings: monograph // Moscow. Avenue. 2016.

2. Civil Procedure Code of the Republic of Moldova No. 225-X V dated May 30, 2003 // The Official Monitor of the Republic of Moldova No. 111-115/451 dated June 12, 2003.

3. Civil process: textbook and workshop for secondary vocational education / M. Yu. Lebedev [etc.]; edited by M.Yu. Lebedev. - 8th ed., revised. and additional Moscow. Publishing house Urayt, 2023.

4. Eisman A.A. Expert opinion // M. Legal literature. 1967.

5. Evidence law course: Civil procedure. Arbitration process // Ed. M.A. Fokina. M. Statute. 2014.

6. Fedulova S.N. Some problems of legal regulation of the procedural status of persons assisting in the administration of justice in civil cases // Russian Judge. 2013. No. 7.

7. Isaenkova O.V. Some problems of evidence and forms of their presentation in civil proceedings // Taxes. 2009. No. 17.

8. Kuznetsov O.Yu. Legal personality of a translator in civil proceedings and the procedure for its acquisition // Modern law. 2007. No. 10.

9. Laskina N.V. Are judicial representative's persons participating in the case or persons promoting justice? // Modern law. 2010. No. 3.

10. Law of the Republic of Moldova "Code of Constitutional Jurisdiction" No. 502 of June 16, 1995// The Official Monitor of the Republic of Moldova No. 53-54 dated 09.28.1995.

11. Mokhov A.A. Specifics of expert opinion as judicial evidence // Arbitration and civil process. 2003. No. 9.

12. Prisak A. Commentary on the Civil Procedure Code of the Republic of Moldova / Chişinău: The Legal Book, 2019.

13. Rossinskaya E.R. Forensic examination in civil, arbitration, administrative and criminal proceedings // M. Norma. 2006.

14. Sakhnova T.V. Forensic examination // M. Gorodets. 2000.

15. Treushnikov M.K. Judicial evidence // 5th ed., additional. M. Publishing House "Gorodets". 2016.

EXPLODING THE MYTH OF SELF-SUFFICIENCY OF INDIAN VILLAGES

Assistant Professor Dr. Geetika Gupta
Symbiosis Law School, Noida (Uttar Pradesh)
ORCID: 0000-0002-7369-8740.

Abstract
The paper attempts to explore the enduring perception of Indian villages as a gateway to understand traditional Indian society. The paper is divided into two sections, first revolves around the debate on the self-sufficient nature of Indian villages; second section attempts to debunk the myth revolving around the concept of self-sufficiency and self-reliance by critical examination, exploration and drawing a comparison with the present scenario. It is to be observed that the concept of self-sufficiency in ancient Indian villages go beyond mere economic autonomy as it encompasses a comprehensive system of social, economic, political and cultural interdependence. These villages were distinguished by their remarkable ability to fulfill their essential needs internally as well as externally, thereby maintaining a delicate equilibrium between agriculture, specialized craftsmanship, trade and local governance. The paper delves into pre and post-Independence period which brought about remarkable large-scale changes in the political, economic and social life which had a significant impact on rural life.

OLD WINE IN NEW BOTTLE: PRACTICE OF COMMUNITY MEDIATION IN INDIA

Assistant Professor Dr. Sneha Singh
Symbiosis Law School, Noida under Symbiosis International University, Pune and works on Mediation, Alternative Dispute Resolution Mechanisms and Public Policy

ABSTRACT

Conflict and its resolution has been the aim of all the elements of the society. The disputants and actors often approach the conflict with the goal of affecting the opposite party and the resolution mechanism with the same perspective. Community Mediation is a mechanism of dispute resolution which is about empowered individuals and communities over the State playing a crucial role in the process. The core feature of mediation is the role of parties in the specific and customized outcome from the process for the benefit of the disputants and the voluntariness of the parties to engage in the same. Humans are social beings and often thrive in peaceful communities. At some point or the other as a part of the society and community, each one of us have been involved in the resolution of dispute of either our neighbors, families or any member of the local community. In India since time immemorial community mediation has been practiced by communities and societies. Community mediation is viable and different from traditional mediation. The success of community mediation often depends on the impact the process brings forth for the parties of the dispute and the community as a whole.

This paper will highlight the changes brought in approach to community mediation after the incorporation of the same under The Mediation Act, 2023 in comparison to the prevalent mechanisms of mediation informally practiced successfully across communities in India. The Mediation Act, 2023 is the statutory law for mediation in India and the key aim of the statute is to streamline and provide details and procedures for the widespread practice of mediation. One of the key areas of focus is Community mediation and thus it can give fair aspect about the practice of the same before and after the statutory codification.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

MANAGEMENT OF TOURISM POTENTIALS AND DEVELOPMENT OF ECOTOURISM İIN KOSOVO

Dr.Halil Bajrami
Faculty of Law, University of Mitrovica "Isa Boletini"

Blerona Bajrami
Faculty of Economics, University of "Hasan Prishtina"

Dr.Venet Shala
Faculty of Economics, University of Prizren “Ukshin Hoti”

Dr.Fadil Lekaj
Faculty of Tourism Management, College “Pjeter Budi”

ABSTRACT
Tourism today is considered among the largest industries in the world, creating more and more jobs than many other sectors. Countries that are in the early stages of tourism development, such as Kosovo, have opportunities to benefit from tourism, especially in reducing poverty and increasing economic development. For tourism to have a rapid development in a sustainable manner, public institutions must ensure a supportive legislation, an institutional framework which is favorable for the development of the private sector, guarantee quality assurance for tourists and clearly define the mechanisms for the management of touristic potentials The topic "Management of touristic potentials and the development of ecotourism in Kosovo", a chosen topic that aims to deal analytically and comparatively with the issues related to the importance of managing the touristic potentials of the states in general and Kosovo, in particular, has potential in the development of tourism, and with the development of tourism, the economy will also develop. The focus of this paper will be the main potentials that lead to the development of tourism, the state of tourism in Kosovo as well as eco-tourism as a new branch of tourism.
The purpose of this work is to finally provide a clear expertise about the tourist potentials, the potentials that lead to the development of tourism, the goals that can be achieved if all the potentials are used correctly and if they are managed correctly. In the process of drafting this paper, I applied the following methods: during the drafting of this paper, I used the toric data analysis method and the comparative method. The work was carried out according to the inductive method, according to the deductive method and according to the hypothetical-deductive method. Which means drawing general and specific conclusions from the treatment of specific and general issues. On the occasion of summarizing and conceptualizing the material, I have consulted and served relatively wide current and contemporary literature, literature from university textbooks, literature from the field of economic sciences as well as various scientific articles.
Keywords: Tourism, tourist potentials, eco-tourism, economic development, tourist offer

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

PERFECTING THE PROVISIONS OF VIETNAMESE LAW ON THE LEGAL CONSEQUENCES OF INVALID LEGAL ACTS DUE TO FORGERY

Nguyen Huy Hoang
Tra Vinh University – School of Economics and Law, VNU, Hanoi – University of Law
ORCID: 0000-0003-1662-4371

ABSTRACT
When a legal act is invalid due to forgery, it will give rise to legal consequences prescribed by law. The legal consequences when a legal act is invalid due to forgery can be listed as: it will not give rise to rights and obligations for the subject; the responsibility to restore the original state, return to each other what has been received; the subject at fault causing damage must compensate, the responsibility to return yield and/or income ... The article will present the legal consequences of a legal act invalid due to forgery according to the provisions of Vietnamese law. Based on the analysis of the provisions of Vietnamese law on the legal consequences of a legal act invalid due to forgery, the article will present the limitations and inadequacies of these provisions. From there, the article proposes a number of recommendations to improve the provisions of Vietnamese law on the legal consequences of a legal act invalid due to forgery.
Keywords: Fake legal act; Invalid legal act due to forgery; Invalid legal act.

INTRODUCTION
When a legal act is invalid due to forgery, it will cause many legal consequences such as not creating rights and obligations for the subject; responsibility to restore the original state, return to each other what has been received; the subject at fault causing damage must compensate... Vietnamese law has relatively complete provisions on the legal consequences of legal acts invalid due to forgery. However, these provisions still reveal some limitations and shortcomings that need to be improved, such as not mentioning the time of return in cases where both parties are obliged to return to each other what has been received, not stipulating how to determine when the subject cannot return in kind, the value must be valued in money to return... Based on the presentation and analysis of the provisions of Vietnamese law on the legal consequences of legal acts invalid due to forgery, this article will point out the limitations, shortcomings and recommendations to improve these provisions.

RESEARCH AND FINDINGS
1. Provisions of Vietnamese law on legal consequences of invalid legal acts due to forgery
The legal consequences of a legal act being invalid due to forgery are stipulated in Article 131 of the Vietnamese Civil Code 2015, including the following issues:
First, the validity of rights and obligations in a forgery legal act: When a legal act is invalid due to forgery, the very fundamental consequence is that it will not create, change, or terminate the rights and obligations of the subject from the time the forgery legal act is established[1]. Legal acts are established to create, change, and terminate rights and obligations, but when a legal act is invalid in general and a legal act is invalid due to forgery in particular, the prominent consequence will be that it will not create legal consequences and will be considered as if they did not exist.

[1] Clause 1, Article 131 of the Vietnam Civil Code 2015

Therefore, commentators on the Vietnamese Civil Code believe that a forged legal act will have no legal value and will not create legal consequences[2]. Although a legal act invalidated due to forgery will not have the legal consequences mentioned above. However, the invalidity of a legal act invalidated due to forgery itself will give rise to certain rights and obligations for the subject. These are rights and obligations arising from the invalidity of a legal act invalidated due to forgery. This obligation can be the obligation to return to each other what has been received, the obligation to compensate for damages...

Second, a fictitious legal act is naturally invalid, absolutely invalid and invalid from the time the transaction is established, so if the subject has not yet exercised the rights and obligations, it will not have to perform them. If it has been performed, it must restore the original state and return to each other what has been received. In case it is not possible to return in kind, the value in money to be returned[3]. It is necessary to provide for the restoration of the original state in the legal consequences of a false legal act. The natural consequence of a void legal act is the need to return what has been done to each other. If the voidness of the contract is used as a basis to benefit one party and disadvantage the other party, it will be unfair[4]. Article 157 of the Chinese Civil Code 2020 also stipulates in a similar way that when a legal act is invalid, the obligation to return arises. The purpose of restoring the original state when a legal act is invalid due to forgery is to avoid the case where there is a party taking advantage and a party whose interests are affected by the forgery if there is no restoration of the original state. The laws of some countries in the world have different views on restoring the original state regarding the invalidity of legal acts. The laws of England, Scotland and Ireland have a quite different approach compared to the Vietnamese Civil Code 2015, in that if it is not possible to return in kind, the right to request a declaration of the contract as invalid will no longer exist[5]. With this provision, it can be understood that the laws of the above countries have limited the right to request a declaration of invalidity of the contract when the object of return is irrevocable, the above handling is quite strange to Vietnamese law. The laws of some other countries consider that the inability to return in kind does not affect the right to request a declaration of invalidity of the legal act and at this time the conversion into money for return will be raised.

Third, return of benefits and income: It can be seen that in addition to restoring the original state, returning to each other what has been received when the legal act is invalid due to forgery, the issue of returning benefits and income can also arise. Because, in practice, there are not a few cases where assets are the subject of a forgery legal act that gives rise to benefits and income (for example: the amount of money received from leasing assets that are the subject of a legal act invalid due to forgery...). The question is how to handle these benefits and income? Are they within the scope of returning to each other what has been received? According to the provisions of Article 1352-3 of the French Civil Code 2016 when dealing with this issue, it is stipulated that compensation will include the benefits that the property is bringing, and compensation for benefits and profits, if it cannot be realized in material, must determine the price at the time of return to perform.

---

[2] Nguyen Minh Tuan (2016), *Scientific commentary on the Civil Code of the Socialist Republic of Vietnam 2015*, Justice Publishing House, p. 203.

[3] Clause 2, Article 131 of the Vietnam Civil Code 2015.

[4] G. Rouhette (Ed) (2003), *Principles of European Contract Law*, Publisher. Société de législation comparée, tr 238.

[5] Do Van Dai (2017), *Vietnamese Contract Law - Judgments and judgment comments*, volume 2, Hong Duc Publishing House - Vietnam Lawyers Association, page 35.

Thereby, it can be seen that in the French Civil Code 2016, the return to each other of what has been received when the legal act is invalid includes the return of benefits and benefits that the property brings.

The handling direction in the Vietnamese Civil Codes is different on this issue. Specifically, the provisions on the legal consequences of invalid legal acts in the Vietnamese Civil Code 1995 do not mention this issue. From the Vietnamese Civil Code 2005, the issue of handling benefits and income has just been raised. However, in the Vietnamese Civil Code 2005, the content of handling benefits and income is included in the part of returning to each other what has been received and in the direction of either returning to the owner or confiscation according to the provisions of law. However, the above handling direction is not convincing, because benefits and income are the increase compared to the assets that the parties have received, so it cannot be included in the content of what has been received.

The Vietnam Civil Code 2015 has overcome the limitations of the 2005 Vietnam Civil Code mentioned above when it separated the issue of handling benefits and income from the part of returning to each other what has been received into an independent amount and did not maintain the provision that benefits and income can be confiscated by the state. Accordingly, it is stipulated that the bona fide subject in collecting benefits and income will not have the obligation to repay[6].

Fourth, compensation for damages: In addition to the legal consequences when a legal act is invalid due to forgery as presented above, the law also stipulates the issue of compensation for damages. Specifically, the party at fault causing damage must compensate for the damage, this provision is essentially unchanged compared to the Vietnamese Civil Codes 1995 and 2005. Regarding this issue, Article 157 of the Chinese Civil Code 2020 stipulates that, if there is a fault, the party responsible shall be liable for compensation for losses to the other party. In the event that both parties are at fault, each party shall be liable for the corresponding damages. The provision on compensation for damages when a legal act is invalid due to forgery is a very necessary provision to ensure the legitimate rights and interests of the subject. Compensation for damages will be based on the fault of the subject in the forged legal act, in the direction that the party at fault must compensate for the damages.

Final, resolving the consequences of invalid legal acts due to forgery related to personal rights: This is a new content recognized by the Vietnamese Civil Code 2015 compared to previous Vietnamese Civil Codes[7]. Accordingly, the settlement of legal consequences of invalid legal acts due to forgery will be settled according to the provisions of the Vietnamese Civil Code 2015 and related laws. This is a necessary supplement to create coverage of the Vietnamese Civil Code 2015 for specialized laws. In addition, the addition of provisions on legal consequences of invalid legal acts is completely appropriate and necessary in more thoroughly settling the legal consequences of invalid legal acts due to forgery in particular and invalid legal acts in general that may occur.

3. Some limitations and shortcomings in the provisions of Vietnamese law on the legal consequences of invalid legal acts due to forgery

First, the provision stipulates that when a legal act is invalid, the parties must restore the original state and return to each other what they have received. However, it does not mention the time of return in cases where the parties are obliged to return to each other what they have received. This may cause difficulties in the practical application of determining the time and order of return, when the subjects of the fictitious legal act are obliged to return to each other.

[6] Clause 3, Article 131 of the Vietnam Civil Code 2015.
[7] Clause 5, Article 131 of the Vietnam Civil Code 2015.

Second, clause 2, Article 131 of the Vietnamese Civil Code 2015 stipulates that in cases where it is impossible to return in kind, the value in money is used to return. However, there is no regulation or document guiding how to understand what it means to be unable to return in kind. One of the ways to restore the original state is to return to each other what has been received, in cases where it is impossible to return in kind, the value in money is used to return. Thus, the value in money is only implemented if it is impossible to return in kind. However, the 2015 Civil Code does not specify what it means to be unable to return in kind. This may cause confusion and inconsistent application of the regulation on what it means to be unable to return in kind.

Third, clause 2, Article 131 of the Vietnamese Civil Code 2015 does not have an exceptional provision or detailed guidance for cases where it is not necessary to restore the original state when the subject with the obligation to return in a forged legal act has created additional assets other than the time of receiving the assets. When a legal act is invalid in general and a legal act invalid due to forgery in particular, restoring the original state is absolutely necessary. However, there should also be an exceptional provision when returning to each other what has been received but not necessarily restoring the original state, while still ensuring the rights and legitimate interests of the subject and avoiding waste for society.

Fourth, clause 2, Article 131 of the Vietnamese Civil Code 2015 does not stipulate how to determine the case where the subject cannot return the object in kind, then the value must be valued in money at the time of return. According to social fluctuations, the value of assets may increase or decrease compared to the previous time. The value of the object at the time of return may be higher or lower than the time of establishing the fake legal act, so the value in money at the time of return is also an issue that affects the rights of the subject, especially real estate such as houses and land use rights, the price will usually increase at the time of return compared to the time of establishing the fake legal act. The fact that the current law does not stipulate this issue may cause inconsistent understanding and application in practice and perception, which may lead to infringement of the rights and legitimate interests of the subject.

Fifth, the provision that the at-fault party in the provision that the at-fault party causing damage must compensate for the damage in Clause 4, Article 131 of the Vietnamese Civil Code 2015 does not cover all the subjects at fault causing damage in invalid legal acts due to forgery: As analyzed above, the subject at fault in causing damage when a legal act is invalid due to forgery can be the subject of the legal act and can also be other subjects. The above provision uses the word at-fault party, which can lead to the understanding that the party here is only the subject of the forgery legal act and does not include other subjects. This does not cover all subjects that may be at fault in causing damage such as Notaries or other subjects. This does not create coverage and good predictions for cases where the subject at fault causes damage when a legal act is invalid due to forgery.

Final, there is no guidance on how to determine damages when a legal act is invalid due to forgery. This seems to have created inconsistency in determining damages when a legal act is invalid due to forgery in judicial practice.

4. Some recommendations to improve Vietnamese law on the legal consequences of invalid legal acts due to forgery

First, supplement the provision on simultaneous return to each other what has been received in Clause 2, Article 131 of the Vietnamese Civil Code 2015: In the first paragraph, Clause 2, Article 131 of the Vietnamese Civil Code 2015 stipulates that the subjects must restore the original state and return to each other what has been received.

The above provision refers to the return to each other what has been received when the legal act is invalid but does not mention the time of return. Therefore, it is necessary to supplement the provision on the time of return being simultaneous and add more content except in cases where the parties have other agreements or relevant laws have other provisions, in order to increase the predictability, comprehensiveness and consistent application in legal practice of the issue of returning to each other what has been received.

Second, it is necessary to issue a document guiding cases where it is not possible to return in kind in paragraph 2, clause 2, Article 131 of the Vietnamese Civil Code 2015: The basic legal consequence of a legal act that is invalid due to forgery is to return to each other what has been received, in which return in kind is very common. However, there is currently no document guiding in detail the cases where it is not possible to return in kind in paragraph 2, clause 2, Article 131 of the Vietnamese Civil Code 2015. Therefore, it is necessary to issue a document guiding cases where it is not possible to return in kind.

Third, it is necessary to issue a document guiding Clause 2, Article 131 of the Vietnamese Civil Code 2015 in the direction of providing for exceptional cases where it is not necessary to restore the original state when the subject has created some additional assets compared to the time of receiving the assets in the direction of ensuring the rights of the subjects, for example: building more houses, construction works, other assets on the land. In this case, it is necessary to have provisions to anticipate exceptional handling directions such as the parties will pay each other the price that is different from the time of receiving the assets to avoid waste for the parties and for society in the direction of still ensuring the legitimate interests of the subjects.

Fourth, supplement the regulation on determining the value of the refund in case it is not possible to refund in kind in Clause 2, Article 131 of the Vietnam Civil Code 2015: In case it is not possible to refund in kind, the monetary value for refund is set forth. Clause 2, Article 131 of the Vietnam Civil Code 2015 stipulates that in case it is not possible to refund in kind, the monetary value is used for refund. This regulation does not mention the value of the property at the time of refund. In order to protect the rights of the subject in a legal act invalid due to forgery in particular, it is necessary to determine the value of the returned property at the time the obligation to refund arises. In case the subject receives the property in a legal act in good faith, he/she only has to refund the value of the property at the time of actual receipt of the property. In case the value of the property at the time the obligation to return arises is lower than the value of the property at the time the subject actually transfers the property, the value of the property at the time of actual transfer of the property must be returned.

Fifth, clause 4, Article 131 of the 2015 Vietnamese Civil Code stipulates that the party at fault causing damage must compensate. In order to create more comprehensive coverage for the subject at fault causing damage when the legal act is invalid in general and the legal act is invalid due to forgery in particular, it is necessary to change the word party to the word subject in the general provision. This change both demonstrates conformity with the types of legal acts and anticipates the subjects that can become at fault when the legal act is invalid.

Final, it is necessary to issue a document guiding how to determine the damages to be compensated when a legal act is invalid due to forgery: In order for the application of the law in determining the damages to be compensated when a legal act is invalid due to forgery to be consistent and accurate, it is necessary to have a document guiding how to determine the nature of the liability to compensate for damages, how to determine damages as a basis for compensation when a legal act is invalid due to forgery.

CONCLUSION

Vietnamese law has provisions on the legal consequences of invalid legal acts due to forgery. However, these provisions still reveal some limitations and shortcomings such as not mentioning the time of return in cases where both parties are obliged to return to each other what they have received in the responsibility to restore the original situation; there are no regulations or documents guiding how to understand what is not possible to return in kind; there are no regulations on how to determine when the subject cannot return in kind, the value must be valued in money for return; ... Based on the above limitations and shortcomings, the article has proposed a number of recommendations to improve these limitations and shortcomings.

REFERENCES

Vietnam Civil Code 1995;

Vietnam Civil Code 2005;

Vietnam Civil Code 2015;

Do Van Dai (2017), *Vietnam Contract Law - Judgments and Judgment Commentaries Volume 2*, Hong Duc Publishing House - Vietnam Lawyers Association;

Nguyen Minh Tuan (2016), *Scientific Commentary on the Civil Code of the Socialist Republic of Vietnam 2015*, Judicial Publishing House;

G. Rouhette (Ed) (2003), *Principles of European Contract Law, Publisher*. Société de législation comparée.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

TIME LIMIT FOR HANDLING FAKE LEGAL ACTS UNDER VIETNAMESE LAW

Nguyen Huy Hoang
Tra Vinh University – School of Economics and Law, VNU, Hanoi – University of Law
ORCID: 0000-0003-1662-4371

ABSTRACT
Fake legal act is of course invalid, so it is necessary to raise the issue of handling this act according to the provisions of law. One of the important legal issues related to handling a forged legal act is to determine the time limit for requesting to handle this legal act. Determining the time limit for requesting to handle a forged legal act has many theoretical and practical meanings in protecting the legitimate rights and interests of the subject and the stability of transactions in civil relations. The article presents and analyzes the provisions of Vietnamese law on the time limit for requesting to handle a forged legal act. In the process of analysis, the article makes comparisons with the law of the French Republic on the time limit for handling a forged legal act. Based on the above presentation and analysis, the article will point out the limitations and inadequacies of Vietnamese law on the time limit for requesting to handle a forged legal act and make recommendations to improve this provision.
Keywords: Time limit; Time limit for handling fake legal acts; Fake legal acts.

INTRODUCTION
According to the provisions of current Vietnamese law, the statute of limitations for requesting to handle a fake legal act is not limited in time. However, this provision has revealed limitations and shortcomings in both theory and practice. This article will analyze the limitations and shortcomings in the provisions of Vietnamese law on the statute of limitations for requesting to handle a fake legal act and propose recommendations to improve this provision.

RESEARCH AND FINDINGS
Statute of limitations for requesting handling of fake legal acts under Vietnamese law
According to the provisions of the Vietnamese Civil Code 2015, the statute of limitations for requesting handling of legal acts is divided into 02 groups: (i) the group with a statute of limitations for requesting handling; and (ii) the group with no statute of limitations for requesting handling. In which, fake legal acts belong to the group without a statute of limitations for requesting handling. Specifically, Clause 2, Article 132 of the Civil Code 2015 stipulates that the statute of limitations for requesting handling of fake legal acts is not limited in time. The fact that there is no statute of limitations for requesting handling of fake legal acts in the Vietnamese Civil Code 2015 is similar to the Vietnamese Civil Code 1995 and the previous Vietnamese Civil Code 2005. The Vietnamese Civil Contract Ordinance 1991 and the Vietnamese Economic Contract Ordinance 1989 do not stipulate fictitious legal acts, so there is no provision on the statute of limitations for handling fictitious legal acts. How should we understand the unlimited statute of limitations? Unlimited means there is no time limit, anyone, at any time, when recognizing this fictitious legal act, will not acknowledge its legal value[1].

[1] Tran Thi Ha (2022), *"Absolutely invalid contracts and relatively invalid contracts"*, in Proceedings of the workshop on invalid contracts and legal consequences of invalid contracts, Hanoi Law University, November 1, 2022, pp. 47-59.

In fact, the fact that there is no limitation on the statute of limitations for requesting the handling of a fake legal act does not mean that anyone has the right to request the handling of a fake legal act. The non-application of the statute of limitations for requesting the handling of a fake legal act of the Vietnamese Civil Code 2015 can be explained on the basis that the fake legal act has violated the public interest, the interests of third parties, if not eliminated, it can affect the interests of the state, social order and the interests that need to be protected of other subjects[2]. Therefore, not applying the statute of limitations will help better protect the rights of the subjects that are infringed by the forged legal act. It can be seen that lawmakers are further strengthening the absolute invalidity of forged legal acts by not applying the statute of limitations to request the handling of this type of act. That is, there is no exception for accepting the validity of forged legal acts, which is completely different from cases of relative invalidity when there is a certain statute of limitations to request a declaration of validity and when the statute of limitations expires without declaring invalidity, the legal act becomes valid. When studying the statute of limitations for requesting to handle invalid contracts, Professor Vu Van Mau based on the absolute or relative invalidity of the contract to determine the statute of limitations for requesting to handle invalid contracts into short-term and long-term statute of limitations. Accordingly, absolutely invalid contracts will be subject to long-term effect[3]. The Northern Civil Code 1931 and the Central Civil Code 1936 do not stipulate forged legal acts, however, these two documents stipulate the statute of limitations for handling absolutely invalid contracts with a long-term statute of limitations in the direction of a statute of limitations. The Vietnamese Civil Code 1972 mentions the right to annul contracts from Articles 878 - 884. It stipulates the right to annul relatively invalid contracts such as in the case of an incompetent person, a person who agrees to be suppressed will have a statute of limitations of five years, and the parties have the right to confirm the contract, but for absolutely invalid acts, the Vietnamese Civil Code 1972 stipulates that confirmation is not allowed. When talking about the statute of limitations in Article 1474 of the Vietnamese Civil Code 1972, it also stipulates in the direction of limiting the statute of limitations for requesting the handling of invalid legal acts.

Article 2262 of the French Civil Code 1804 provides that the right to request a declaration of absolute nullity of a contract has a statute of limitations of 30 years. French civil law has been criticized for applying a perpetual statute of limitations to cases of absolute nullity of a deed. However, French case law has not paid attention to this and has applied a perpetual statute of limitations to absolutely null legal acts[4]. When discussing the regulation of unlimited time to handle fake legal acts in the Vietnamese Civil Code 2015, there was an opinion that in order to create a basis to contribute to stabilizing legal acts and surrounding social relations, it is necessary to apply a limited statute of limitations to fake legal acts and the validity of this type of act needs to be recognized when the statute of limitations expires[5].

Through the presentation and analysis of some issues on the statute of limitations for requesting to handle fake legal acts as above, it can be seen that this is still a different issue in some legal systems and there are different views in legal science.

---

[2] Pham Van Tuyet, *"Overview of invalid contracts",* in Proceedings of the workshop on invalid contracts and legal consequences of invalid contracts, Hanoi Law University, November 1, 2022, p. 10.

[3] Vu Van Mau (1963), *Brief study of Vietnamese civil law - Volume II Obligations and contracts*, published by the Ministry of National Education, pp. 216 - 221.

[4] Vu Van Mau (1963), *Brief study of Vietnamese civil law - Volume II Obligations and contracts*, published by the Ministry of National Education, pp. 288.

[5] Nguyen Hong Hai (2018), *Some issues on invalid contracts in current private law of Vietnam,* https://fdvn.vn/mot-so-van-de-ve-hop-dong-vo-hieu-trong-phap-luat-tu-hien-hanh-cua-viet-nam/, accessed on July 30, 2024.

It is thought that limiting the statute of limitations for requesting to handle fake legal acts to a specific time limit is necessary. For the following reasons:

First, in essence, a fake legal act is a violation of the law in the field of civil law. In general, violations of the law are regulated in the direction of a statute of limitations for handling. Even criminal violations that are dangerous to society are also regulated in the Penal Code on the statute of limitations for criminal prosecution. The maximum statute of limitations for criminal prosecution for particularly serious crimes is only 20 years and when the statute of limitations expires, the offender will no longer be prosecuted. Meanwhile, the statute of limitations for handling fake legal acts under current Vietnamese law is not limited, which seems to indicate that the law is too strict with this type of behavior compared to crimes in the Penal Code. Therefore, it is necessary to determine the statute of limitations for handling fake legal acts as a specific period.

Second, the provision of no limitation on the statute of limitations for handling fictitious legal acts causes a contradiction with the provisions on establishing ownership rights according to the statute of limitations in Article 236 of the Vietnamese Civil Code 2015. This will cause certain disturbances in civil legal relations in general and relations on ownership rights in particular.

Third, to stabilize legal acts: Practice shows that the subject of a fake legal act is usually property and this property will often be circulated by the subject of the fake legal act establishing legal acts with other subjects... Not limiting the statute of limitations for handling fake legal acts can affect legal acts related to the property that is the subject of the fake legal act, even being declared invalid or creating legal troubles. For legal reasons, stability in social relations is very important. Therefore, even if a legal act is invalid, after a period of time, it still needs to be recognized[6]. Indeed, not limiting the statute of limitations for claims against sham legal acts would significantly impact the stability of the relevant legal acts.

Fourth, the statute of limitations without a specific time limit will make it difficult to prove the objective truth: The current law stipulates that the statute of limitations for handling fictitious legal acts is not limited, which shows its strictness and absolute invalidity. However, such a statute of limitations will cause difficulties in collecting evidence, proving and finding the objective truth for cases that occurred a long time ago.

Fifth, increasing the responsibility of the subjects whose rights are infringed by a forged legal act: In addition to the reasons mentioned above, limiting the statute of limitations for requesting to handle a forged legal act will increase the responsibility of the subjects whose rights are infringed in exercising the right to request a declaration of invalidity. If they are fully aware of the forged legal act and have the conditions to request a declaration but do not exercise the right to request a declaration of invalidity within a certain period of time, it is considered that they have acknowledged the forged legal act and lost the right to request a declaration of invalidity.

Final, the regulation of the statute of limitations requiring the handling of unrestricted fictitious legal acts loses the meaning of the present time: Because the statute of limitations is a time limit prescribed by law, when that time limit expires, legal consequences will arise for the subject according to the conditions prescribed by law. In which, the time limit is a period of time determined from one point in time to another. However, when the statute of limitations is prescribed, it means that there is no statute of limitations, so the regulation of the statute of limitations will no longer have meaning in requiring the handling of fictitious legal acts.

---

[6] Vu Van Mau (1963), *Brief study of Vietnamese civil law - Volume II Obligations and contracts*, published by the Ministry of National Education, pp. 299.

Determining the statute of limitations for requesting to handle a fake legal act within a certain period of time is necessary as analyzed above. However, the legal provisions on statute of limitations are only effective when one of the parties requests it, and the prosecution agency does not have the right to arbitrarily invoke the provisions on statute of limitations[7]. This is a new provision of the Vietnam Civil Code 2015 compared to previous Civil Codes of Vietnam. This provision has similarities with the provisions in PECL and PICC, as well as some countries such as Belgium, Luxembourg, Italy, Spain[8]. The above provision can be understood as if the parties do not request the Court to apply the statute of limitations, the Court is not automatically allowed to invoke this provision during the trial. This reduces the significance of limiting the statute of limitations for requests to handle fake legal acts. Because, in principle, civil disputes in which disputes related to requests to declare fake legal acts invalid will not be subject to the statute of limitations if one or more parties request the application of the statute of limitations before the Court of First Instance issues a judgment or decision to resolve the case. However, limiting the statute of limitations for requests to handle fake legal acts as analyzed above is still very necessary, which creates the initiative and responsibility of the subject in handling fake legal acts.

Proposal to improve the provisions of Vietnamese law on the statute of limitations for requesting to handle fake legal acts

According to Clause 3, Article 132 of the Vietnamese Civil Code 2015, the statute of limitations for requesting to handle fake legal acts is not limited. However, this provision needs to be amended in the direction of limiting the statute of limitations. Accordingly, based on the subject of the fake legal act, it is prescribed into two different statutes of limitations: In which, for fake legal acts with real estate as the subject, the statute of limitations for requesting to handle is 30 years. For fake legal acts with movable property as the subject and other cases, the statute of limitations for requesting to handle is 10 years.

CONCLUSION

According to the provisions of Vietnamese law, the statute of limitations for requesting to handle fake legal acts is not limited. However, not limiting the statute of limitations for requesting to handle fake legal acts will cause some limitations and shortcomings such as making it difficult to prove objective truth; not increasing the responsibility of the subject whose rights are violated by fake legal acts; losing the meaning of the present time... Therefore, it is necessary to limit the statute of limitations for requesting to handle fake legal acts to overcome the limitations and shortcomings in this provision.

REFERENCES

Civil Code of Tonkin, Vietnam 1931;
Civil Code of Central Vietnam, Vietnam 1936;
Vietnam Civil Code 1972;
Vietnam Civil Code 1995;
Vietnam Civil Code 2005;
Vietnam Civil Code 2015;
Vietnam Civil Contract Ordinance 1991;
Vietnam Economic Contract Ordinance 1989;

[7] Clause 2, Article 49 of the 2015 Vietnam Civil Code.
[8] Do Van Dai (2016), *Scientific commentary on new points of the 2015 Civil Code*, Hong Duc Publishing House - Vietnam Lawyers Association, pp. 94 - 95.

Do Van Dai (2016), *Scientific commentary on new points of the 2015 Civil Code*, Hong Duc Publishing House - Vietnam Lawyers Association;

Tran Thi Ha (2022), "*Absolutely invalid contracts and relatively invalid contracts*", in Proceedings of the workshop on invalid contracts and legal consequences of invalid contracts, Hanoi Law University, November 1, 2022, pp. 47-59.

Nguyen Hong Hai (2018), Some issues on invalid contracts in current private law of Vietnam, https://fdvn.vn/mot-so-van-de-ve-hop-dong-vo-hieu-trong-phap-luat-tu-hien-hanh-cua-viet-nam/, accessed on July 30, 2024.

Vu Van Mau (1963), *Brief study of Vietnamese civil law - Volume II Obligations and contracts*, published by the Ministry of National Education;

Pham Van Tuyet, *"Overview of invalid contracts*", in Proceedings of the workshop on invalid contracts and legal consequences of invalid contracts, Hanoi Law University, November 1, 2022, p. 1-14.

GOETHALS INDIAN LIBRARY AND RESEARCH SOCIETY, KOLKATA: AN EXPLORATIVE STUDY

Arnab Mahajan
Kolkata Police Law Institute.

Assistant Professor Dr. Pubalika Bhattacharya Maitra
Dept. of Library & Information Science, University of Calcutta

Abstract:
Goethals Indian Library and Research Society (GILRS) is an athenaeum of mainly 18th and 19th century books and periodicals. It was started by Paul Goethals, Jesuit Archbishop of Calcutta (1886-1901) and it was later donated to St. Xavier's College in 1908. The library currently contains more than thirty thousand volumes of books on a wide range of topics, such as voyages and travels, history, biographies, folklore, astronomy, flora and fauna, geology, language and literature, archaeology, education, religion, philosophy, law, medicine, government and administration in India and other Asian countries. A special feature of the Goethals Library at St. Xavier's College is the rarity of the collection and the diversity of the languages found. The library has preserved rare documents and archived documents for the research need of scholars. This historical library is carrying the essence of the past to disseminate the knowledge to everyone interested.
This paper tried to explore the services, general collections, rare and valuable collections, functions of Goethals Indian Library and Research Society, Kolkata. The study also revealed that how far the library was acquainted with to deal the present day library scenario. It was found that the library had a rich collection with restricted access. Though the collection had been developed mainly with the donated books but those were historical assets and this why special preservation procedure was followed. Dedicated and special services had been provided by the staff members to the users, especially to research scholars.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

NUMERICAL INVESTIGATION OF COOLING TECHNIQUES IN ORTHOGONAL CUTTING OF A MAGNESIUM ALLOY

Assist. Prof. Dr. Özden İŞBİLİR
Karabuk University, Engineering Faculty, Mechanical Engineering Department
ORCID: 0000-0002-2526-602X

ABSTRACT
Turning is a major manufacturing process for magnesium alloys, and researchers have studied various aspects to understand their machining. Optimizing the turning operation of Mg alloys requires a comprehensive understanding of the material properties, cutting parameters, tool materials, tool geometries, surface integrity, and cooling considerations. Experimental investigations are undoubtedly valuable; however, they are expensive and time-consuming. Researchers in the field of machining have not fully understood the importance of computational tools to overcome the limitations and enhance the machinability of materials. The finite element method is an advanced computational technique used to investigate cutting processes. A 2D orthogonal cutting model based on the finite element method was developed by incorporating the material properties and constitutive model of a magnesium alloy AZ31B, geometric parameters of a cutting tool, machining parameters, and different cooling methods. The analyses were performed using a coupled thermal-mechanical dynamic finite element model with Lagrangian formulation and adaptive mesh technique for chip formation. The effect of different cooling techniques on the outputs such as cutting forces and temperatures was examined numerically during orthogonal cutting of AZ31B. The model demonstrates its potential to reduce the requirement of expensive and time-consuming experimental tests and to optimize machining processes through sustainable and environmental solutions.
Keywords: Finite Element Analysis, Orthogonal Cutting, Magnesium Alloy, Cooling, Cutting Temperatures, Cutting Forces

INTRODUCTION
Magnesium alloys are greatly appreciated by many industries due to their remarkable characteristics, including low density, high specific strength, and a large elastic modulus (Liu et al., 2021). They have shown their potential for substituting traditional engineering materials like cast iron, steel, and aluminum, which has driven the advancement of processing technologies to broaden their applications (Vyas and Sutaria, 2022).
Magnesium alloys, recognized for their low density, high strength-to-weight ratio, castability, damping capacity, and recyclability, have sparked considerable interest in sectors like aerospace, modern automobile manufacturing, civil engineering, and biomedical applications (Wang, 2015). Certain magnesium alloys also show biocompatibility, making them suitable for bone repair and tissue engineering scaffolds, although their rapid corrosion rates have limited clinical usage (Wang et al., 2013). Research has focused on developing magnesium alloys and their composites and refining grain structures to enhance their mechanical properties for lightweight structural applications. In the automotive industry, magnesium alloys have facilitated vehicle weight reduction, resulting in lower fuel consumption and improved efficiency (Dziubińska et al., 2016). Nevertheless, challenges with high-temperature strength, corrosion resistance, and creep properties remain, thus further improvements and required for the widespread adoption of magnesium alloys in automotive applications (Hussein and Northwood, 2014).

A particular magnesium alloy, AZ31B is recognized for its outstanding characteristics, for instance low density, high specific strength, casting capability, weldability, thermal conductivity, and dimensional stability (Gheytani et al., 2014). These properties make it popular in aerospace, electronics, and automotive industries due to its lightweight nature and distinctive characteristics (Shen et al., 2017). AZ31B generally exhibits good machinability, however, there is limited research on the optimal machining parameters. Some experimental studies have explored the best machining conditions to minimize specific cutting energy, power requirements, and cutting temperatures (Outeiro et al., 2013). Despite its favorable machinability, AZ31B can be flammable because of the high localized temperatures generated during machining. Moreover, high cutting temperatures can adversely affect tool life and the dimensional stability of workpieces. Therefore, the choice of cooling strategies and type of coolants have an important function in determining the efficiency, quality, and safety of the machining of AZ31B. The use of appropriate cooling methods with appropriate machining parameters is essential due to the unique properties of AZ31B, such as low thermal conductivity and the risk of fire and ignition associated with its machining (Song, 2005). Various cooling techniques have been explored to address these challenges, including minimum quantity lubrication (MQL), cryogenic cooling, and submerged convective cooling (Zakaria, 2023; Zakaria et al., 2022; Shen et al., 2017). All these techniques aim to control the temperature during cutting to prevent overheating and ensure the integrity of the workpiece and cutting tool during the machining process.

Although experimental machining research is vital to some extent, it is often costly and time-consuming. Consequently, researchers have increasingly gotten the benefit of computational tools for in-depth analysis. The finite element method (FEM) has emerged as a powerful tool in studying the machining processes. Research has been conducted to figure out the impact of many different components of the machining processes including tool geometries, machining parameters, cooling methods, and other factors on process outcomes such as cutting forces, temperatures, energy, stress, and thermal distributions, shear angle, chip formation, tool wear and surface quality (Liu et al., 2019; Parihar et al., 2017; Nasr & Outeiro, 2015). FEM allows researchers to simulate and visualize the complex thermal and mechanical interactions that occur during the machining process, providing valuable insights for optimizing the process and improving machining outcomes. Once these models are validated, numerical investigations can significantly reduce the need for experimental machining, thereby lowering costs, minimizing environmental impacts, and reducing carbon emissions.

In this present study, a numerical investigation of cooling techniques in the orthogonal cutting process of the magnesium alloy AZ31B was conducted. A finite element model was prepared by employing the tool geometry, including the rake angle, clearance angle, and edge radius; cutting parameters such as cutting speed, feed rate, depth of cut, heat generation due to contact and elastic-plastic deformation; and thermo-mechanical properties of the tool and workpiece materials with different cooling methods. The predicted cutting-induced temperatures and cutting forces were compared with published experimental data for validation purposes.

MATERIALS AND METHODS

Workpiece Material

In this study, the workpiece material utilized in the finite element models was the commercial magnesium alloy AZ31B. Tables 1 and 2 provide a summary of its typical chemical composition as well as its physical and mechanical properties.

Table 1: Chemical composition of magnesium alloy AZ31B (Hasenpouth, 2010)

Element	Al	Zn	Mn	Ca	Cu	Fe	Ni	Si	Mg
Weight %	2.5-3.5	0.6-1.4	0.2-1.0	<0.04	<0.05	<0.005	<0.005	<0.05	Balance

Table 2: Physical and mechanical properties of magnesium alloy AZ31B (Ijaz et. al., 2021)

Physical Properties				
Density (kg/m^3)	Melting Temp. (°C)	Specific Heat (J/Kg.°C)	Thermal Conductivity Coef. (W/m.°C)	Thermal Expansion Coef. (1/°C)
1780	630	0.666T+1181.82	0.096T+103.21	2.48×10^{-5}
Mechanical Properties				
Young Modulus (GPa)		Poisson Ratio		
45		0.35		

Appropriate constitutive material model and damage criterion are essential to accurately describe the mechanical behavior of the workpiece material and chip formation through the cutting process. The Johnson-Cook constitutive model is particularly appropriate for this purpose as it effectively represents the behaviour of the material under high strain rates and varying temperatures. Consequently, it is commonly employed in simulations of machining processes.

The yield stress, $\bar{\sigma}$, is expressed in terms of isotropic hardening, strain rate hardening, and thermal softening as shown in Eq. (1) (Johnson and Cook, 1983).

$$\bar{\sigma} = \left[A + B\left(\bar{\varepsilon}^{pl}\right)^{n}\right]\left[1 + C\ln\left(\frac{\dot{\bar{\varepsilon}}^{pl}}{\dot{\varepsilon}_0}\right)\right]\left[1 - \left(\frac{T - T_r}{T_m - T_r}\right)^{m}\right] \quad (1)$$

where $\bar{\varepsilon}^{pl}$ is the equivalent plastic strain, $\dot{\bar{\varepsilon}}^{pl}$ is the equivalent plastic strain rate, $\dot{\varepsilon}_0$ is the reference strain rate, A is the yield stress at or below room temperature, B is the strain hardening constant, C is the strain rate constant, n is the strain hardening power constant, and m is the thermal softening power constant, T_r is room temperature, T is the current temperature, and T_m is the melting temperature of the material. The damage criterion is used to predict the onset of damage. The model calculates the equivalent plastic strain at the onset of damage, $\bar{\varepsilon}_0^{pl}$, as a function of stress triaxiality, strain rate, and temperature as given in Eq. (2).

$$\bar{\varepsilon}_0^{pl} = \left[D_1 + D_2 \exp\left(D_3 \frac{p}{q}\right)\right]\left[1 + D_4\left(\frac{\dot{\bar{\varepsilon}}^{pl}}{\dot{\varepsilon}_0}\right)\right]\left[1 + D_5\left(\frac{T - T_r}{T_m - T_r}\right)\right] \quad (2)$$

The damage initiation parameter, w, is expressed in Eq. (3), and when it reaches 1 or larger, the damage is initiated in the material.

$$w = \frac{\sum \Delta\bar{\varepsilon}}{\bar{\varepsilon}_0^{pl}} \quad (3)$$

In an elastic-plastic material with isotropic hardening, the damage can happen by softening of the yield stress and degradation of the elasticity, as expressed by Eq. (4).

$$\sigma = (1-D)\bar{\sigma} \quad (4)$$

Property degradation for the damage can be made either suddenly or gradually. Sudden degradation is computationally less expensive but may cause significant errors due to energy loss during failure, particularly in ductile materials. In this study, a linear progressive damage evolution was assumed, as expressed by Eq. (5).

$$D = \sum \frac{\dot{\bar{\varepsilon}}^{pl}}{\bar{\varepsilon}_f^{pl}} \quad (5)$$

Based on continuum mechanics, the fracture energy required for an element in the chip formation region is defined by Eq. (6).

$$G_f = \int_{\bar{\varepsilon}_{pl,0}}^{\bar{\varepsilon}_f} L_c \bar{\sigma}_y d\bar{\varepsilon} = \int_0^{\bar{u}_f} \bar{\sigma}_y d\bar{u} \quad (6)$$

where L_c is the characteristic length of the element, $\bar{u}_f$ is the equivalent plastic displacement at failure. To model the fracture in the sacrificial layer, the damage evolution criterion is calculated using the fracture energy based on the fracture toughness in the appropriate mode, as expressed by Eq. (7). The fracture toughness in Mode I was taken as 28 MPa.m$^{1/2}$ (Outeiro et al., 2013).

$$G_f = \left(\frac{1-\nu^2}{E}\right) K_C^2 \quad (7)$$

In practical applications, Johnson-Cook parameters are determined from split Hopkinson pressure bar tests carried out at various strain rates and temperatures for tension, compression, and torsion modes. Table 3 displays the Johnson-Cook material and damage models' parameters for Mg alloy AZ31B.

Table 3. The material constitutive and damage model parameters for magnesium alloy AZ31B (Hasenpouth, 2010; Zakaria et. al. 2023)

Johnson-Cook Material Model							
A (MPa)	B (MPa)	C	n	m	T_r (°C)	T_m (°C)	$\dot{\varepsilon_0}$
141.6	271.7	0.013	0.2105	1.83	20	630	1
Johnson-Cook Damage Model							
D_1	D_2	D_3	D_4	D_5			
-0.35	0.6025	-0.4537	0.206	7.2			

Tool Material

The cutting tool material used in the finite element models is uncoated cemented carbide. The tool features a rake angle (γ) of −7°, a clearance angle (α) of 7°, and an edge radius (R) of 30 µm. It was modeled as rigid, so stress calculations for the tool were not performed. Table 4 provides the physical and mechanical properties of the cutting tool.

Table 4: Physical and mechanical properties of tool material (Ijaz et. al., 2021)

Physical Properties			
Density (kg/m^3)	Specific Heat (J/Kg.°C)	Thermal Conductivity Coef.(W/m.°C)	Thermal Expansion Coef. (1/°C)
12800	579	50	6.3 x 10^{-6}
Mechanical Properties			
Young Modulus (GPa)		Poisson Ratio	
600		0.23	

Finite Element Model

The process is modeled as orthogonal cutting by reducing the problem from three-dimensional (3D) to two-dimensional (2D) to enhance computational efficiency. Since machining involves thermo-mechanical subtractive deformation, a coupled thermal-mechanical dynamic analysis is applied in the model under dry conditions.

The orthogonal cutting process and chip formation are simulated using Lagrangian formulation and an adaptive mesh technique. Figure 1 illustrates the proposed 2D finite element model for orthogonal cutting.

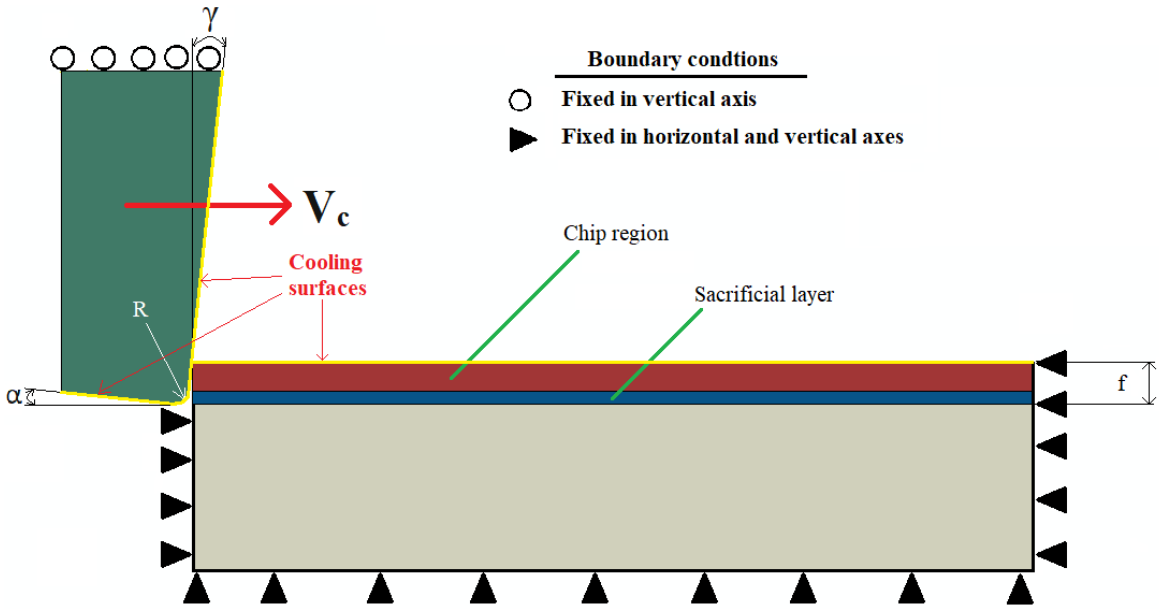


Figure 1. Finite element model of orthogonal cutting process

The workpiece geometry was divided into three regions: the substrate, the sacrificial layer, and the chip, to accurately model chip formation in the finite element analysis. The thickness of the sacrificial layer was chosen to match the tool's edge radius. Initially, the total uncut thickness of the sacrificial layer and chip equaled the feed rate. The workpiece was constrained from the bottom and sides, both horizontally and vertically, while the cutting tool moved solely in the horizontal direction at the designated cutting speed. The rake and and flank faces of the tool, and the top surface of the workpiece were defined for the cooling surfaces for the convection, as depicted in Fig. 1.

The cutting parameters used in the finite element models are a depth of cut of 3.22 mm, a feed rate of 0.1 mm/rev, and a cutting speed of 100 m/min. Since the feed rate is much lower than the depth of cut in all analyses, the plane strain assumption was applied. Both the cutting tool and workpiece were meshed with four-node rectangular plane strain elements with reduced integration for thermal and mechanical analysis. Element sizes were set to 5 μm in the cutting zone for both the tool and the workpiece, while the maximum element size at the bottom surface of the workpiece was 50 μm. The workpiece and tool have 19,260 and 7,701 elements, respectively. The cutting tool was modeled as rigid. The mesh configuration of the model is shown in Fig. 2.

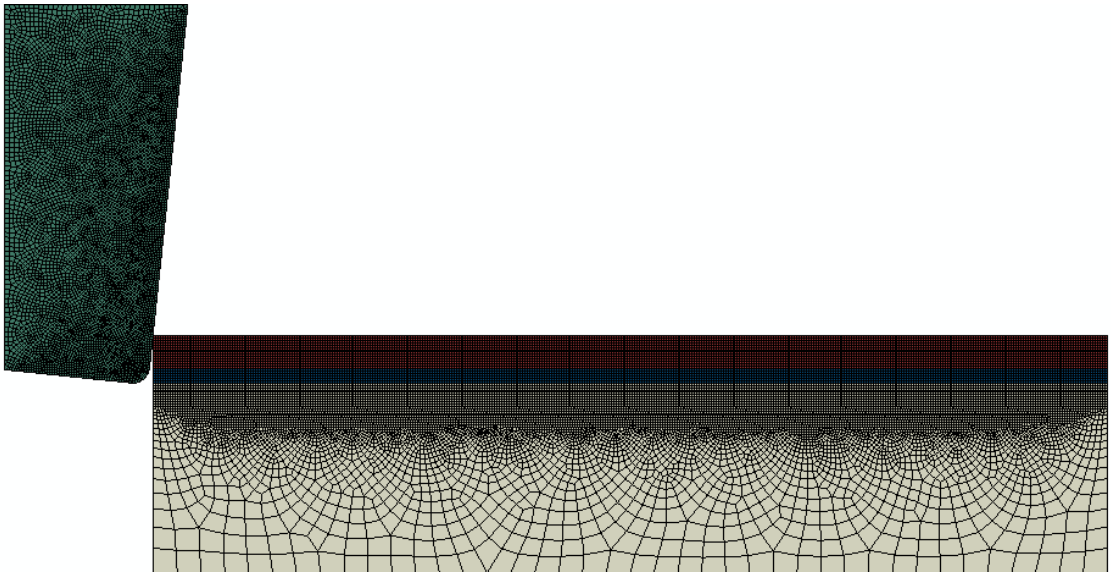


Figure 2. Mesh of the Orthogonal Cutting Process Model

A general contact algorithm was established between the cutting tool and the workpiece, so that as the tool moves, the interior surfaces of the workpiece in the cutting zone automatically become new exterior surfaces, and material failure in the workpiece is accounted for during the cutting process in the finite element analysis. A Coulomb friction model with limited shear stress was applied to all contacting surfaces with a friction coefficient of 0.5.

Thermal issues are vital during the cutting process, as they can significantly impact the material's behaviour. The model accounted for heat generation due to frictional work and elastic-plastic deformation. Frictional contact between the tool and workpiece surfaces produces heat from frictional slip, which transfers energy to the contacting bodies. It was assumed that all frictional work converts into heat and is evenly distributed between the workpiece and the cutting tool. Due to the significant inelastic strain caused by elastic-to-plastic deformation, the workpiece material can experience significant heating, which can affect temperature-dependent material properties and behavior. It was assumed that 90% of the inelastic strain work converts into heat.

The conductive heat transfer between the cutting tool and workpiece is defined by Eq. 8. In the equation, q is the heat flux per unit area passing the interface from a point on one surface to another point on the other. T_1 and T_2 are the temperatures of the points on the surfaces, and k is the conduction heat transfer coefficient. A thermally perfect contact was assumed between the tool and workpiece surfaces. A conduction heat transfer coefficient of 100000 $kW/m^2\ ^\circ C$ was assumed to reach a thermal steady state condition at the tool-workpiece interface in a short computational time (Arrazola et al., 2013; Imbrogno et al., 2017).

$$q = k(T_1\text{-}T_2) \quad (8)$$

The convective heat transfer between the surfaces of the cutting tool and workpiece, and environment is defined by Eq. 9. In the equation, q represents the heat flux per unit area crossing the surface of the cutting tool or workpiece, T is the temperature at a point on one of the solid surface, T_0 is the reference sink temperature, and h is the convection heat transfer coefficient (or film coefficient). Cutting simulations were performed with various cooling strategies. The types of cooling environments along with their corresponding sink temperatures and convection heat transfer coefficients, are listed in Table 5.

$$q = -h(T\text{-}T_0) \quad (9)$$

Table 5. Cooling parameters (Kesriklioglu and Pfefferkorn, 2018; Gupta et al., 2021)

Cooling Type	T_0 (°C)	h (kW/m² °C)
Dry (Air)	20	0.02
Flood Cooling	20	60.465
LN_2	-196,5	165
CO_2	-78,5	309

RESULTS and DISCUSSION

Due to the limited time, all the simulations carried out 1.7 mm of cutting length on the workpiece. Figure 3 illustrates the predicted cutting and thrust forces during the orthogonal cutting of the magnesium alloy AZ31B at a 0.1 mm/rev feed rate and 100 m/min in dry condition. The average forces were calculated in the steady zone when the cutting tool was in full contact with the workpiece surface in all simulations.

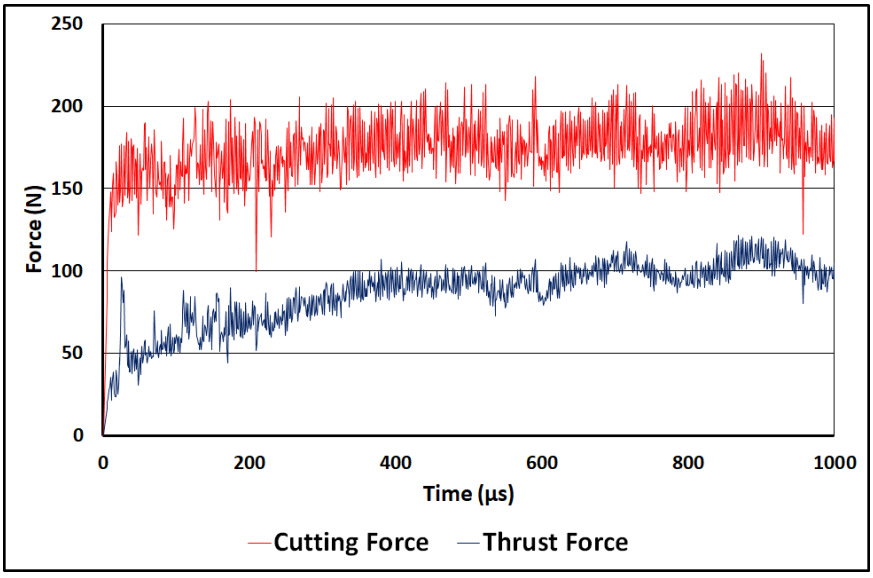


Figure 3. Cutting and Thrust Forces in Orthogonal Cutting with Air (Dry Condition) at f=0.1 mm/rev, V=100 m/min

Figure 4 displays cutting-induced stress distribution with chip formation. It can be noticed that the predicted maximum stresses in the workpieces were found in the shear zone in each of the simulations. This is the region where there is elastic-plastic deformation in the material cut. Shear bands can also be observed easily on the chip. Cooling has a significant influence on chip formation. A continuous chip was predicted during the cutting with dry and flood cooling, whereas a discontinuous type of chip was simulated with CO2 and LN2 cooling methods.

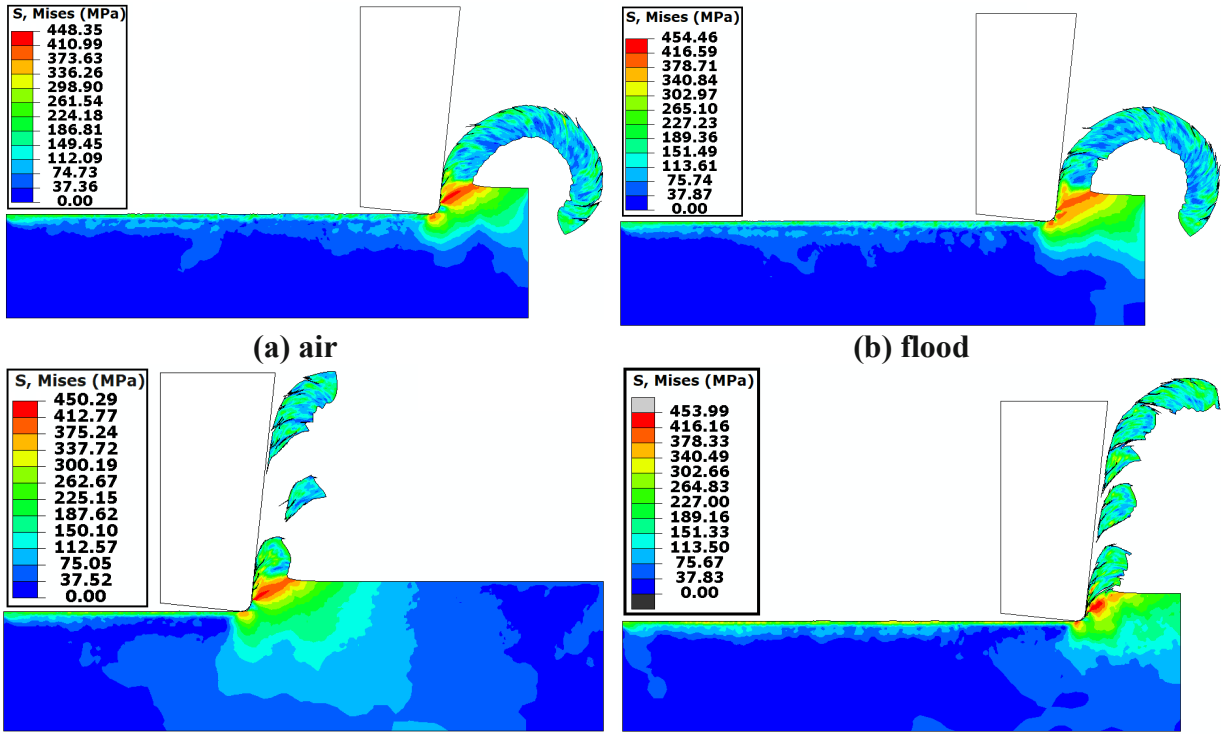


Figure 4. Comparison of the Stress Distribution and Chip Formation in Orthogonal Cutting with Different Cooling Methods at f=0.1 mm/rev, V=100 m/min

Figure 5 represents distribution of the temperature of the machined surface of the workpiece with different cooling methods during orthogonal cutting at a 0.1 mm/rev feed rate and 100 m/min cutting speed. Cooling has a serious effect on the predicted temperature during cutting. On average, CO_2 and LN_2 cooling methods predicted lower cutting-induced temperatures on the workpiece compared to dry and flood cooling.

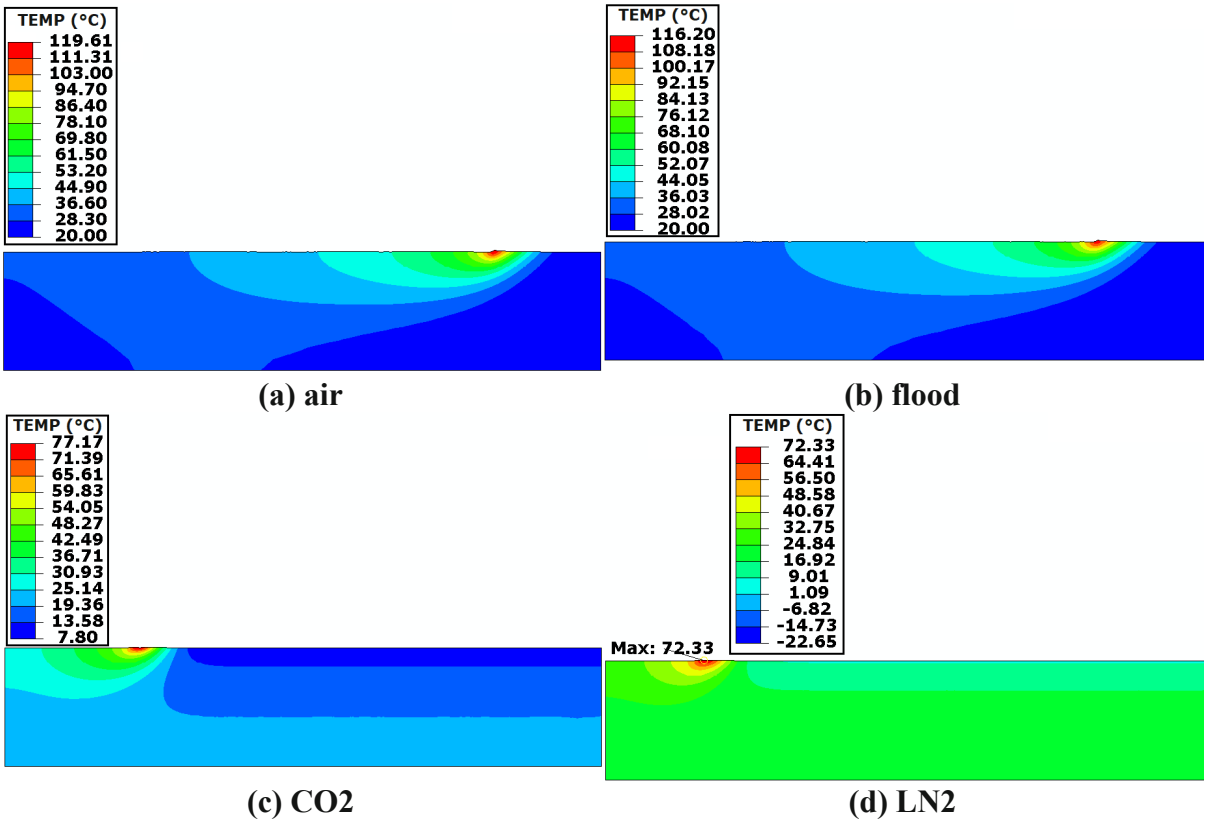


Figure 5. Comparison of the Temperature Distribution of the Machined Surface of Workpiece in Orthogonal Cutting with Different Cooling Methods at f=0.1 mm/rev, V=100 m/min

The average simulated cutting and thrust forces in orthogonal cutting at a 0.1 mm/rev feed rate and 100 m/min cutting speed were calculated for each simulation and shown in Figure 6. The estimated thrust and cutting forces in dry cutting were in good agreement with the published experimental literature (Pu et al., 2012) at the same cutting conditions. The proposed model overestimates the experimental results in dry cutting by approximately 3 %. However, the success of the model for LN2 cooling was different. The model underestimated the cutting and thrust forces by 7.5% and 41 %, respectively. The difference could be from the inaccurate convection coefficient, friction coefficient, and friction model in that environment, and not surprisingly due to the nature of the discontinuous chip formation. Simulations clearly show the efficiency of the cooling methods on thrust and cutting forces.

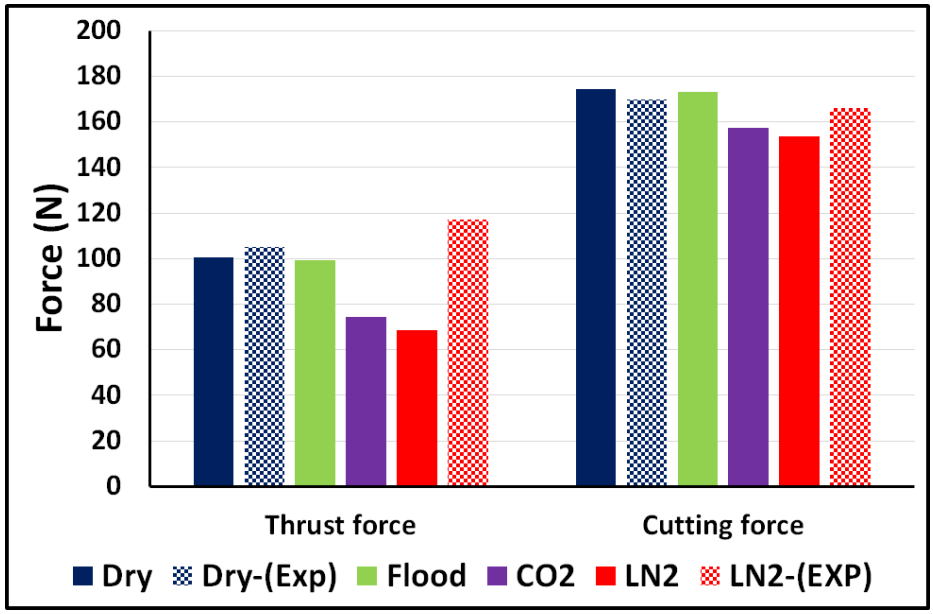


Figure 6. Comparison of the Average Forces in Orthogonal Cutting with Different Cooling Methods
at f=0.1 mm/rev, V=100 m/min

The maximum temperature on the machined surface of the workpiece in orthogonal cutting at a 0.1 mm/rev feed rate and 100 m/min cutting speed were obtained from each simulation and shown in Figure 7. The predicted temperature with dry cutting was in good agreement with the published experimental literature (Pu et al., 2012) at the same cutting conditions. The proposed model underestimates the experimental results in dry cutting by only 4 %. Nevertheless, the model overestimated the temperature for LN2 cooling with a 39% difference. In general, simulations clearly show the efficiency of the cooling methods on predicted temperatures.

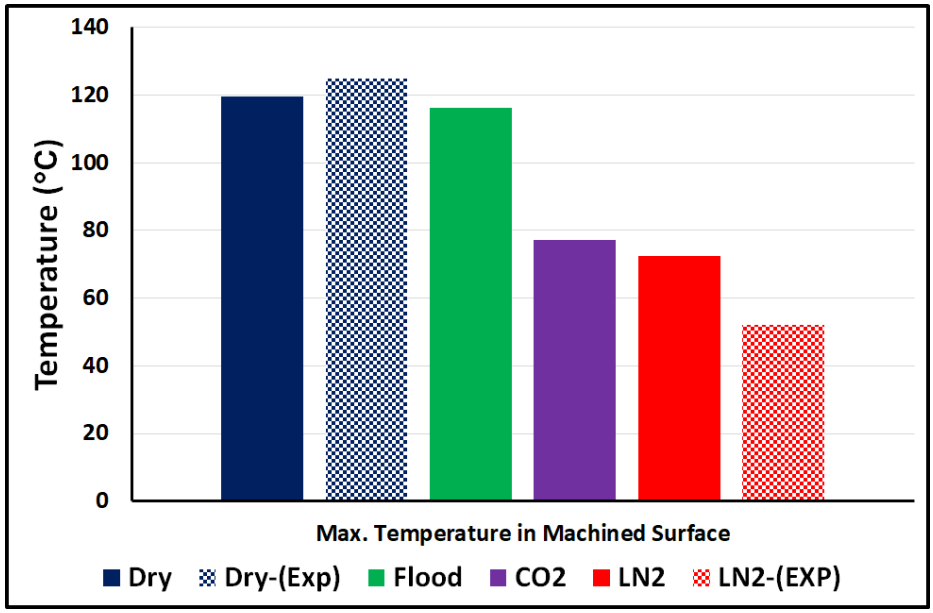


Figure 7. Comparison of the Maximum Temperature on the Machined Surface of Workpiece in Orthogonal Cutting with Different Cooling Methods at f=0.1 mm/rev, V=100 m/min

CONCLUSION

This study investigated cooling techniques in orthogonal cutting of magnesium alloy AZ31B. The major aim of this research was to assess the effect of cooling methods on cutting forces and temperatures during the machining of AZ31B. A two-dimensional thermal-mechanical coupled dynamic finite element model with Lagrangian formulation and adaptive mesh technique for chip formation was developed. The research can be concluded with the following outcomes:

- The cooling method has a substantial influence on the predicted temperature, chip formation, and forces.
- The developed model predict the outputs accurately in dry cutting, the difference with the experimental results varies between 3 and 4 %.
- The developed model shows a notable difference with the experimental results in cutting with LN2 cooling; between 7.5 and 41 % variations were found in the simulation outputs.
- The proposed model can be further developed for research and development activities in the manufacturing industry. It shows its potential to reduce the requirement of expensive and time-consuming experimental tests and optimize machining processes.

REFERENCES

Arrazola, P.J., Özel, T., Umbrello, D., Davies, M., & Jawahir, I.S. (2013). Recent advances in modelling of metal machining processes. CIRP Annals-Manufacturing Technology 62:695–718.

Dziubińska, A., Gontarz, A., Dziubiński, M. & Barszcz, M. (2016). The forming of magnesium alloy forgings for aircraft and automotive applications. Advances in Science and Technology Research Journal, 10(31), 158-168.

Gheytani, M., Bagheri, H., Masiha, H., Aliofkhazraei, M., Rouhaghdam, A. & Shahrabi, T. (2014). Effect of SMAT preprocessing on MAO fabricated nanocomposite coating. Surface Engineering, 30(4), 244-255.

Gupta, M.K., Song, Q., Liu, Z., Sarikaya, M., Mia, M., Jamil, M., Singla, A.K., Bansal, A., Pimenov, D.Y., & Kuntoglu, M. (2021). Tribological performance based machinability investigations in cryogenic cooling assisted turning of α-β titanium Alloy. Tribology International (160) 107032

Hasenpouth, D. (2010). Tensile High Strain Rate Behavior of AZ31B Magnesium Alloy Sheet. UWSpace. http://hdl.handle.net/10012/5449

Hussein, R. & Northwood, D. (2014). Improving the performance of magnesium alloys for automotive applications. WIT Transactions on the Built Environment, 137, 531-544.

Ijaz, H., Asad, M., Danish, M., Gupta, M.K., Siddiqui, M.E. & Al-Zahrani, A. (2021). Numerical investigations of cutting temperature and cutting forces in cryogenic assisted turning of magnesium alloy. The International Journal of Advanced Manufacturing Technology, 114, 1991–2001.

Imbrogno, S., Sartori, S., Bordin, A., Bruschi, S., & Umbrello, D. (2017). Machining Simulation of Ti6Al4V under Dry and Cryogenic Conditions. Procedia CIRP, Volume 58, Pages 475-480.

Johnson, G.R. & Cook, W.H. (1983). A constitutive model and data for metals subjected to large strains, high strain rates and high temperatures. Proceedings of the Seventh International Symposium on Ballistics, 541–547.

Kesriklioglu, S., and Pfefferkorn, F. E. (2019). Prediction of Tool-Chip Interface Temperature in Cryogenic Machining of Ti–6Al–4V: Analytical Modeling and Sensitivity Analysis. ASME Journal of Thermal Science and Engineering Applications; 11(1): 011003.

Liu, G., Huang, C., Su, R., Özel, T., Liu, Y. & Xu, L. (2019). 3D FEM simulation of the turning process of stainless steel 17-4PH with differently texturized cutting tools. International Journal of Mechanical Sciences, (155), 417–429.

Liu, J.G., Dong, B.K., Fang, X.G., Li, B., Yang, Y.W., Wu, T.Y., Ren, R.D. & Wu S.S. (2021). Microstructure evolution and mechanical properties of Mg-12Zn-2Y alloy containing quasicrystal phase fabricated by different casting processes. China Foundry 18, 147–154.

Nasr, M. and Outeiro, J. (2015). Sensitivity analysis of cryogenic cooling on machining of magnesium alloy AZ31B-O. Procedia Cirp, 31, 264-269.

Outeiro, J.C., Rossi, F., Fromentin, G., Poulachon, G., Germain, G. & Batista, A.C. (2013). Process Mechanics and Surface Integrity Induced by Dry and Cryogenic Machining of AZ31B-O Magnesium Alloy. Procedia CIRP, 8, 487-492.

Parihar, R.S., Sahu, R.K. & Srinivasu, G. (2017). Finite element analysis of cutting forces generated in turning process using deform 3D software. Materials Today Proceedings, 4(8), 8432–8438.

Pu, Z., Outeiro, J.C., Batista, A.C., Dillon, O.W., Puleo, D.A. & Jawahir, I.S. (2012). Enhanced surface integrity of AZ31B Mg alloy by cryogenic machining towards improved functional performance of machined components. International Journal of Machine Tools and Manufacture, 56, 17-27.

Shen, N., Ding, H., Pu, Z., Jawahir, I. & Jia, T. (2017). Enhanced surface integrity from cryogenic machining of AZ31B Mg alloy: a physics-based analysis with microstructure prediction. Journal of Manufacturing Science and Engineering, 139(6), 061012.

Song, G. (2005). Recent progress in corrosion and protection of magnesium alloys. Advanced Engineering Materials, 7(7), 563-586.

Vyas, A.V. & Sutaria, M.P. (2022). Investment Castings of Magnesium Alloys: A Road Map and Challenges. Archives of foundry engineering. 22(4), 19-23.

Wang, R. (2015). Process parameter research on AZ31 magnesium alloy profile expanding extrusion process. Proceedings of the 5th International Conference on Civil Engineering and Transportation

Wang, Y.P., Ouyang, Y.M., He, Y.H., Chen, D.Y. Jiang, Y., Mao, L., Niu, J.L. Zhang, J. & Yuan, G.Y. (2013). Biocompatibility of Mg-Nd-Zn-Zr alloy with rabbit blood. Chinese Science Bulletin, 58, 2903–2908.

Zakaria, M., Mustapha, M., Azmi, A., Ahmad, A., Ismail, S., & Shuaib, N. (2022). Effects of submerged convective cooling in the turning of AZ31 magnesium alloy for tool temperature and wear improvement. The International Journal of Advanced Manufacturing Technology, 120(5-6), 3181-3200.

Zakaria, M. (2023). Finite element modelling of serrated chip formation during turning AZ31 magnesium alloy. Journal of Physics Conference Series, 2643(1), 012004.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

NUMERICAL INVESTIGATION OF BALLISTIC PERFORATION OF AN ALUMINUM ALLOY

Assist. Prof. Dr. Özden İŞBİLİR
Karabuk University, Engineering Faculty, Mechanical Engineering Department
ORCID: 0000-0002-2526-602X

ABSTRACT
There is an increasing demand for lightweight materials in protective structures. Researchers have performed a vast number of experimental studies to understand the ballistic perforation of these materials. These investigations are extremely valuable; however, they require high costs. On the other hand, the number of computational investigations on such problems is still limited. The numerical investigation of ballistic perforation of a material helps in understanding the material behavior, improving design, and enhancing protective capabilities. Precise numerical simulations of ballistic impacts can reveal more valuable details that are often beyond the limits of experimental methods. The high-velocity perforation process is highly complex and demands the use of advanced constitutive models, which can accurately simulate material behavior under conditions of high strain rates, extreme pressures, and progressive damage. A three-dimensional finite element model was prepared by incorporating the material properties and constitutive model of the target material AA2024-T351, geometric parameters of the projectile, initial impact velocity, and impact angle. The analyses were performed using a coupled thermal-mechanical dynamic finite element model with Lagrangian formulation. Failure of the target material, residual velocities were obtained for different impact angles.
Keywords: Perforation; Ballistic impact; Projectiles; Lightweight protection; Residual velocity

INTRODUCTION
There is a growing interest in utilizing lightweight materials in protective structures due to the need to improve mobility, fuel efficiency, and overall performance while still ensuring strong protection. Aluminum alloys have become a popular material choice among design engineers because of their beneficial properties, such as a high strength-to-weight ratio, excellent ballistic resistance, and durability against corrosion. These properties make aluminum alloys ideal in applications where weight reduction is essential without sacrificing structural strength and protective effectiveness.
Ballistic armor is an important example of aluminum alloys in protective structures. Studies have demonstrated that aluminum alloys, like 2024, possess better mechanical strength and ballistic characteristics than many other materials, making them very suitable for ballistic protection (Hua et al., 2023). Their remarkable energy absorption, high toughness, and structural integrity enable aluminum alloys to effectively resist high-velocity impacts, ensuring the safety and security of personnel and equipment across various industries, such as aerospace, defense, and automotive (ibid).
Additionally, the use of aluminum alloys in protective structures provides benefits like increased rigidity, lighter weight, and good mechanical performance at moderate temperatures (Stojanović et al., 2018). These advantages are especially important in scenarios where lightweight materials are critical for optimal performance, such as in the aerospace industry.

The high strength-to-weight ratio in aluminum alloys makes them an ideal choice for components where reducing weight is a priority, without sacrificing durability or protective effectiveness (ibid).

Experimental studies are essential for understanding the ballistic perforation behavior of materials under high-velocity impact conditions. These studies offer valuable insights into material response, deformation mechanisms, failure modes, and energy absorption characteristics, which are crucial for developing effective protective structures. Various aluminum alloys have been researched experimentally for their behavior under impact and perforation processes, demonstrating their potential for use in protective structures. Studies have focused on determining the ballistic limit velocities and perforation performances of various aluminum alloy armor plates, assessing their ability to withstand high-velocity projectiles and providing valuable insights into their protective performance (Forrestal et al., 2021; Forrestal et al., 2014, Borvik et al., 2009; Holmen et al., 2013). The ballistic endurance of an aluminum alloy AA1050, has been assessed through experimental and numerical approaches, emphasizing its effectiveness in protecting against various threats (Bendarma et al., 2021). It is also worth noting that experimental studies are often costly and time-consuming.

Numerical models play an important role in studying the ballistic perforation of materials, offering a cost-effective and efficient means to analyze complex phenomena associated with high-velocity impacts. These models enable researchers to simulate and predict material behavior under extreme loading conditions, offering insights into deformation, failure mechanisms, and energy absorption during ballistic events. Gupta et al. (2007) and Iqbal et al. (2010) investigated the deformation behavior of thin aluminum plates under different projectile nose shapes and impact angles, offering insights into the forces generated during penetration and perforation. Iqbal et al. (2015) explored the ballistic performance and energy absorption features of thin aluminum plates, focusing on the effect of target-to-projectile diameter ratio. Forrestal & Warren (2010) highlighted the significance of the thickness of the target plate and strength of the material in determining the perforation resistance of aluminum armor plates. These numerical approaches demonstrate that researchers can explore various scenarios, optimize designs, and assess material performance without extensive physical testing, thereby accelerating development processes and reducing costs.

In this present research, a numerical investigation of the ballistic perforation of the aluminum alloy AA2024-T351 was conducted. A finite element model was prepared using three-dimensional projectile and target geometries; initial impact speed and angle; thermo-mechanical properties of the target and projectile materials; and a constitutive model of the target material for high impact speeds. The failure of the aluminum plate and the residual velocities of the projectile were analyzed under different conditions.

MATERIALS AND METHODS

Target Material

A commercial aluminum alloy AA2024-T351 was used as the target material in this study. The typical physical and mechanical properties of the target material are displayed in Table 1.

Table 1: Physical and mechanical properties of aluminum alloy AA2024-T351 (Buyuk et al. 2009)

Physical Properties			
Density (kg/m^3)	Melting Temp. (°C)	Specific Heat (J/Kg.°C)	Thermal Conductivity Coef. (W/m.°C)
2770	502	875	121
Mechanical Properties			
Young Modulus (GPa)	Yield Strength (MPa)	Poisson Ratio	
73	369	0.33	

A proper constitutive material model and damage criterion are needed to provide the mechanical response of the target material during the ballistic perforation process. In high-velocity impact events, shock wave propagation becomes very important, because the pressure generated by shock wave propagation exceeds the strength of the material by several orders of magnitude. Thus, the material behaviour can be observed as hydrodynamic at the initial period of the process, whereas the strength effects can appear in later stages (Zukas, 2008). Therefore, the volumetric behaviour is described by the Mie-Grüneisen equation of state (EOS) model, and the deviatoric behaviour is described by the combination of the linear elasticity and the Johnson-Cook plasticity models. It must be noted that this form of EOS model is suitable only for solids with impact velocities less than 2 km/s since solid-liquid-gas transitions occur in the material beyond this limit. The Mie-Grüneisen equation of state is linear in energy and the most common form is expressed by Eq. (1).

$$p\text{-}p_H = \Gamma\rho(E_m\text{-}E_H) \quad (1)$$

where, p, p_H, ρ, E_m, and E_H are the pressure, the Hugoniot pressure, density, the internal energy per unit mass, and the specific energy per unit mass, respectively. It must be noted that the pressure is accounted as positive in compression. Both the Hugoniot pressure and the specific energy per unit mass are functions of density and the Grüneisen ratio, Γ, is expressed by Eq. (2).

$$\Gamma = \Gamma_0 \frac{\rho_0}{\rho} \quad (2)$$

Where Γ_0 and ρ_0 are the material's Grüneisen coefficient and the reference density, respectively. The Hugoniot energy, E_H, is expressed by Eq. (3).

$$E_H = \frac{p_H \eta}{2\rho_0} \quad (3)$$

where p_H and η are the Hugoniot pressure and the nominal volumetric compressive strain, respectively.

$$\eta = 1\text{-}\frac{\rho_0}{\rho} \quad (4)$$

Eq. (1) can be rewritten by elimination of Γ and E_H as shown in Eq. (5).

$$p = p_H\left(1\text{-}\frac{\Gamma_0\eta}{2}\right) + \Gamma_0\rho_0 E_m \quad (5)$$

The equation of state and the energy equation present coupled equations for pressure and internal energy and they are solved simultaneously during the simulations. Linear equation of state can be expressed by Eq. (6).

$$p = f + gE_m \quad (6)$$

Since f and g are functions of density only and depend on the particular equation of state model.

A common linear fit to the Hugoniot data can be expressed by Eq. (7)

$$p_H = \frac{\rho_0 c_0^2 \eta}{(1-s\eta)^2} \quad (7)$$

Where c_0 and s are material constants and define the relation between the particle velocity (U_p) and the linear shock velocity (U_s) as expressed by Eq. (8).

$$U_s = c_0 + sU_p \quad (8)$$

After all these assumptions, the linear Hugoniot form is described by Eq. (9).

$$p = \frac{\rho_0 c_0^2 \eta}{(1-s\eta)^2}\left(1-\frac{\Gamma_0 \eta}{2}\right) + \Gamma_0 \rho_0 E_m \quad (9)$$

The Johnson-Cook is a well-suited constitutive model because it can represent the response of a material under high strain rates and different temperatures. Therefore, it is widely used in high-velocity impact simulations. The yield stress, $\bar{\sigma}$, is expressed in terms of isotropic hardening, strain rate hardening, and thermal softening as shown by Eq. (10) (Johnson and Cook, 1983).

$$\bar{\sigma} = \left[A + B\left(\bar{\varepsilon}^{pl}\right)^n\right]\left[1 + C\ln\left(\frac{\dot{\bar{\varepsilon}}^{pl}}{\dot{\varepsilon}_0}\right)\right]\left[1-\left(\frac{T-T_r}{T_m-T_r}\right)^m\right] \quad (10)$$

The damage criterion is used to predict the onset of damage. The model assumes that the equivalent plastic strain at the onset of damage, $\bar{\varepsilon}_0^{pl}$, as a function of stress triaxiality, strain rate, and temperature as given in Eq. (11).

$$\bar{\varepsilon}_0^{pl} = \left[D_1 + D_2 \exp\left(D_3 \frac{p}{q}\right)\right]\left[1 + D_4\left(\frac{\dot{\bar{\varepsilon}}^{pl}}{\dot{\varepsilon}_0}\right)\right]\left[1 + D_5\left(\frac{T-T_r}{T_m-T_r}\right)\right] \quad (11)$$

The damage initiation parameter, w, is expressed in Eq. (12), and when it reaches 1 or larger, the damage is initiated in the material.

$$w = \frac{\sum \Delta\bar{\varepsilon}}{\bar{\varepsilon}_0^{pl}} \quad (12)$$

In an elastoplastic material with isotropic hardening, the damage can appear by degradation of the yield stress and the elasticity, as expressed by Eq. (13).

$$\sigma = (1-D)\bar{\sigma} \quad (13)$$

Property degradation for the damage can be made either suddenly or gradually. Sudden degradation is computationally less expensive but may cause significant errors due to energy loss during failure, particularly in ductile materials. In this study, a linear progressive damage evolution was assumed, as expressed by Eq. (14).

$$D = \sum \frac{\dot{\bar{\varepsilon}}^{pl}}{\bar{\varepsilon}_f^{pl}} \quad (14)$$

Based on continuum mechanics, the fracture energy required for an element in the damage zone is defined by Eq. (15).

$$G_f = \int_{\bar{\varepsilon}_{pl,0}}^{\bar{\varepsilon}_f} L_c \bar{\sigma}_y d\bar{\varepsilon} = \int_0^{\bar{u}_f} \bar{\sigma}_y d\bar{u} \quad (15)$$

where L_c is the element's characteristic length, $\bar{u}_f$ is the equivalent plastic displacement at failure. The Johnson-Cook constitutive material, damage, and EOS model parameters for aluminum alloy AA2024-T351 are presented in Table 2.

Table 2. The material constitutive and damage model parameters for aluminum alloy AA2024-T351 (Buyuk et al. 2009, Lesuer, 2000)

Johnson-Cook Material Model							
A (MPa)	B (MPa)	C	n	m	T_r (°C)	T_m (°C)	$\dot{\varepsilon}_0$
369	684	0.0083	0.73	1.7	20	502	1
Johnson-Cook Damage Model							
D_1	D_2	D_3	D_4	D_5			
0.13	0.13	-1.5	0.011	0			
EOS Model							
Γ_0	c_0 (mm/s)	s					
1.338	5328000	2					

Projectile

An ogive nose with a 3.0 caliber-radius-head projectile made of 4340 steel was used in the ballistic perforation simulation of AA2024-T351. The typical physical and mechanical properties of 4340 steel are summarized in Table 3. The mass of the projectile is 77.36 grams. It was assumed as a rigid body for computational efficiency, hence there was no stress calculation for the projectile. The geometry of the projectile is presented in Fig. 1.

Table 3: Physical and mechanical properties of 4340 Steel Projectile (Simulia, 2012)

Physical Properties			
Density (kg/m^3)	Melting Temp. (°C)	Specific Heat (J/Kg.°C)	Thermal Conductivity Coef. (W/m.°C)
7830	1520	477	44.5
Mechanical Properties			
Young Modulus (GPa)	Yield Strength (MPa)	Poisson Ratio	
202	1430	0.3	

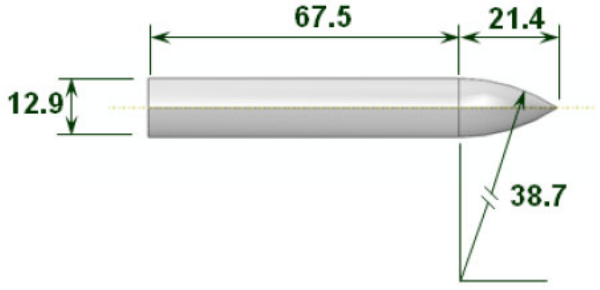


Figure 1. Projectile Geometry

Finite Element Model

A three-dimensional FE model was developed by incorporating the geometries of the projectile and target plate, impact velocity, and impact angle. A coupled thermal-mechanical dynamic analysis with lagrangian formulation was used to simulate the ballistic perforation process. The AA2024-T351 target plate is 300 mm square with a thickness of 26.3 mm. The plate was meshed with eight-node reduced integration elements.

The element sizes were set to 1 mm in the center and the thickness direction whereas the maximum element sizes were set to 10 mm in the outside of the plate, which makes a total 241800 of elements in the target plate. The plate was fixed in all directions from the outer side surfaces. The proposed finite element model of the process is illustrated in Fig. 2.

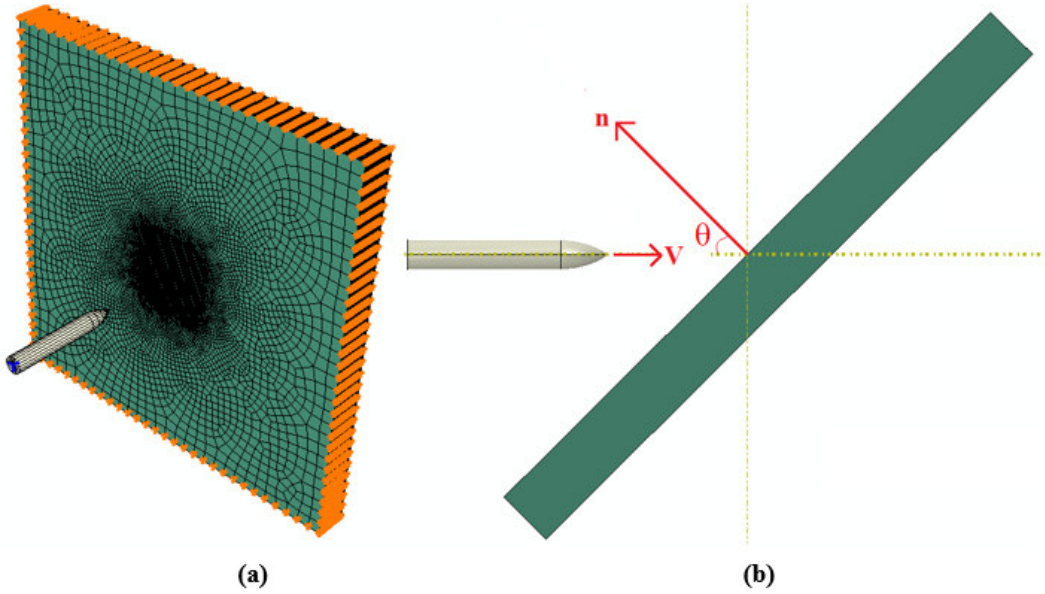


Figure 2. Finite element model of perforation process (a) normal impact (b) oblique impact

A surface-based contact algorithm was defined between the projectile and the target. The friction coefficient was assumed zero as the contact time is very limited. Thermal issues may affect the mechanical response of the material. Heat generation due to elastic-plastic deformation was employed in the model. Owing to the large amount of inelastic strain induced from elastic to plastic deformation, the target material can be heated and local stresses can be affected. 90 % of the inelastic strain work was assumed to transform into heat. The effect of impact velocity and the angle (θ) between the projectile velocity vector and the plate normal vector were investigated in the perforation simulations and these parameters are summarised in Table [4]. When θ is 0° it represents the normal impact, the other angles represent the oblique impact of the projectile.

Table 4. Ballistic impact parameters

Impact velocity (m/s)	300	400	500	600	700	800
Angle, θ (°)	0	15	30	45	60	

RESULTS and DISCUSSION

Figures 3 and 4 illustrate the ballistic perforation process of 26.3 mm thick Al2024 by the impact of 12.9 diameter 3 caliber ogive nose steel projectile with initial velocities of 300, 400, 500, 600, 700, and 800 m/s at normal and oblique impact angles, respectively. The finite element results showed that the main failure mechanism is a ductile failure.

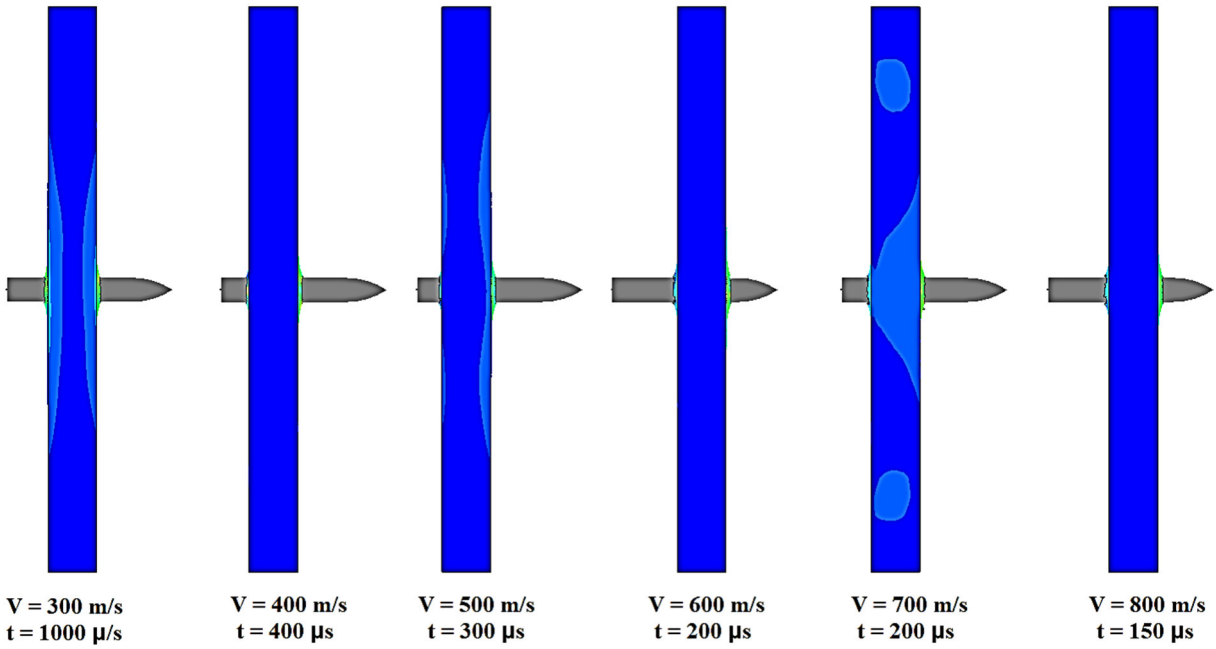


Figure 3. Ballistic perforation process at various velocities and process times in normal impact - side view

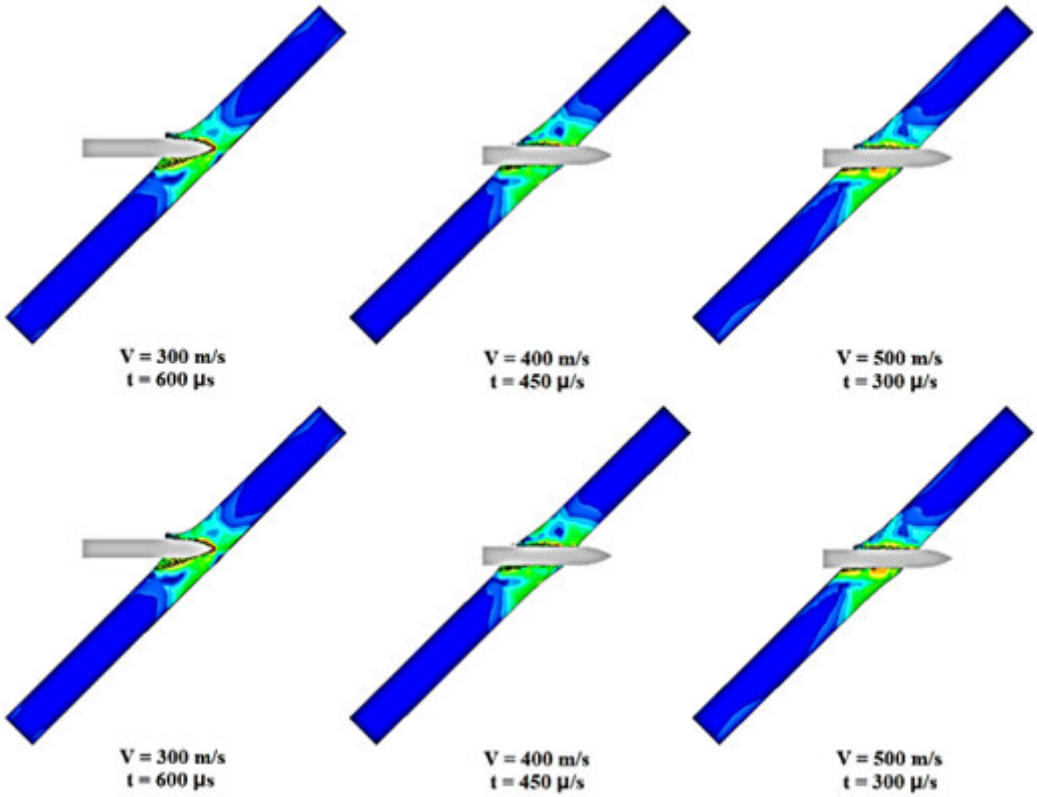


Figure 4. Ballistic perforation process at various velocities and process times in 45° oblique impact-cut side view

Figure 5 displays the predicted residual projectile velocities versus initial impact velocities at different angles. When the angle (θ) between the projectile velocity vector and the plate normal vector increased, the residual velocities decreased significantly since the projectile had to travel longer distances in the target material. This means, the more oblique plate, the more energy was absorbed. However, this effect was less dominant when the impact velocity was higher. The predicted results were compared with published literature with similar material (AA6061) (Piekutowski et al., 1996). In general, there was a good agreement between the experimental literature and finite element results. However, experimental results with the same material are required for proper validation.

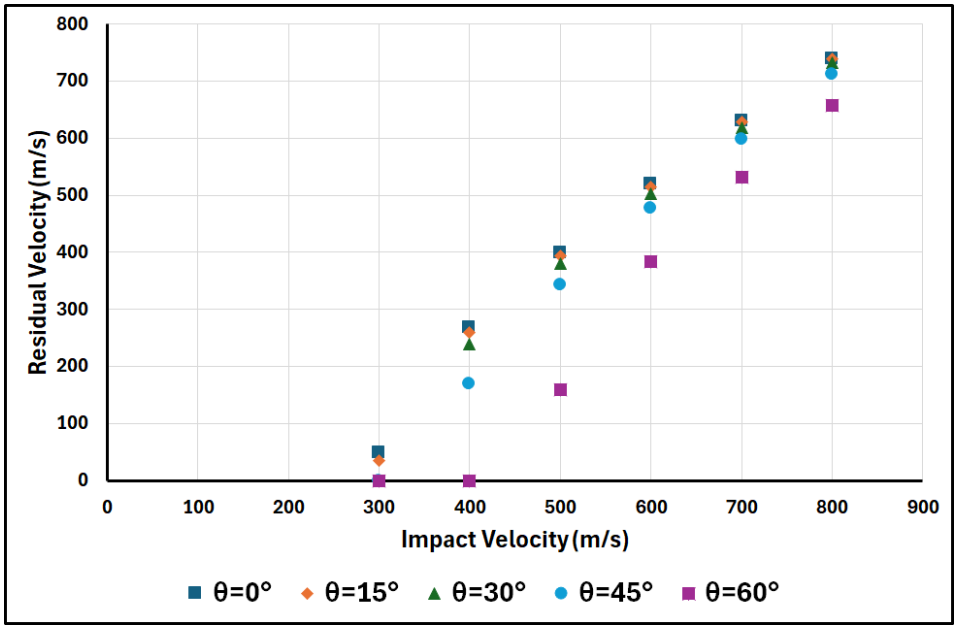


Figure 5. Predicted Residual vs Impact Velocities at Different Impact Angles

Figure 6 illustrates petal formation during the ballistic impact of the projectile by 800 m/s with normal impact. The maximum height of the petals is 2.91 mm and 2.29 mm at the entrance and exit sides of the target plates, respectively. This was an expected result since the material was ductile.

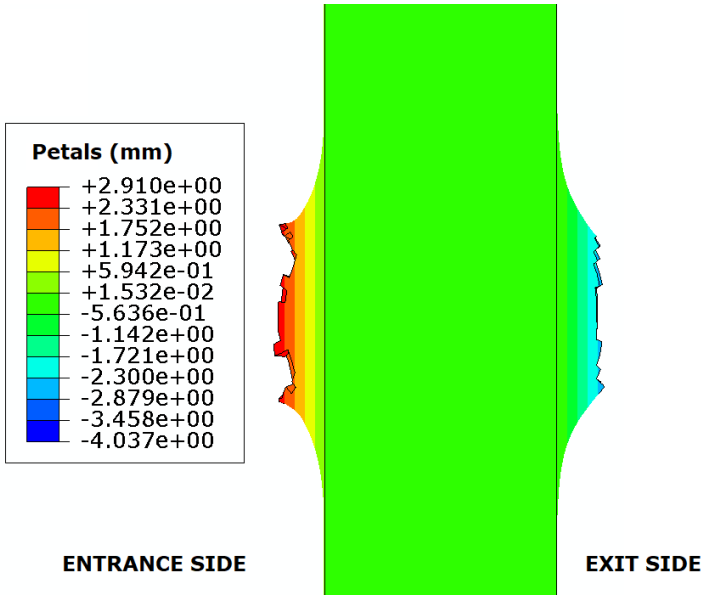


Figure 6. Petals at Perforation with 800 m/s Initial Speed with Normal Impact

Figure 7 shows the predicted maximum height of the petals at both sides of the target by the impact velocities of 300, 400, 500, 600, 700, and 800 m/s with normal impact. The maximum height of the petals at the entrance side was larger with the increase in impact velocity between 300 and 600 m/s, then there was not a clear trend. There was no tendency for the maximum height of petals at the exit side. It should be noted that experimental results are required for proper validation.

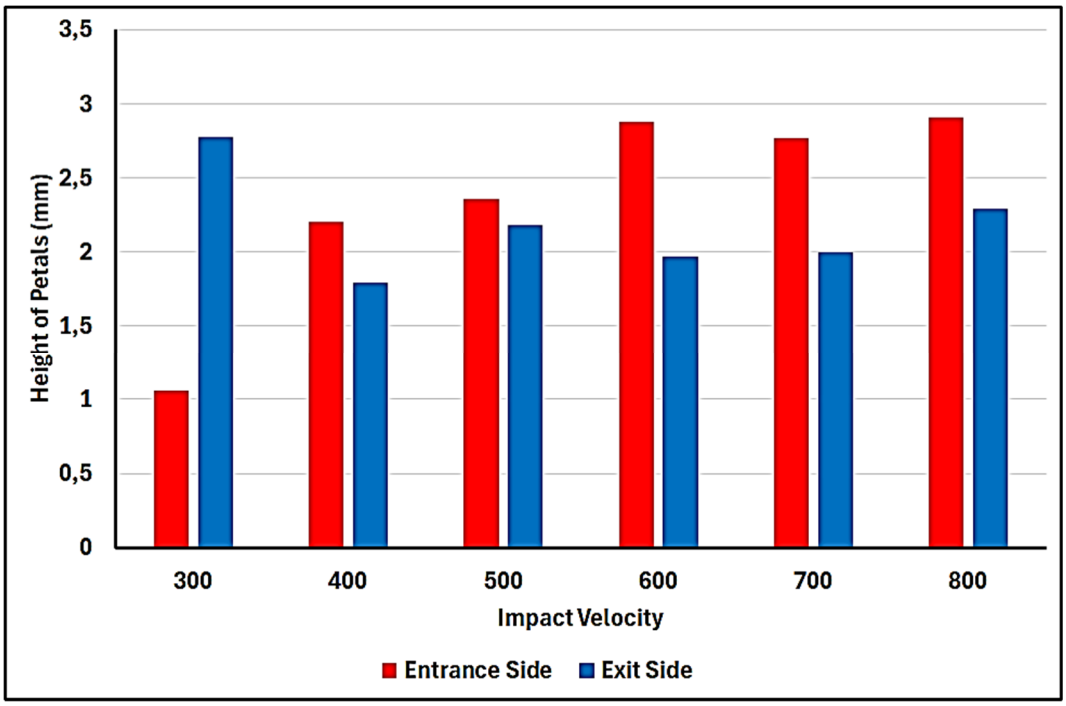


Figure 7. Predicted Height of Petals at Different Impact Velocities with Normal Impact

CONCLUSION

This research investigated the ballistic perforation of aluminum alloy 2024-T351 with the impact of a steel projectile. The primary aim of this study was to assess the behaviour of the aluminum target with the ballistic impact of a steel projectile with several impact speeds and impact angles. A three-dimensional thermal-mechanical coupled dynamic finite element model with Lagrangian formulation was developed. The research can be concluded with the following outcomes:

- The developed model predicted the residual velocities of the projectile successfully.
- When the angle (θ) between the projectile velocity vector and the plate normal vector increased, the residual velocity decreased significantly due to the ballistic resistance of the plate.
- The main failure mechanism was ductile failure. Ductile petal formation was predicted numerically.
- The proposed FE model can be further developed for R&D activities. It has the potential to reduce the requirement of expensive and time-consuming experimental tests.

REFERENCES

Bendarma, A., Garouge, S., Akhzouz, H., Kardellass, S., Bouslikhane, S., & ELMinor, H. (2021). The behaviour of aluminum alloy 1050 sheet subjected to impact and perforation process: experimental and numerical approaches. Matec Web of Conferences, 348, 01010.

Børvik, T., Forrestal, M., & Warren, T. (2009). Perforation of 5083-h116 aluminum armor plates with ogive-nose rods and 7.62 mm apm2 bullets. Experimental Mechanics, 50 (7), 969-978.

Buyuk, M., Kan, S., & Loikkanen, M. J. (2009). Explicit finite-element analysis of 2024-t3/t351 aluminum material under impact loading for airplane engine containment and fragment shielding. Journal of Aerospace Engineering, 22, 287-295.

Forrestal, M. and Warren, T. (2010). Perforation of 7075-t651 aluminum armor plates with 7.62 mm apm2 bullets. Experimental Mechanics, 50 (8), 1245-1251.

Forrestal M.J., Borvik T., Warren T.L. & Chen W. (2014). Perforation of 6082–T651 aluminum plates with 7.62 mm APM2 bullets at normal and oblique impacts. Experimental Mechanics, 54, 471–481.

Forrestal, M., Warren, T., & Holmen, J. (2021). Ballistic-limit velocities for 7.62 mm apm2 bullets and aluminum alloy armor plates. Journal of Dynamic Behavior of Materials, 7 (4), 624-627.

Gupta, N., Iqbal, M., & Sekhon, G. (2007). Effect of projectile nose shape, impact velocity and target thickness on deformation behavior of aluminum plates. International Journal of Solids and Structures, 44 (10), 3411-3439.

Holmen, J.K., Johnsen, J., Jupp, S., Hopperstad, O.S. & Borvik, T. (2013). Effects of heat treatment on the ballistic properties of AA6070 aluminum alloy. International Journal of Impact Engineering, 58, 119–133.

Hua, F., Li-zheng, S., Luo, X., & Ye, J. (2023). Recent advances in ballistic resistance of lightweight metal sandwich cores. Journal of Physics Conference Series, 2478 (7), 072072.

Iqbal, M., Gupta, G., & Gupta, N. (2010). 3d numerical simulations of ductile targets subjected to oblique impact by sharp nosed projectiles. International Journal of Solids and Structures, 47 (2), 224-237.

Iqbal, M., Tiwari, G., Gupta, P.K., & Bhargava, P. (2015). Ballistic performance and energy absorption characteristics of thin aluminium plates. International Journal of Impact Engineering, 77, 1-15.

Johnson, G.R. & Cook, W.H. (1983). A constitutive model and data for metals subjected to large strains, high strain rates and high temperatures. Proceedings of the Seventh International Symposium on Ballistics, 541–547.

Lesuer, D. R. (2000). Experimental investigations of material models for Ti-6A1-4V titanium and 2024-T3 aluminum. FAA Rep. No. DOT/ FAA/AR-00/25, Federal Aviation Administration, Washington, D.C.

Piekutowski, A.J., Forrestal, M.J., Poormon, K.L. & Warren, T.L. (1996). Perforation of aluminum plates with ogive-nose steel rods at normal and oblique impacts. International Journal of Impact Engineering, 18 (7–8), 877-887.

Simulia (2012). Abaqus Technology Brief, Simulation of the ballistic perforation of aluminum plates with Abaqus/Explicit, TB-12-BP-1.

Stojanović, B., Bukvic, M., & Epler, I. (2018). Application of aluminum and aluminum alloys in engineering. Applied Engineering Letters Journal of Engineering and Applied Sciences, 3 (2), 52-62.

Zukas, J.A., (2008). Introduction to Hydrocodes, Elsevier.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

MAKİNE ÖĞRENMESİ KULLANILARAK OPTİMUM YALITIM KALINLIĞININ BELİRLENMESİ

Doç. Dr. M. Özgün KORUKÇU
Bursa Uludağ Üniversitesi, Mühendislik Fakültesi, Makine Mühendisliği Bölümü,
ORCID: 0000-0002-4761-4304

Prof. Dr. Muhsin KILIÇ
Bursa Uludağ Üniversitesi, Mühendislik Fakültesi, Makine Mühendisliği Bölümü
ORCID: 0000-0003-2113-4510

ÖZET
Bu çalışmada makine öğrenmesi yöntemi kullanılarak optimum yalıtım kalınlığı belirlenmiştir. Son 20 senenin doğal gaz fiyatları kullanılarak 2036 yılına kadar olan doğal gaz fiyatı Destek Vektör Makinesi (DVM) yöntemi ile tahmin edilmiştir. DVM yöntemine göre, doğal gaz fiyatının yıllara göre doğrusal bir artış göstereceği hesaplanmıştır. Derece Gün Yöntemine göre yalıtım ve yıllık enerji maliyetleri ile enerjiden tasarruf miktarı hesaplanmıştır. Hesaplamalar konut ve sanayide kullanılan binalar için yapılmış. Optimum yalıtım kalınlığının seneye bağlı olarak değişimini veren bir bağıntı elde edilmiştir.
Anahtar kelimeler: Optimum Yalıtım Kalınlığı, Makine Öğrenmesi, Doğal Gaz, Derece Gün Yöntemi.

DETERMINATION OF OPTIMUM INSULATION THICKNESS BY USING MACHINE LEARNING

ABSTRACT
In this study, the optimum insulation thickness was determined using machine learning method. Using the natural gas prices of the last 20 years, the natural gas price until 2036 is predicted with the Support Vector Machine (SVM) method. According to the SVM method, it is calculated that the natural gas price will increase linearly over the years. According to the Degree Day Method, insulation and annual energy costs and the amount of energy savings were calculated. Calculations were made for residential and industrial buildings. A relation was obtained that gives the change of the optimum insulation thickness depending on the year.
Keywords: Optimum Insulation Thickness, Machine Learning, Natural Gas, Degree Day Method

GİRİŞ
Günümüzde enerji kullanımı oldukça büyük önem taşımaktadır. Özellikle küresel enerji krizlerinin olduğu zamanlarda ısıtma ve soğutma gibi uygulamalarda daha az enerji kullanımı gün geçtikçe önem kazanmaktadır. İnsanların büyük çoğunluğu günün yaklaşık %85-90'ını iç ortamlarda geçirdiklerinden binalardaki ısıtma ve soğutma için daha verimli enerji sistemleri kullanılmalıdır.
Yüce ve Acar'ın belirttiğine göre binalar küresel enerjinin yaklaşık %40'ını kullanmaktadır (Yüce ve Acar, 2021). Binaların yapım aşamasında ısı yalıtımı açısında yapılabilecek en küçük bir iyileştirme yıl bazında ve uzun süre içerisinde ekonomik olarak yarar sağlayacaktır.

Bina duvarlarının yapı bileşenleri içerisinde yer alan yalıtımın hangi malzeme olması ve kullanılacak yalıtım malzemesi kalınlığının hangi değerde olacağı kavramı optimum yalıtım kalınlığı terimini doğurmuştur.

Fertelli Türkiye'de yer alan dört farklı şehir, yakıt tipleri ve duvar tipleri için optimum yalıtım kalınlığını belirlemiştir (Fertelli, 2013). Aydın, Trabzon, Malatya ve Sivas illerinde LPG, elektrik, fuel-oil, kömür, doğal gaz ve jeotermal enerji kullanılması durumunda enerji tasarrufu ve geri ödeme süresi gibi parametreleri hesaplamıştır. Elde ettiği sonuçlara göre, optimum yalıtım kalınlığı değerleri 0-0.179 m, enerji tasarrufu 0-235 $/m² ve geri ödeme süresi ise 0-11.53 sene arasında bulunmuştur.

Türkiye'de yer alan dört farklı derece gün bölgesinde, ısıtma ve soğutma için optimum yalıtım kalınlığı Kaynaklı ve Kaynaklı tarafından hesaplanmıştır (Kaynaklı ve Kaynaklı, 2016). Isıtma ve soğutma süreçleri için güneş ışınımının da hesaba katıldığı bu çalışmada optimum yalıtım kalınlıkları ve geri ödeme sürelerinin değişimi, mevsimsel ve yıllık olarak analiz edilmiştir.

Derece gün ve sıcaklık analizine göre Düzce ili için binalarda yalıtım malzemesi tasarım metodolojisi Şen tarafından incelenmiştir (Şen, 2020). Çalışmada tuğla ve gaz beton duvarlarda, taş yünü, EPS ve XPS yalıtım malzemeleri için optimum yalıtım kalınlığı değerleri belirlenmiştir. Sonuç olarak en uygun yalıtım malzemesinin 20 kg/m³ yoğunluğundaki EPS olması gerektiği hesaplanmıştır. Gaz betonlu duvarlarda 0,0185 m - 0,0247 m arasında değişen optimum kalınlığa sahip yalıtım yapılması durumunda, %43,01 ile %48,54 oranlarında enerji tasarrufu sağlanacağı vurgulanmıştır.

Solmaz ısıtma ve soğutmada bina toplam elektrik tüketimini azaltmak için makine öğrenimi tabanlı bir optimizasyon yaklaşımı önermiştir (Solmaz, 2020). Kullandığı optimizasyon yaklaşımı üç aşamalıdır. İlk olarak, temel durum bina tasarım değişkenlerinin örneklenmesi ve ilgili simülasyon sonuçları, özellikler/etiketler oluşturmak için EnergyPlus'ta elde edilmiştir. Bir sonraki adım olarak, enerji tüketimini tahmin etmek için Destek Vektör Regresyon algoritmasına dayalı bir Makine Öğrenimi (ML) Modeli oluşturulmuştur. Üçüncü olarak, tasarım değişkenleri için optimum değerleri belirlemek üzere ML modeli üzerinde Bayesian optimizasyonu gerçekleştirilmiştir. Önerilen yaklaşımın uygulanabilirliğini göstermek için varsayımsal bir ofis binası vaka çalışması olarak kullanılmıştır. Sonuçlar, önerilen makine öğrenimi tabanlı yaklaşımın toplam enerji tüketimini tahmin etmede çok doğru olduğunu ve çok daha az hesaplama maliyeti ile herhangi bir kara kutu optimizasyon tekniğine kolayca entegre edilebileceğini göstermiştir.

YÖNTEM

Isıtma gereksinimi için Derece Gün yöntemi oldukça kolay ve popüler bir yaklaşımdır. Derece gün yöntemine göre ısıtma günleri aşağıdaki gibi hesaplanabilir. Burada T_m herhangi bir günün ortalama sıcaklığıdır, d ise gün sayısıdır.

$$IDG = (18\text{-}T_m) \times d$$

Çalışmada kullanılan duvar bileşenleri ve diğer parametreler Tablo 1'de ayrıntılı biçimde verilmiştir.

Tablo 1. Çalışmada kullanılan parametreler ve değerleri

Parametre	**Değer**
3 cm dış sıva	k=0.87 w/mK
X cm yalıtım malzemesi	k=0.03 W/mK
20 cm delikli tuğla	k=0.45 W/mK
2 cm iç sıva	k=0.87 W/mK
iç taraftaki ısı taşınım katsayısı	h=8.9 W/m²K
dış taraftaki ısı taşınım katsayısı	h=34 W/m²K
	$U=1/(R_{ins}+0.652)$ W/m²K
Yalıtım	
maliyet	C_{ins}= 6013 TL/m³
Doğal Gaz	
Alt ısıl değer	34.526×10^6 J/m³
Isıtma sistemi verimi	0.93
Finansal Parametreler	
Enflasyon oranı	0.54
Faiz oranı	0.14
ömür	12 yıl
Şimdiki değer faktörü	138.83

Binanın ısıtma yükü aşağıdaki bağıntı ile hesaplanabilir:

$$q = U(18\text{-}T_m)$$

Senelik ısıtma yükü ısıtma sisteminin veriminin de eklendiği bir bağıntıdır.

$$q_{AH} = 86400 \times HDD \times U/\eta$$

Yapı bileşenlerine göre duvarın toplam ısı transfer katsayısı şu şekilde bulunabilir:

$$U = \frac{1}{\frac{1}{h_i} + R_w + \frac{x}{k} + \frac{1}{h_o}}$$

Hesaplamalarda kolaylık olması açısından yalıtım dışındaki ısıl dirençler toplanırsa yukarıdaki bağıntı aşağıdaki gibi yazılabilir:

$$U = \frac{1}{R_{tw} + \frac{x}{k}}$$

Toplam yalıtım maliyeti ise;

$$C_{t,ins} = C_{ins} \times x$$

Şimdiki değer faktörü

$$PWF = \left(\frac{1+i}{g\text{-}i}\right)\left[1\text{-}\left(\frac{1+i}{1+g}\right)^{LT}\right]$$

Bütün parametreler bir araya getirildiğinde toplam ısıtma maliyeti aşağıdaki bağıntı ile bulunabilir:

$$C_{t,H} = C_{ins} \times x + \frac{86400 \times HDD \times C_f \times PWF}{\left(R_{tw} + \frac{x}{k}\right) \times H_u \times \eta}$$

Yukarıdaki bağıntıda x yalıtım kalınlığı optimize edilirse optimum yalıtım kalınlığı değerine ulaşılabilir.

$$x_{opt} = \left(\frac{86400 \times HDD \times C_f \times PWF \times k}{H_u \times \eta \times C_{ins}}\right)\text{-}R_{tw} \times k$$

BULGULAR

Öncelikle doğal gazın son 20 sene içerisindeki fiyatları elde edilmiş ve elde edilen fiyatlara göre gelecek 12 yıl içerisinde doğal gaz fiyatının ne olacağı Destek Vektör Yöntemi (Support Vector Method) kullanılarak tahmin edilmiştir.

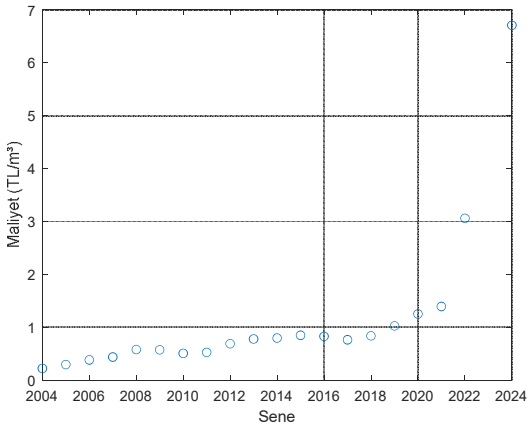
Şekil 1'de son 20 sene için doğal gaz fiyatının senelere göre değişimi verilmiştir. Özellikle son senelerdeki enerji krizinden dolayı doğal gaz fiyatındaki hızlı artış ısıtma maliyetini oldukça artırmıştır.

Şekil 2'de SVM yönteminin test ve eğitim verilerinin senelere göre değişimi gösgerilmiştir.

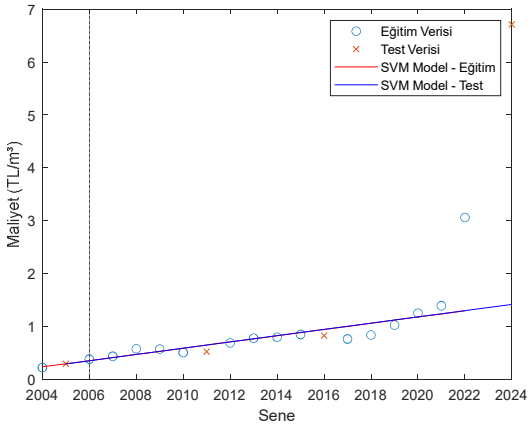
Şekil 3 ise SVM yöntemi sonucunda önümüzdeki 12 sene için doğal gaz fiyatının doğrusal olarak artacağını ön görmektedir.

Elde edilen doğal gaz fiyatı verileri 2025-2036 yılları arasında doğal gaz maliyeti C_f olarak optimum yalıtım kalınlığı bağıntısında yerine konmuş ve önümüzdeki 12 yıl için optimum yalıtım kalınlığı değerleri hesaplanmıştır.

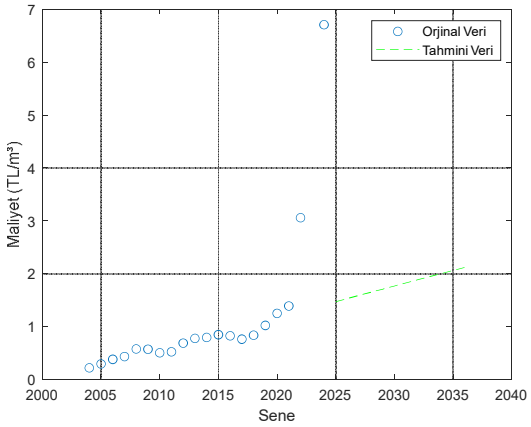
Şekil 4'de hesaplanan optimum yalıtım kalınlığı değerlerinin senelere göre değişimi görülmektedir. En düşük optimum yalıtım kalınlığı 0.0416 m ile 2025 yılı için elde edilirken, doğrusal artıştan dolayı en yüksek optimum yalıtım kalınlığı 2036 yılı için 0.0538 m olarak elde edilmiştir. İki değer birbiri ile karşılaştırıldığında 1.2933 değeri elde edilmektedir.



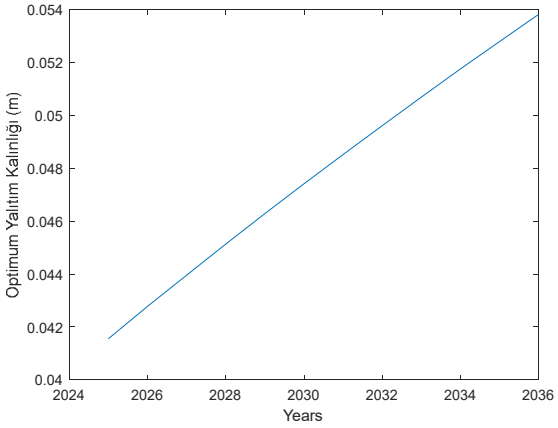
Şekil 1. Doğal gaz birim fiyatının son 20 sene için değişimi.



Şekil 2. SVM yöntemi test ve eğitim verilerinin senelere göre değişimi.



Şekil 3. Orijinal ve tahmini doğal gaz verilerinin senelere göre değişimi.



Şekil 4. Optimum yalıtım kalınlığının senelere göre değişimi.

TARTIŞMA VE SONUÇ

Bu çalışmada konutlar için ısıtma sürecinde optimum yalıtım kalınlığı değerleri önümüzdeki 12 sene için makine öğrenmesi yöntemi kullanılarak hesaplanmıştır. İstanbul ili için yapılan hesaplamalarda geçtiğimiz 20 senenin doğal gaz verileri yardımıyla SVM yöntemi kullanılarak gelecek 12 yıl içerisindeki doğal gaz birim fiyatı tahmin edilmiştir. Tahmin edilen doğal gaz birim fiyatı değerleri yardımıyla ilerideki 12 sene için optimum yalıtım kalınlığı değerleri bulunmuştur.

Hesaplamalara göre 2036 senesinde 2025 senesinde göre yaklaşık %30 daha fazla kalınlıkta yalıtım malzemesi kullanılması gerekmektedir.

Çalışmanın ilerleyen aşamalarında Türkiyede'ki bütün iller ve farklı yakıt, duvar bileşenleri ve yalıtım malzemeleri için yapay zeka kullanarak optimum yalıtım kalınlığı değerlerinin hesaplanması hedeflenmektedir.

KAYNAKLAR

Fertelli, A. (2013). Determination of optimum insulation thickness for different building walls in turkey. *Transactions of Famena*, *37*(2), 103–113.

Kaynaklı, Ö., Kaynaklı, F. (2016). Determination Of Optimum Thermal Insulation Thicknesses For External Walls Considering The Heating, Cooling And Annual Energy Requirements. *Uludağ University Journal of The Faculty of Engineering*, *21*(1), 229. https://doi.org/10.17482/uujfe.27323

Şen, Y. (2020). Derece Zaman ve Sıcaklık Analizine Göre Düzce İlinde Binalar için İzolasyon Malzemesinin Tasarım Metodolojisi. *Düzce Üniversitesi Bilim ve Teknoloji Dergisi*, *8*, 1676–1694.

Solmaz, A. S. (2020). MACHINE LEARNING BASED OPTIMIZATION APPROACH FOR BUILDING ENERGY PERFORMANCE Aslihan Senel Solmaz Department of Architecture , Dokuz Eylul University , Izmir , Turkey. *2020 Building Performance Analysis Conference and SimBuild Co-Organized by ASHRAE and IBPSA-USA*, 69–76.

Yüce, B. E., Acar, M. C. (2021). Bitlis İlinde Farklı Yakıtlar Ve Duvar Bileşenleri İçin Optimum Yalıtım Kalınlığı Ve Enerji Tasarrufunun Analizi. *Bitlis Eren Üniversitesi Fen Bilimleri Dergisi*, *10*(4), 1426–1434. https://doi.org/10.17798/bitlisfen.959930

ÇAPRAZ KONUMLANDIRILMIŞ KARE ÜZERİNDEN AKIŞIN SAYISAL ANALİZİ

Doç. Dr. M. Özgün KORUKÇU
Bursa Uludağ Üniversitesi, Mühendislik Fakültesi, Makine Mühendisliği Bölümü,
ORCID: 0000-0002-4761-4304

Prof. Dr. Muhsin KILIÇ
Bursa Uludağ Üniversitesi, Mühendislik Fakültesi, Makine Mühendisliği Bölümü
ORCID: 0000-0003-2113-4510

ÖZET
Daraltılmış kanal içerisinde yer alan cisimler üzerinden akış ve ısı transferinin elektronik sistemlerin soğutulması, ısı değiştiricileri, reaktörler, ısıtma-soğutma sistemleri gibi biçok uygulama alanı bulunmaktadır. Bu çalışmanın amacı çapraz konumlandırılmış bir kare üzerinden laminer akışta ısı transfer karakteristiklerinin incelenmesidir. Sürekli rejimde, laminer iki boyutlu momentum ve enerji denklemi ANSYS 18.2 yazılımı yardımıyla çözülmüştür. Akışkan olarak hava kullanılan analizlerde çapraz konumun +20° ve -20° açıları arasında iki derecelik açı değişimlerinin ısı transferi ve akış karakteristiklerine olan etkisi incelenmiştir. Kanal genişliği ve karenin bir kenarı arasındaki oran 1/9 olacak biçimde blokaj oranı sabit tutulmuştur. Kanal girişinde Re=40 değerinde tam gelişmiş laminer akış profili tanımlanmıştır. Analizler sonucunda en yüksek ısı transfer katsayısının 15.14 W/m²K olarak 0° değeri için bulunmuştur. En düşük ısı transfer katsayısı ise 12.19 W/m²K olarak 20° için hesaplanmıştır. Isı transferi ve kayma gerilmesinin kare açısına göre olan değişimini veren bağıntılar elde edilmiştir.
Anahtar kelimeler: Çapraz Kare, Laminer Akış, Isı Transferi, Sayısal Hesaplamalı Akışkanlar Dinamiği

NUMERICAL ANALYSIS OF FLOW OVER TILTED SQUARE

ABSTRACT
Flow and heat transfer through objects in a collapsed channel has many applications such as cooling of electronic systems, heat exchangers, reactors, heating and cooling systems. The aim of this study is to investigate the heat transfer characteristics of laminar flow over a diagonally positioned square. In the steady regime, the laminar two-dimensional momentum and energy equation is solved using ANSYS 18.2 software. Air is used as the fluid and the effect of two degree angle changes between +20° and -20° angles of the transverse position on heat transfer and flow characteristics is investigated. The blockage ratio was kept constant with 1/9 between the channel width and one side of the square. A fully developed laminar flow profile was defined at Re=40 at the channel inlet. As a result of the analysis, the highest heat transfer coefficient of 15.14 W/m²K was found for 0°. The lowest heat transfer coefficient of 12.19 W/m²K was calculated for 20°. Correlations for the variation of heat transfer and shear stress with respect to the square angle were obtained.
Keywords: Wedge, Laminar Flow, Heat Transfer, Computational Fluid Dynamics

GİRİŞ

Sınırlandırılmış bir kanal içerisindeki cisimler üzerinden olan ısı transferi ve akış karakteristiklerinin belirlenmesi birçok ısıtma-soğutma uygulamalarında, kurutma işlemlerinde, ısı değiştiricilerinde, güç santrallerinde ve yenilenebilir enerji sistemlerinde kullanılmaktadır. Bir kanal içerisine yerleştirilen sabit geometrideki cisim ile üzerine gönderilen akışkanın sıcaklık farkından dolayı kanal içerisinde ve cisim yüzeyleri üzerindeki sıcaklık ve hız değerleri değişmektedir. Kanal içerisine yerleştirilen cisimler daire, üçgen, kare, dikdörtgen, elips gibi birçok geometrik şekil biçiminde olabilir.

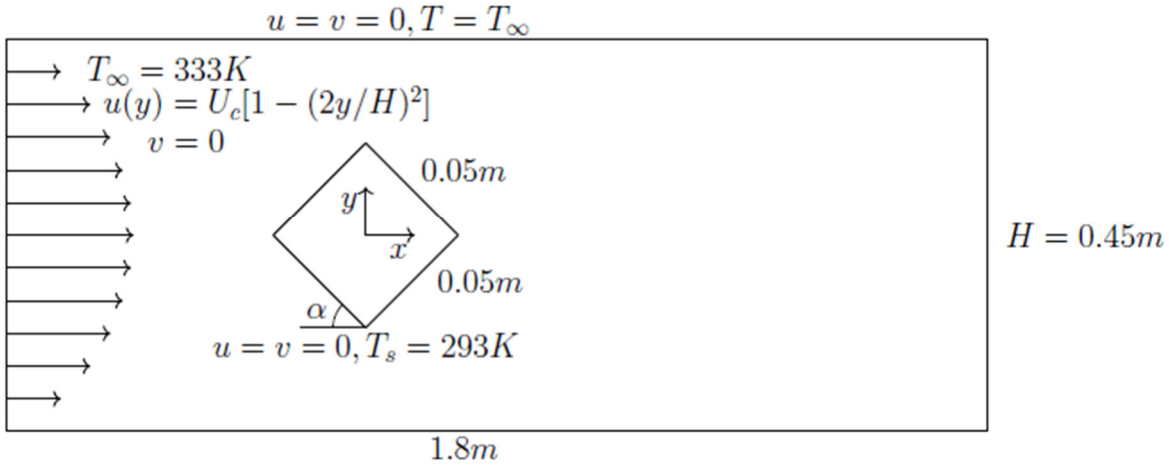
Konu ile ilgili kaynaklar incelendiğinde ilgili birçok çalışma bulunabilir. Malavasi ve Zappa (Malavasi ve Zappa, 2009), duvar yakınına yerleştirilmiş eğik bir dikdörtgen üzerinden akışı deneysel olarak incelemişlerdir. Çalışmada en boy oranı 3 ve 4 olan farklı dikdörtgenler ile dikdörtgen silindirin duvara olan yakınlığının akış karakteristiklerine olan etkilerini araştırmışlardır. Dikdörtgen silindirlerin sürüklenme ve kaldırma katsayıları ile Strouhal sayılarının atak açısına göre olan değişimlerini grafikler halinde sunmuşlardır. Yoon ve diğerleri (Yoon ve diğerleri, 2009), bir kanal içerisindeki ısı transferini artırmak için, kanal içerisine yerleştirilmiş eğik bir kare silindir kullanmışlardır. Araştırmalarında kare silindir üzerinden akışı iki boyutlu olacak biçimde modellemiş ve korunum denklemlerini sayısal olarak çözümlemişlerdir. Laminer akışta Reynolds sayısını Re=500 değerinde sabit tutmuşlardır. Kare silindir açısının 0° olduğu durumda ısı transferinin kanal içerisinde kare silindir olmadığı duruma göre % 5.5 arttığını belirtmişlerdir. Kare silindir açısının 45 ° olduğu durumda ise ısı transferinin kanal içerisinde kare silindir olmadığı duruma göre %21 arttığını bulmuşlardır. Kanal içerisinde yer alan bir kare üzerinden laminer akışta ısı transferinin güç kanunu akışkanlarının etkisini Aboeian-Jahromi ve diğerleri (Aboueian-Jahromi ve diğerleri, 2011) incelemişlerdir. Çalışmada blokaj oranı 1/4 ve Prandtl sayısı Pr=50 olarak sabit tutulurken, atak açısı 0° ile 45°, güç kanunu indeksi ise 0.4 ile 1.8 arasında değiştirilmiştir. Kararlı akış rejiminde sonuçlar, silindir üzerindeki toplam sürükleme katsayısının güç kanunu indeksindeki bir artışla arttığını ve maksimum toplam kaldırma katsayısının 15° oluştuğunu göstermiştir. Güç kanunu indeksinde bir azalma ve/veya eğim açısında bir artış Nusselt sayısını artırır ve boyutsuz yerel pompalama gücünü azalttığı belirtilmiştir. Bir kanal içerisine yerleştirilmiş dikdörtgen silindirin en boy oranı ve eğim açısının ısı transferine olan etkisi Shuja ve Yılbaş tarafından sayısal olarak incelenmiştir (Shuja ve Yilbas, 2014). Dikdörtgen silindirin en boy oranı 1:1, 1:4, 1:9 arasında değişirken eğim açısı ise 0°,30°, 60° ve 90° arasında değiştirilmiştir. Bloğun arkasındaki akış alanının blok eğim açısı ve en-boy oranından önemli ölçüde etkilendiği bulunmuştur. Kanal girişindeki bloğun kısma etkisi, kanal duvarı ile blok yüzeyleri arasındaki akışı hızlandırmaktadır. Bu da blok etrafındaki termal sınır tabakasını değiştirmektedir. Nusselt sayısı dikdörtgen silindirin düşük en boy aranı için yüksektir. Buna ek olarak, blok eğim açısının Nusselt sayısı üzerindeki etkisi düşük blok en-boy oranları için kayda değerdir. Hu ve diğerleri eğik bir sonsuz dikdörtgen silindir üzerinden akışın Large Eddy Simülasyonunu (LES) ve deneysel ölçümlerini yapmışlardır (Hu ve diğerleri, 2015). İleriye doğru eğimin, başlangıçta dikey silindirin serbest ucunun arkasında gözlenen aşağı doğru çalkantıyı arttırdığı ve aşağı doğru eksenel bir akışa yükselttiği bulunmuştur. Tersine, geriye doğru eğim, dikey silindirin tabanının arkasında ortaya çıkan yukarı doğru eksenel akışa yol açmıştır. Diğer yandan, dikey silindir kendi dümen suyunda iki çift ters yönde dönen akıntı girdabı (dörtlü girdap) üretirken, hem ileri hem de geri eğimli silindirlerin arkasında sadece bir çift girdap (dipol girdap) oluştuğu gözlemlenmiştir.

İki boyutlu laminer kanal akışında silindir kesit geometrisi ve blokaj oranının girdap kaynaklı titreşim tabanlı karıştırma performansı üzerindeki etkileri Hasheminejad ve Fallahi tarafından incelenmiştir (Hasheminejad ve Fallahi, 2022). Çalışmada, dairesel, kare, eğik kare, eğik elips ve dik elips silindirler üzerinden akış 0.4-0.25 ve 0.166 blokaj oranın sahip kanal içerisinde sayısal olarak incelenmiştir. Sayısal sonuçlar, en iyi genel karıştırma verimliliğinin (%90'ın üzerinde) ve karıştırma enerjisi maliyetinin (yaklaşık 8 birim) dar kanalda (β = 2 /5) sabit dikey eliptik ve eğimli kare silindirler için aynı anda elde edildiğini, VIV tabanlı karıştırma tasarımının ise bu iki özel konfigürasyon için karıştırma performansı parametrelerinde kayda değer bir iyileşmeye yol açmadığını göstermiştir. Ayrıca, tercih sırasına göre VIV tabanlı karıştırma verimliliklerindeki en büyük genel iyileştirmeler, en yüksek blokaj oranına (β = 2 /5) sahip kanal için alt VIV dalındaki kare (%51'e kadar), dairesel (%39'a kadar) ve eğimli eliptik (%38'e kadar) kesitler için elde edilirken, karıştırma enerji maliyetlerindeki en iyi genel iyileştirmeler kare ve eğimli eliptik kesitler için elde edilmiştir. Eğim açısının eğik kare silindir dizisinden doğal taşınımla ısı transferine eğim açısının etkisi Al-Suhaibani ve diğerleri tarafından incelenmiştir (Al-Suhaibani ve diğerleri, 2024). S/D = 1.25, 1.75, 2.25 ve 2.75 olmak üzere dört merkezden merkeze kenar uzunluğu mesafesi kullanılmıştır. Yerel Nusselt sayıları ve değiştirilmiş Rayleigh sayıları her bir silindir için her bir çevre ortalama sıcaklık noktasında elde edilmiştir. Sonuçlar, tüm S/D ve kullanılan eğim açıları için alt silindirin ısı transferinin tek silindire kıyasla diziden en az etkilendiğini, bunu orta ve üst silindirin izlediğini göstermiştirNusselt sayısının 30°'lik küçük silindir eğim açısında, ardından 45° ve 60°'de, özellikle yüksek modifiye Rayleigh sayılarında arttığı gözlemlenmiştir.

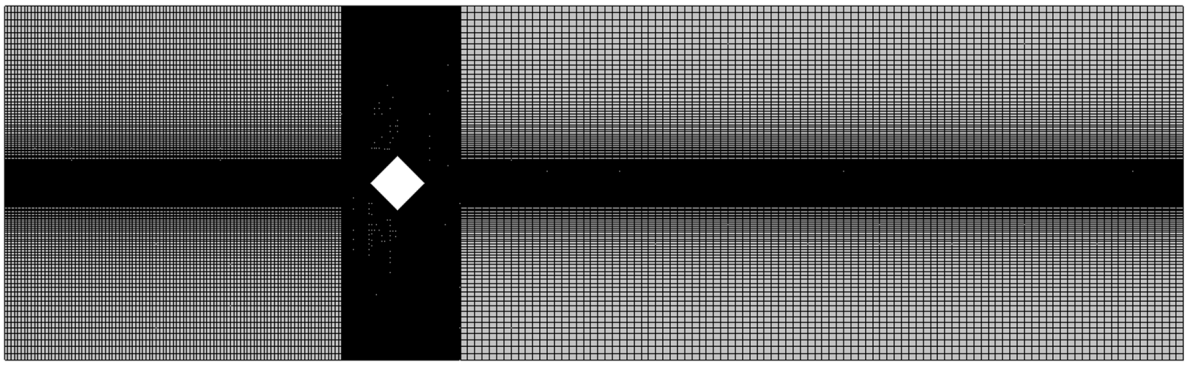
YÖNTEM

Problem Geometrisi

Şekil 1'de kare silindir etrafındaki akış için geometrik konum ve akış durumu belirtilmektedir. Hava, tam gelişmiş laminer hız profili $u(y)=U_c\ [1-(2y/H)^2\ ]$ ile kanala girmektedir. $U_c=3/2\ U_\infty$ olup, merkezdeki akış hızıdır. Çıkışta basınç değeri için P=0 Pa ve kare silindirin bir kenarı B=0.05 m alınmıştır. Şekil 2 'de ise hesaplamalarda kullanılan örnek bir ağ yapısı gösterilmektedir. Kare yüzeylerine yakın bölgelerde daha sık ağ yapısı oluşturulmuştur.



Şekil 1. Problemin geometrisi ve sınır şartları



Şekil 2. Hesaplamalarda kullanılan ağ yapısı.

Sıkıştırılama ve sürekli rejimde laminer akış için iki boyutlu kartezyen koordinatlardaki korunum denklemleri aşağıdaki gibi yazılabilir. Akışkan olarak bu çalışmada hava kullanılmıştır.

Süreklilik denklemi:

$$\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}=0 \tag{1}$$

Momentum denklemi:

$$\rho\left(u\frac{\partial u}{\partial x}+v\frac{\partial u}{\partial y}\right)=-\frac{\partial P}{\partial x}+\mu\left(\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}\right) \tag{2}$$

$$\rho\left(u\frac{\partial v}{\partial x}+v\frac{\partial v}{\partial y}\right)=-\frac{\partial P}{\partial y}+\mu\left(\frac{\partial^2 v}{\partial x^2}+\frac{\partial^2 v}{\partial y^2}\right) \tag{3}$$

Enerji denklemi:

$$u\frac{\partial T}{\partial x}+v\frac{\partial T}{\partial y}=\alpha\left(\frac{\partial^2 T}{\partial x^2}+v\frac{\partial^2 T}{\partial y^2}\right) \tag{4}$$

Kullanılan diğer parametreler ise şu şekildedir:

$$\beta=\frac{B}{H} \tag{5}$$

$$Re=\frac{\rho U_c B}{\mu} \tag{6}$$

$$Nu=\frac{hB}{k} \tag{7}$$

Yukarıdaki denklemlerde □□blokaj oranı, *Re* kare silindir için Reynolds sayısı, □□akışkanın yoğunluğu, □ dinamik viskozite, *Nu* Nusselt sayısı, *h* ısı taşınım katsayısı, *k* akışkanın ısı iletim katsayısı, U_∞ serbest akış hızı, ve *A* alandır.

Sayısal hesaplamalarda ANSYS-FLUENT 19.2 kullanılmıştır. Korunum denklemleri için yakınsama şartı olarak $1x10^{-7}$ değeri alınmıştır.

BULGULAR

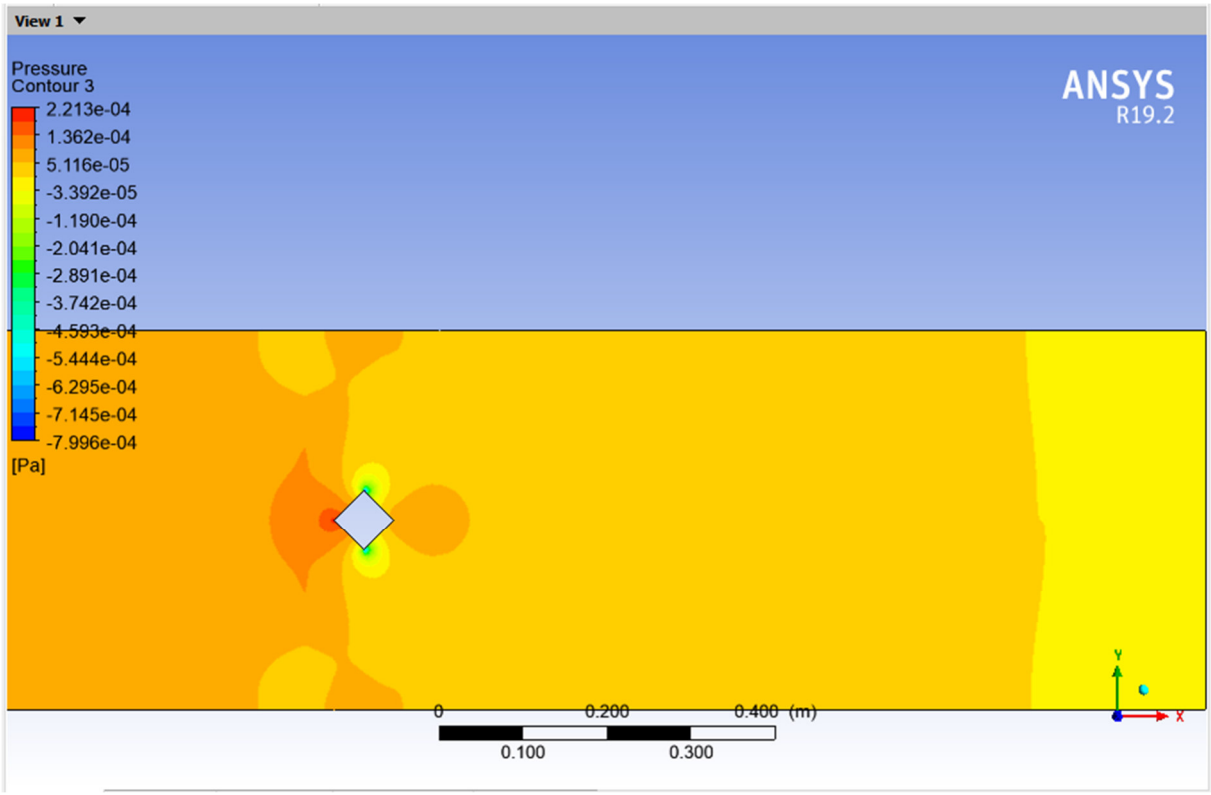
Akış alanı içerisindeki sıcaklık, hız ve basınç değerleri Şekil 3-5'de gösterilmiştir. Şekil 3 incelendiğinde akışın karenin köşesine geldiğinde statik basınç değerinin en yüksek değerine ulaştığı, alt ve üst köşelerinde en düşük değerinde olduğu gözlemlenmiştir. Şekil 4'de karenin ön köşesinde hız en düşük değerde, üst köşelerinde ise en yüksek değerinde olduğu görülebilmektedir.

Akış tam gelişmiş laminer ve Re=40 olduğu için yatay eksene göre simetriktir. Şekil 5'deki sıcaklık dağılımına bakıldığında ise karenin yaklaşık 1 m arkasına kadar uzanan bir soğuk bölge görülebilmektedir.

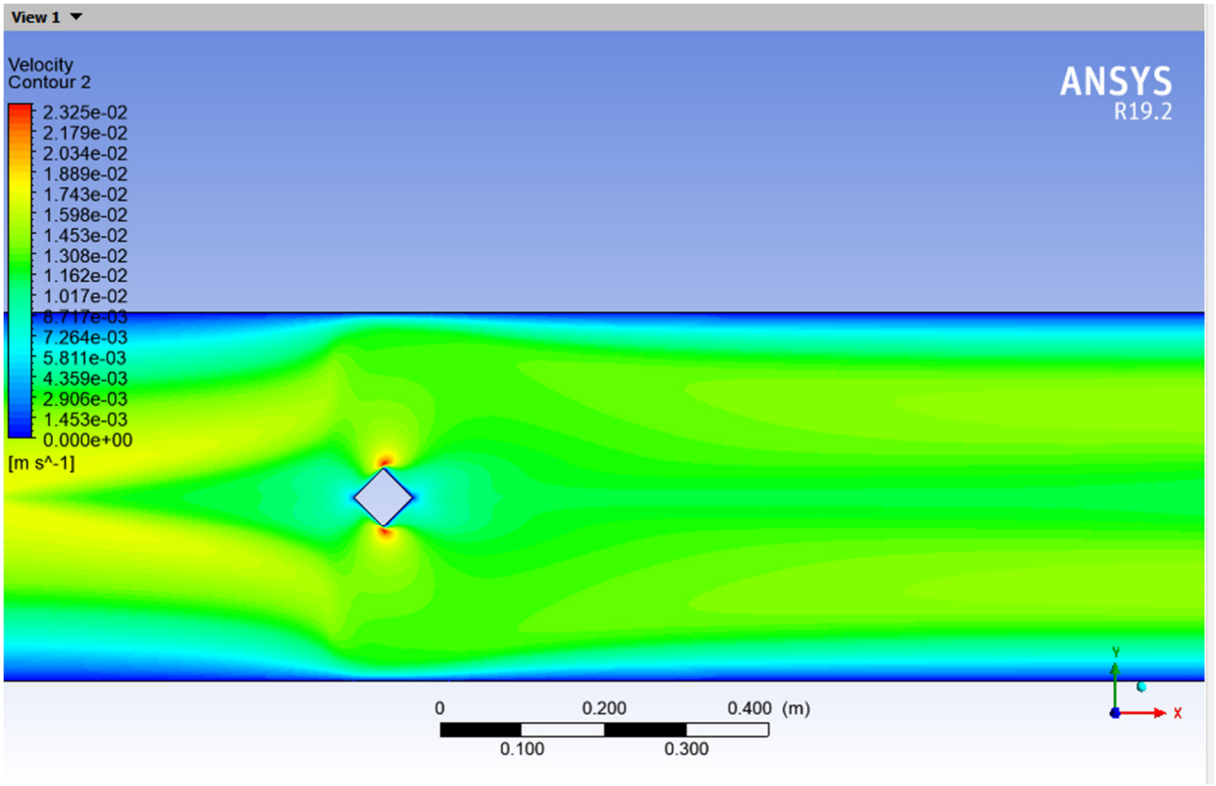
Tablo 1'de kare açısının bütün değerleri için elde edilmiş ısı taşınım katsayısı, Nusselt sayısı, kayma gerilmesi ve birim zamandaki ısı transferi değerleri verilmiştir. Tablo 1 incelendiğinde, kare açısının artması Nusselt sayısının ve dolayısı ile ısı taşınım katsayısının azalmasına neden olmaktadır. Isı taşınım katsayısı kare yüzeylerine olan ısı transferini doğrudan etkilemektedir. Kare yüzeyleri üzerindeki ortalama kayma gerilmesi değerleri de benzer biçimde artan kare eğim açısında azalmaktadır.

Tablo 1'de elde edilen değerler yardımıyla ısı taşınım katsayısı, Nusselt sayısı, ısı transferi ve kare silindir yüzeyleri üzerindeki ortalama kayma gerilmesi değerlerinin kare eğim açısı ile olan değişimleri Şekil 6-9 arasında gösterilmiştir.

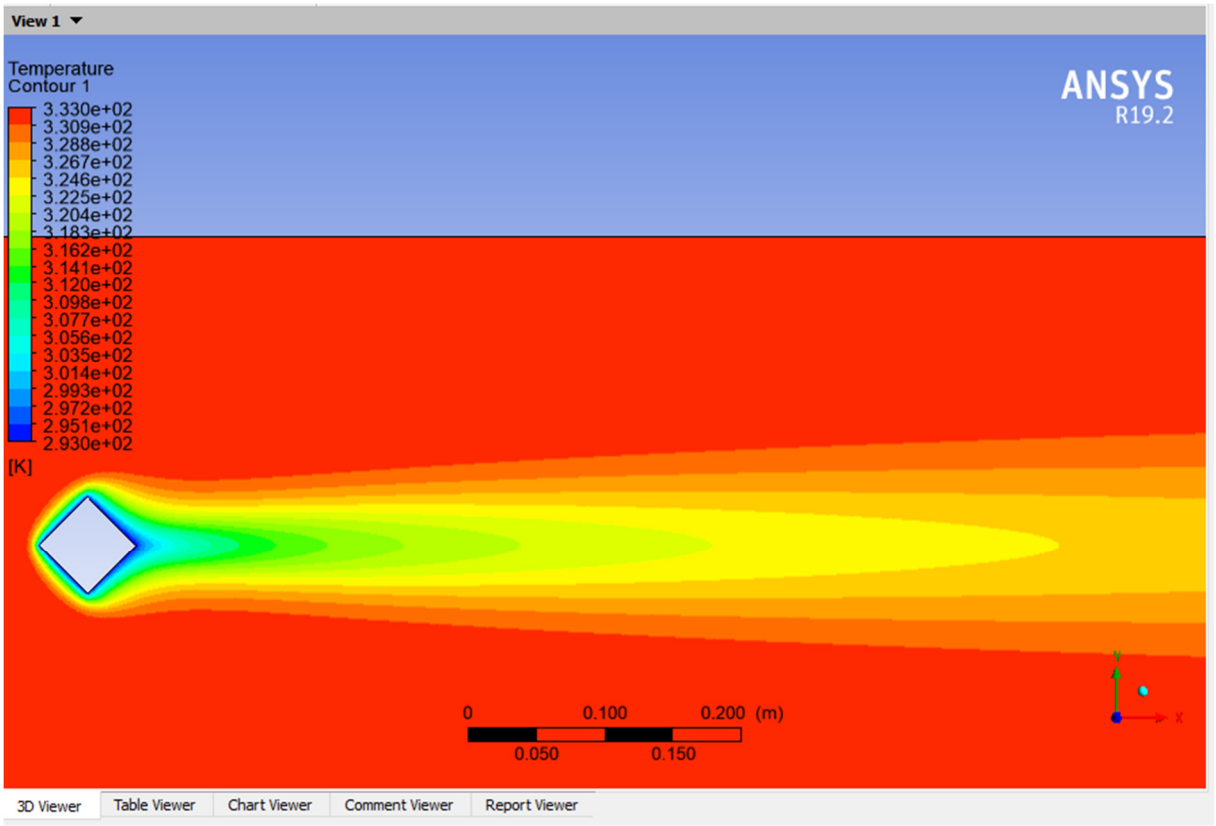
Şekil 6-9 arasındaki grafikler incelendiğinde, kare silindir eğim açısının pozitif ve negatif değerlerinin aynı olduğu durumlar için simetrik bir dağılım ortaya çıkmıştır. En yüksek ısı transferi, ısı taşınım katsayısı, Nusselt sayısı ve kayma değerleri 0° kare eğim açısı için elde edilmiştir. +20° ve -20° kare eğim açıları için incelenen bütün parametreler için en düşük değerler elde edilmiştir.



Şekil 3. 0° eğimli kare için basınç kontörlerinin gösterimi.



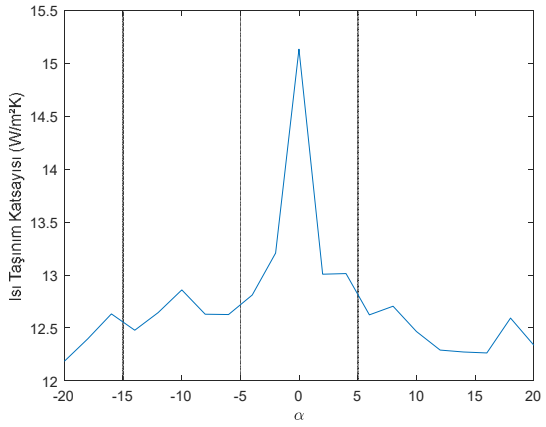
Şekil 4. 0° eğimli kare için hız kontörlerinin gösterimi.



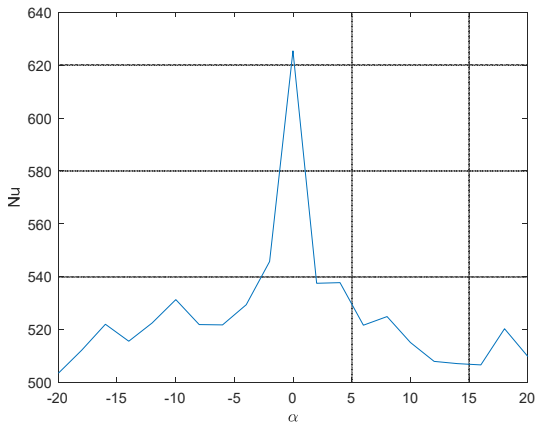
Şekil 5. 0° eğimli kare için sıcaklık kontörlerinin gösterimi.

Tablo 1. Kare eğim açısına göre elde edilen değerler.

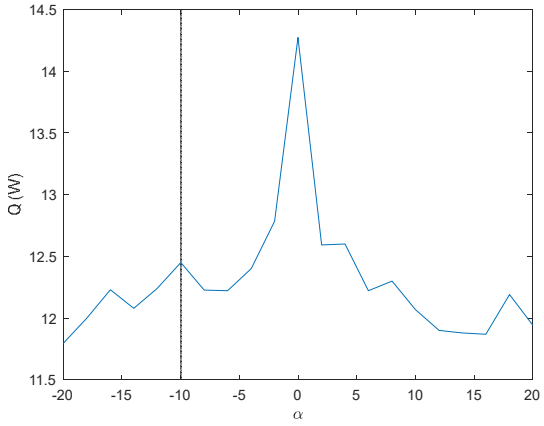
□	Isı Taşınım Katsayısı (W/m² K)	Nusselt	□ (Pa*E-5)	Isı Transferi (W)
-20	12.19	503.54	2.44	11.80
-18	12.40	512.22	2.56	12.00
-16	12.63	522.09	2.67	12.23
-14	12.48	515.61	2.70	12.08
-12	12.65	522.52	2.76	12.24
-10	12.86	531.44	2.85	12.45
-8	12.63	521.94	2.84	12.23
-6	12.63	521.78	2.87	12.22
-4	12.81	529.39	2.93	12.40
-2	13.21	545.80	3.10	12.79
0	15.14	625.48	5.26	14.27
2	13.01	537.53	3.45	12.59
4	13.02	537.85	3.00	12.60
6	12.62	521.69	2.87	12.22
8	12.71	525.02	2.87	12.30
10	12.47	515.19	2.78	12.07
12	12.29	507.96	2.65	11.90
14	12.27	507.16	2.60	11.88
16	12.26	506.72	2.56	11.87
18	12.59	520.39	2.68	12.19
20	12.34	509.81	2.50	11.94



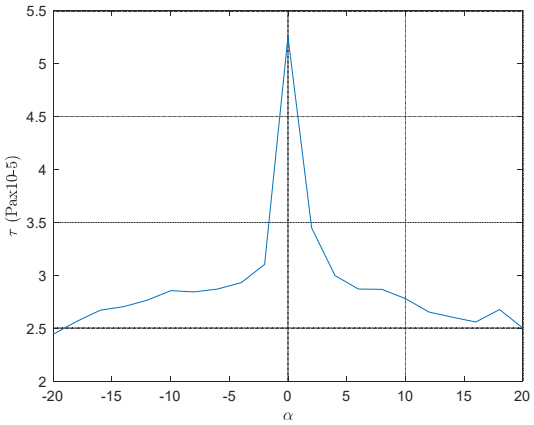
Şekil 6. Isı taşınım katsayısının kare eğim açısı ile değişimi.



Şekil 7. Nusselt sayısının kare eğim açısı ile değişimi.



Şekil 8. Isı transferinin kare eğim açısı ile değişimi.



Şekil 9. Kare yüzeyleri üzerindeki ortalama kayma gerimesinin kare eğim açısı ile değişimi.

TARTIŞMA VE SONUÇ

Bu çalışmada blokaj oranı □=1/9 olan bir kanal içerisinde eğimli bir kare silindir üzerinden laminer sürekli akış için ısı transferi ve akış karakteristikleri sayısal olarak incelenmiştir. Akışkan olarak hava kullanılmş ve Reynolds sayısı Re=40 değerinde sabit tutulurken kare silindir eğim açısı +20° ve -20° arasında 2° aralıklarla artırılıp azaltılmıştır.

Kare silindir eğim açısının 0° olduğu durumlarda en yüksek ısı transferi ve kayma gerilmesi değerleri elde edilirken, +20° ve -20° için en düşük ısı transferi ve kayma gerilmesi değerleri elde edilmiştir.

Çalışmanın ilerleyen zamanda farklı akışkan, farklı Reynolds sayısı ve farklı blokaj oranlarında analizleri yapılarak genişletilmesi amaçlanmaktadır.

KAYNAKLAR

Aboueian-Jahromi, J., Hossein Nezhad, A., & Behzadmehr, A. (2011). Effects of inclination angle on the steady flow and heat transfer of power-law fluids around a heated inclined square cylinder in a plane channel. *Journal of Non-Newtonian Fluid Mechanics*, *166*(23–24), 1406–1414. https://doi.org/10.1016/j.jnnfm.2011.09.004

Al-Suhaibani, Z., Ali, M., & Almuzaiqer, R. (2024). Tilt Angle Effect on Natural Convection Heat Transfer from an Inclined Array of Square Cylinders. *Energies*, *17*(7). https://doi.org/10.3390/en17071516

Hasheminejad, S. M., & Fallahi, R. (2022). Effects of cylinder cross-sectional geometry and blockage ratio on VIV-based mixing performance in two dimensional laminar channel flow. *Chemical Engineering and Processing - Process Intensification*, *177*(May), 108987. https://doi.org/10.1016/j.cep.2022.108987

Hu, G., Tse, K. T., Kwok, K. C. S., & Zhang, Y. (2015). Large eddy simulation of flow around an inclined finite square cylinder. *Journal of Wind Engineering and Industrial Aerodynamics*, *146*, 172–184. https://doi.org/10.1016/j.jweia.2015.08.008

Malavasi, S., & Zappa, E. (2009). Fluid-dynamic forces and wake frequencies on a tilted rectangular cylinder near a solid wall. *Meccanica*, *44*(1), 91–101. https://doi.org/10.1007/s11012-008-9154-2

Shuja, S. Z., & Yilbas, B. (2014). Flow over a heated block in a vertical channel: Influence of block aspect ratio and tilting on heat transfer rates. *International Journal of Numerical Methods for Heat and Fluid Flow*, *24*(5), 1044–1056. https://doi.org/10.1108/HFF-11-2012-0268

Yoon, D. H., Yang, K. S., & Choi, C. B. (2009). Heat transfer enhancement in channel flow using an inclined square cylinder. *Journal of Heat Transfer*, *131*(7), 1–4. https://doi.org/10.1115/1.3090808

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

THE DEVELOPMENT OF PRACTICAL SKILLS ASSESSMENT SCALE FOR METAL WORK CUTTING PROCESS IN TECHNICAL COLLEGES IN NIGERIA

Alhassan A. Yunusa
Department of Mechanical Engineering Technology, Minna Institute of Technology and Innovation

Abdullahi A.M Yassar
Department of Mechanical Engineering Technology, Minna Institute of Technology and Innovation

Alhassan Mohammed,
School of Technical Education, Niger State College of Education

Abstract
This study development of practical skills assessment scale for metal cutting in technical colleges in Nigeria (MCPSAS) to improve students' performance in metal-cutting practical skill processes. The study answered three research questions and tested two hypotheses. The MCPSAS comprising of practical skills based on the National Business and Technical Examinations Board (NABTEB) curriculum and related literature was developed and validated by five experts in Federal University of Technology Minna. The study adopted an instrumentation design and was carried out in two geo-political zones North - Central and North-East of Nigeria. The population of the study was 492 Metalwork students. The sample size was 48 metalwork students selected from 12 Technical Colleges. The instrument for data collection was entitled Metal Cutting Practical Skills Assessment Scale MCPSAS. The reliability of the instrument was established using Kendall coefficient concordance and this yielded a reliability coefficient of 0.89. Data for the study was collected by personal contact with the respondents with the help of research assistants. Data were analyzed using factor analysis, statistical mean and standard deviation for the research question, and t-test at 0.05 level of significance for the hypotheses. The result of the study showed that seven clusters and 75 practical skills were found appropriate for the MCPSAS. Based on this result, it was recommended amongst others that metal cutting practical skill assessment scale is appropriate for Technical Colleges and other similar institutions in Nigeria should be made to be aware and learn to use the MCPSAS for assessing performance in metalwork practical skills processes in Technical Colleges
Keywords: assessment scale; practical skill; metal work cutting Process.

1. Introduction

Technical College is one of the principal vocational institutions that provide technical education in Nigeria, charged with the responsibility of imparting necessary skills that lead to the production of craftsmen and technicians who are expected to be skilled and self–reliant in the world of work. The skill-oriented and performance-based programs allow effective training and assessment of craftsmen in a wide range of trades that help students achieve various instructional objectives in the different domains of learning (Okwelle and Okoye, 2012). Technical College education centers around the performance in the psychomotor domain with relevant emphasis on cognitive and affective domains (FGN 2004 and NBTE 2007). Technical College is viewed as an institution where vocational training is given to students.

These skills will enable them to gain entry into various occupations like Automobile, Electrical/Electronic, and Mechanical Engineering Craft Epenyong (2011). Macdelyn Mosalagae & Bekker,(2021) defined Technical College as the principal vocational institution that gives vocational training intended to prepare students for entry into various occupations as craftsmen and technicians. Both definitions are geared towards training for skill acquisition in different occupations. Hence, a Technical College can be described as an institution where students are trained in various occupations to acquire employable skills that will enable them to function well in the occupation in the world of work. By implication, much attention is focused on psychomotor performance or practical learning. The psychomotor component requires the appropriate use of workshop tools, equipment, and training materials that are necessary for effective training of the craftsman in his / her chosen trade such as Automobile, Electrical/Electronic, and Metalwork Mechanical Engineering Craft, among others.

Metalwork technology is one of the technical courses studied in Technical Colleges in Nigeria. Metalworking is a science, art, craft, and trade. According to Anya and Kelly (2017), metalwork technology is one of the courses in technical colleges that are aimed at training skilled labor for self-reliance. Metalwork technology is a field of study that teaches individuals how to make use of metal to produce different products for daily needs. Danjuma and Umaru (2019) stated that Metalwork Technology is the activity of making objects/products out of metals. Metalwork is generally called Metalwork Technology because it involves modern ways of making metal products using different tools, equipment, and machines. Ombugus (2013) opined that the aim of the Metalwork technology curriculum at the Technical College level is to teach the learner how to practice the trade independently upon graduation. Okeme (2011) defined metalwork technology as the study of all aspects of metalworking such as bench, sheet, art, metal jewelry, metal finishing, forging, casting, machines, heat treating, material testing, welding, and other fasting methods in metal manufacturing. In this context, metalwork technology involves the study where metals are redesigned and reconstructed for modern objects used at home and the industries. Ruth Cardoso Rocha et al.,(2023) stated that metalwork craftsmen are involved among others in the following operations: manipulating complex tools and equipment; determining and selecting appropriate metals; determination and committing to obeying safety rules guiding the complex machines they are working with.

Metalwork studies aim to produce skilled craftsmen for self or paid employment in the world of work. In the metalwork curriculum, there are some operations/tasks enumerated in metal cutting operations. According to the National Board for Technical Education (NBTE, 2013) metalwork process involves complex tasks. Such tasks are taught in step-by-step procedures to enable students to acquire the required skills for machine operation. According to Anya (2015), the step-by-step procedure will facilitate their rate of acquisition of practical skills.

Skills acquisition is one of the surest ways through which young people can find their way into the labor market either in the public or private sectors. Jing et al., (2023) defined skill as the ability to perform expertly and facilitate performance during employment. Matsumoto et al (2022) note that skill is an individual capability to control elements of behavior, thinking, and feeling within specified content and particular task domain. Advances in technology have rendered metalwork skills inadequate for work in the metal process industry; while creating needs for new and often sophisticated skills. This is because metal products are coming with new devices as a result of technological advancements. (Lima et al., 2023) With the seemingly rapid growth in metal users in Nigeria today, there is a need to improve the skills of the workforce needed for the metal industry.

The popular method of assessing students' practical skills in Technical Colleges including metal cutting practice trade by their teachers and instructors in Nigerian Evidence from research studies (Abeles et al., 2023) (Lars Mommers et al., 2023); Adio,. 2014) Okwelle, 2003) indicates that is based on mere looking at the students' finished products with little or no attention to the process involved in carrying out the practical work. Marks are then awarded to the students based on what the teacher or examiner feels the student deserves. This observatory method of awarding marks to students is considered biased and subsumes the award of grades that show individual examiner's feelings. According to Alkali (2010) the reason for this lopsided practice of assessment by the teachers could be that they are either reluctant, background, or too busy to assess the various stages of individual students' work by at least preparing a definite procedure of assessment.

To improve the standard of assessment in technical and vocational education, there is a need to use valid and reliable assessment instruments that will take into account the process of practical activities leading to the completion of the final practical products. Though such instruments have been developed in some other technical and vocational trades (Bukar, 2015, 2006; Chiejile, 2006; Adio,. 2014).; Okeke, 2004; Yalams, 2005), literature available to the researcher indicates that no such instrument has been developed and validated for use in metal cutting practical skill processes in Technical Colleges. Against the background of the paucity of standard instruments for assessing practical skills in metal-cutting operations, trade prompted the development of practical skills assessment scale for metal cutting in Technical Colleges in Nigeria

Statement of the Problem

Metalwork technology as a skill-oriented field of study is expected to equip learners with saleable skills that make way for self-reliance and paid employment. Poor performance of students in metalwork technology has made most Technical College school leavers to be unable to gain admission into higher institutions due to their inability to make at least a credit in the subject in the National Board for Technical Education Examinations (NABTEB). The Chief Examiner's reports for 2018 and 2019 stated that many candidates recorded poor achievement in metalwork technology in their practical results. It is also the observation of the West African Examination Council (Technical) Chief Examiner 2019 and National Examination Council 2018 that students do not know how to carry out practical work in the workshops, especially in the area of metal cutting. According to examiner reports students perform below credit level in their external examinations. The students might have had poor assessments that led to poor mastery of the skills in drilling, reaming, facing, turning, boring, milling, and broaching in metalwork technology processes. The extent of mastery in skill attainment in a competency-based subject like metal work trade is ascertained through a competency-based assessment process.

However, it has been revealed from research studies that graduates of metalwork technology from Technical Colleges are unable to perform as expected in their occupational trades. This situation could be attributed to various factors which include; the wrong method of assessing the skills of the students of metalwork technology. Furthermore, less attention has been given to the influence of school proprietorship on students' practical skill acquisition. The three types of proprietorship of Technical Colleges; include private Technical Colleges, State Technical Colleges, and Federal Technical Colleges. However, the study examines the extent of State and Federal Technical Colleges' influence on students' assessment in practical skill acquisition on metal cutting practices in the metalwork trade.

The influence of gender has become necessary in assessing students' practical skills due to the nature of metal cutting practices in metalwork technology, to clarify the gender differences in metal cutting practice skills irrespective of location. The location of the school is attributedto students' skill acquisition in metal-cutting practice.
The National Technical Certificate (NTC) and the Advanced National Technical Certificate (ANTC) examination conducted by NABTEB for assessing metalwork technology are focused more on the assessment of knowledge (cognitive) neglecting the process skills (psychomotor) and the whole affective (attitude). This assessment process has made the metalwork graduates lack sufficient skills resulting in a lack of saleable skills, unemployment, and lack of self-reliance in metal cutting practice work. This study, therefore, seeks to development of practical skills assessment scale for metal cutting in Technical Colleges in Nigeria

Purpose of the Study
The main purpose of the study is to develop metal metal-cutting practical skills assessment scale in TechnicalColleges in Nigeria. Specifically, the study will seek to:

- validate metal cutting practical skill assessment scale
- test reliability of the metal cutting practical skill assessment scale
- Find out the influence of location on the mean rating of the student's practical skills

Research Questions
The following research questions were formulated to guide the study

- What are valid metal-cutting practical skill assessment scales?
- What reliability of the metal cutting practical skill assessment scale?
- How does location influence the mean rating of the student's practical skills?

Hypotheses
The null hypothesis which was formulated to guide the study was analyzed at a 0.05 level of significance.

- H_0: There is no significant difference in the mean ratings of the Metal Cutting Practical Skill Assessment Scale (MCPSAS) in metalwork technology between Urban and Rural students in Technical Colleges.

METHODOLOGY
The study is an instrumentation research design. Instrumentation research design is used for a study if the purpose of the study is to produce new or modified content, procedures, technologies, or instruments for educational practices. The study answered three research questions and tested two hypotheses. The MCPSAS comprising practical skills based on the National Business and Technical Examinations Board (NABTEB) curriculum and related literature was developed and validated by five experts at Federal University of Technology Minna. The study adopted an instrumentation design and was carried out in two geo-political zones North - Central and North-East of Nigeria. The population of the study is 492 Metalwork practice technical students. The sample size of the study was 48 metalwork technology students selected from the 12 Government Technical Colleges selected from each geo-political zone of Nigeria (seven State Technical Colleges and five Federal Technical Colleges). The sampling method was a purposeful sampling technique. This was to enable the researcher to select the metalwork practice students purposefully from the sampled Technical Colleges.

Data were analyzed using factor analysis, statistical mean and standard deviation for the research question, and t-test at 0.05 level of significance for the hypotheses. The instrument used for this study is the Metal Cutting Practical Skill Assessment Scale (MCPSAS). The draft copy of the instrument has a total of 79 items which were designed to assess the following practical skills in metal cutting processes; Lathe turning, Milling, Facing, Drilling, Reaming, Boring, and Broaching Operations in Technical Colleges. Following a detailed review of relevant literature and the NABTEB curriculum, which awards the Nigeria National Technical Certificate (NTC), the instrument was arranged into seven clusters. The developed MCPSAS was based on a point scale namely: Very Highly Appropriate (VHA), Highly Appropriate (HA), Moderately Appropriate (MA), Appropriate (A), and Inappropriate (IA). These levels of responses were weighted as 4, 3, 2, 1, and 0 respectively to form parts of MCPSAS. Also, an operational scoring guide was attached to assist the Raters / Teachers in their assessments. Face validation of the draft instrument was carried out by five experts; three in the Industrial and Technology Education Department Federal University of Technology Minna, one expert from the Measurement and Evaluation Unit of Science Education, and one expert from Metal Work Technology, Faculty of Educational Technology Unit of Vocational and Technical Education, University of Ilorin, Nigeria. Following the comments of these experts, a final instrument consisting of 75 items was finally drafted and used for the study. To determine the reliability of the instrument, a pilot testing of the draft copies of the instrument was administered to 12 Metalwork Students in the North-West zone of Nigeria which consist of Niger, Kwara, Kogi, Benue, Plateau, and Nasarawa States that are outside the study area. The responses of these metalwork students were scored and subjected to factor analysis. The items that did not meet the specifications in terms of minimum loading were dropped out of the seventy-nine items that were subjected to a preliminary validation exercise. Four items failed to attain a minimum loading of 0.35 on any of the seven factors. Kendal coefficient concordance was used to test the degree of reliability of each of the operations and the entire instruments, which yielded 0.89. This was considered reliable and adequate for academic research. To answer research question 2, Kendal's coefficient of concordance was used to test the degree of reliability of each of the operations and the entire instrument. T-test was used in testing hypotheses 1, and 2, which guided the study. This was tested at a 0.05 level of significance. For selecting the practical skills appropriate for inclusion in the Metal Cutting Practical Skills Assessment Scale (MCPSAS) a mean cut of 2.50 and above was utilized. Therefore, any practical skill with a mean score of 2.50 and above was considered appropriate and chosen while a practical skill with a mean score below 2.50 was considered inappropriate to be included in the developed instrument for testing the hypothesis, t- a test was used at a 0.05 level of significance. That means if the calculated value is more than the critical value, the hypothesisis rejected, but when the calculated value is less than the critical value the hypothesis is upheld.

RESULTS AND DISCUSSIONS

Research Question 1: What are valid metal-cutting practical skill assessment scales?

Table 1: Factor Loadings Summary of Means, and Standard Deviations of the Seven Metal CuttingPractical Skill Assessment Scale in Technical Colleges in Nigeria N = 48

Metal Cutting Practical Skills Assessment	Scales	Factor DOS1	LTO2	MOS3	FOS4	BOS5	ROS6	BOS7		SD
DOS1-10	Drilling Operation Skills	.951							2.97	0.48
	Cronbach's alpha	.867								
	KMOMSA	.714								
LTO11-25	Lathe Turning Skills		.753						3.06	0.46
	Cronbach's alpha		.645							
	KMOMSA		.833							
MOS26-40	Milling Operation Skills			.717					3.02	0.29
	Cronbach's alpha			.473						
	KMOMSA			.479						
FOS41-48	Facing Operation Skills				.788				3.07	0.50
	Cronbach's alpha				.549					
	KMOMSA				.719					
BOS50-56	Boring Operation Skills					.853			3.01	0.28
	Cronbach's alpha					.640				
	KMOMSA					.862				
ROS57-65	Reaming Operation Skills						.780		3.04	0.36
	Cronbach's alpha						.749			
	KMOMSA						.780			
BOS66-75	Broaching Operation Skills							.751	3.18	0.35
	Cronbach's alpha							.823		
	KMOMSA							.788		
	Overall Cronbach's alpha							**0.68**	**3.05**	**0.39**

Extraction Method: Principal Component Analysis; KMOMSA = Kaiser–Meyer–Olkin Measure of SamplingAdequacy.

Table 1 presents the summary of the factor loadings of the practical skill assessment scale in metal cutting processes in Technical Colleges in Nigeria. The results showed homogeneity of item spread. However, out of seventy-nine items of the MCPSAS subjected to factors analysis, four items (i.e., items 5, 12, 58, and 60) did not load properly and were discarded, thus leaving 75 items. According to Ogbonna in Obe (2019), for an item to be accepted in any factor it has to attain a loading of up to 0.35. For the drilling operation skills its validity was determined using 2scales: agree (1) and disagree (0). This section consists of 10 items describing different drilling operation skills. The items were subjected to principal components analysis (PCA). PCA is considered suitable for this analysis because it helps researchers who are interested in scale and wish to generate an empirical summary of any given data set (Tabachnick, & Fidell, 2001).

More than 90% of the respondents agreed that each of the items is drilling operation skills required in Technical Colleges in Nigeria. The metalwork technology students (more than 70%) also affirmed that all the items identified as the lathe turning and milling operation skills are metal cutting operating skills required in Technical Colleges in Nigeria and that these skills are capable of improving their metalwork practice and also improve their performance. From the factor loading results, about 78%, 85%, 78%, and 75% agree that the items identified as facing, boring, reaming, and broaching operation skills respectively are metalwork cutting practical skill assessment scales required in Technical Colleges in Nigeria. Furthermore, results presented in Table 1 also indicated a positive value of Kaiser–Meyer–Olkin Measure of Sampling Adequacy (KMO) and the result showed a grand value of .714, .833, .479, .719, .862, .780, and .788 respectively. These results are congruent with Lars Mommers,et al (2023) who noted that for factor analysis to be considered appropriate for data analysis, the KMO value must be .6 and above. Factor analysis is considered fit for this study because it permits a researcher to ascertain if many variables can be described by a few factors (Fraenkel & Wallen, 2009).

Research Question 2: What are the reliable Metal Cutting Practical Skills Assessment Scale (MCPSAS) inTechnical Colleges?

Table 2: The result of the reliability of the metal cutting practical skills assessment scale using Kendalcoefficient of concordance Tau (w) are given below:

S / N	TASK / OPERATION	N0 OF ITEMS	Kendal coefficient of concordance Tau (w)	REMARKS
1	Drilling Operation	10	0.65	A
2	Lathe Turning Operation	15	0.80	A
3	Milling Operation	15	0.80	A
4	Facing Operation	8	0.45	A
5	Boring Operation	8	0.45	A
6	Reaming Operation	9	0.50	A
7	Broaching Operation	10	0.65	A
	Average (W)		0.614	A

Key: A=Appropriate.

Table 2: revealed that each of the seven major tasks/operations has a high-reliability co-efficient. Also, the resultof the analysis revealed that 75 items of the instrument were highly reliable for inclusion in the final copy of the instrument. The obtained Tau (w) for the various clusters ranged between 0.45 and 0.80. And that of the entire instrument was found to be 0.61. The developed instrument was found to be valid, reliable, and practically useful for assessing metal cutting practical skills in Technical Colleges.

Research Question 3: What is the influence of location on the mean rating of the student's practical skills?

Table 3: Mean and Standard Deviation Ratings on the Influence of Location on the Student Practical Skills in Technical Colleges N = 48

S/N	Items	Urban		Rural		Remark
		$\overline{X}$	SD	$\overline{X}$	SD	
1	Taking measurement	2.80	0.30	3.12	0.56	A
2	Setting- up the drilling machine	3.01	0.30	3.11	0.57	A
3	Drilling a hole in a metal bar	3.02	0.34	3.02	0.25	A
4	Drilling a blind hole in a metal	2.84	0.31	3.27	0.56	A
5	Spot drilling	2.97	0.29	3.06	0.28	A
6	Make chain drill	2.96	0.33	3.11	0.37	A
7	Use the appropriate clamping device	3.00	0.27	3.34	0.34	A
8	Handling vibrating drilling machine	2.94	0.30	3.15	0.42	A
9	Counter sunk drilling	2.80	0.30	3.12	0.56	A
10	Counter sink drilling	3.01	0.30	3.11	0.57	A
	Cluster mean	**3.02**	**0.34**	**3.02**	**0.25**	**A**

Key: $\overline{X}$ = Mean, SD = Standard Deviation, A = Appropriate.

The result presented in Table 3 showed the mean ratings of the respondents on the influence of location on metal-cutting practical skills. The result revealed that items 1 to 10 in Technical Colleges in the Urban area had mean values ranging from 2.80 to 3.01 with corresponding standard deviations ranging from 0.27 to 0.34 indicating that the metal technology students in the Urban area agree that the 10 items identified as the metal cutting practical skills are the skills, they require for effective metal cutting. Similarly, the results from the Technical Colleges in Rural areas revealed mean values ranging from 2.02 to 3.34 with corresponding standard deviation ranging from 0.25 to 0.57 indicating that all the respondents agree that these skills are needed for metal cutting practical. The overall standard deviations of 0.34 and 0.25 indicate that the respondents in the Urban and Rural Technical Colleges are very close to one another in their opinions.

Hypothesis 1:

H_{O1}: There is no significant difference in the mean ratings of the Metal Cutting Practical Skill Assessment Scale (MCPSAS) in metalwork technology between male and female students in Technical Colleges

Table 4: t-test Summary of Metal Cutting Practical Skills in Metalwork Technology between Male andFemale Students in Technical Colleges in Nigeria N (Male = 32, Female = 16)

S/N	Operations Skills	Male		Female		Df	t-cal	Sig. 2-tailed	Remk
		$\bar{X}_m$	SD	$\bar{X}_f$	SD				
1	Drilling	3.05	1.01	2.93	0.97	46	0.461	0.832	NS
2	Lathe Turning	3.10	0.88	3.04	1.00	46	0.196	0.505	NS
3	Milling	3.03	0.93	3.01	0.92	46	0.138	0.299	NS
4	Facing	3.02	1.02	3.09	0.99	46	-0.48	0.877	NS
5	Boring	3.06	0.85	2.99	0.95	46	0.851	0.889	NS
6	Reaming	2.97	1.01	3.08	1.00	46	-1.01	0.229	NS
7	Broaching	3.20	0.96	3.17	0.97	46	0.081	0.320	NS
	Cluster Mean	**3.06**	**0.95**	**3.04**	**0.97**	**46**	**0.034**	**0.564**	**NS**

Key: $\bar{X}$= Mean, SD = Standard Deviation, Df = Degree of freedom, Remk = Remarks, S = Significant, NS =Not significant.

Table 4 presents a t-test summary to test hypothesis 1 that there is no significant difference in the mean responses of male and female students on the Metal Cutting Practical Skill Assessment Scale (MCPSAS) in metalwork technology in Technical Colleges in Nigeria. Results revealed P-values on the operating skills items which ranged from 0.299 – 0.889 with overall cluster means of p = 0.564, t-cal of 0.034 at 46degree of freedom. Since each of the overall P-values is greater than 0.05 criterion values, it implies that there was no significant difference in the mean responses of the respondents. Therefore, the hypothesis 1 of no significant difference wasnot rejected.

Hypothesis 2

H_{03}: There is no significant difference in the mean ratings of the Metal Cutting Practical Skill Assessment Scale (MCPSAS) in metalwork technology between Urban and Rural students in Technical Colleges.

Table 5: t-test Summary of Metal Cutting Practical Skills in Metalwork Technology between Urban and Rural Technical Colleges in Nigeria N (Urban = 25, Rural = 23)

S/N	Operations Skills	Urban $\bar{X}_m$	SD	Rural $\bar{X}_f$	SD	Df	t-cal	Sig. 2-tailed	Remk
1	Drilling	2.80	0.30	3.12	0.56	46	-2.48	0.053	NS
2	Lathe Turning	3.01	0.30	3.11	0.57	46	-0.72	0.030	S
3	Milling	3.02	0.34	3.02	0.25	46	0.016	0.167	NS
4	Facing	2.84	0.31	3.27	0.56	46	-3.25	0.121	NS
5	Boring	2.97	0.29	3.06	0.28	46	-1.07	0.659	NS
6	Reaming	2.96	0.33	3.11	0.37	46	-1.46	0.419	NS
7	Broaching	3.00	0.27	3.34	0.34	46	-3.86	0.163	NS
	Cluster Mean	**2.94**	**0.30**	**3.15**	**0.42**	**46**	**-1.83**	**0.053**	**NS**

Key: $\bar{X}$= Mean, SD = Standard Deviation, Df = Degree of freedom, Remk = Remarks, S = Significant, NS =Not significant.

Table 5 shows a t-test summary of hypothesis 3 that there is no significant difference in the mean responses of the Metal Cutting Practical Skill Assessment Scale (MCPSAS) in metalwork technology among students in Federal and State Technical Colleges. Results show P-values on all the operating skills which ranged from 0.030 – 0.659 with overall cluster means of p = 0.053, t-cal of -1.83at 46degree of freedom. Since each of the overall P-values except that of item 2 is greater than 0.05 criterion values, it implies that there was no significant difference in the mean responses of the respondents from urban and rural locations on MCPSAS of the metalwork technology in Technical Colleges in Nigeria. Therefore, the hypothesis 3 of no significant difference was not rejected.

Conclusion

The study set out to develop and validate the metal cutting practical skill assessment scale for assessing practical skills in mechanical engineering craft students in Technical Colleges. The study successfully developed a valid and reliable test instrument for assessing the practical skills of students in the metalwork trade in technical colleges. The result related to the research question indicated that all 75 practical skills were considered appropriate for inclusion in the metal cutting practical skill assessment scale (MCPSAS). This signifies that the mechanical engineering craft studies trade teachers in technical colleges considered the 75 skill activities as appropriate for use in assessing students' performance in practical areas of the metalwork trade. Technical Colleges in Nigeria are set up to equip youths in different trades, either paid or self-employed. This study on metal works skills required by students of Technical Colleges for self-employment in Nigeria is a result of the technical manpower in the 21st-century labor market demands which have caused many metalwork graduates with various certificates to be unemployed. For Nigeria to rise above the problem of unemployment among metalwork Technical College students there is a need to impart sound metal-cutting practical skill processes as this will help them to be self-employed without necessarily waiting for white-collar jobs.

Recommendations

From the data collected and analyzed, the following recommendations are made;

- The examination bodies in charge of conducting and organizing examinations for the Technical Colleges (NABTEB) should integrate the competency-based assessment instrument in their examination for certification of students in metalwork in Technical Colleges.
- The NBTE should integrate the developed competency-based assessment instrument into the curriculum of Technical Colleges for training metalwork students.
- The Nigerian Educational Research and Development Council should integrate the Developed competency-based assessment instrument into the vocational curriculum of Technical Colleges.

References

Abeles, D., Herszage, J., Shahar, M., & Nitzan Censor. (2023). Initial motor skill performance predicts future performance, but not learning. Scientific Reports, 13(1). https://doi.org/10.1038/s41598-023-38231-5

Adio, E. C. (2014). Workshop-Based Process Skills Test in Metal Grinding for Students in Technical Colleges. Journal of Home Economics Research 21, 92-104. Available online at www.heran.org

Alkali, Y.(2010), Conducting Research in Education and the Engineering Technology. Patigi: Dzawafinni.

Anya & Kelly (2017) Ayala, R. I. & Kelly, H. P. (2017). MEC item analysis. Measurement and Evaluation Centre. University of Texas. Retrieved on June 10, 2018 from mecscore @ www. Utexas. Edu.

Anya, D. E. (2015). Development and Preliminary validation of the Electricity Achievement Test (ELAT) For Nigerian Technical Colleges. Unpublished Med Thesis. University of Nigeria, Nsukka.

Bukar, B. (2006). Development and validation of laboratory–based tests for assessing practical skills of higher national diploma students in electronics maintenance and repairs. Unpublished Ph.D dissertation, Department of Vocational Education, University of Nigeria, Nsukka.

Chiejile, L. C. (2006). Development and validation of a test instrument for assessing students' practical performance in electrical installations. Unpublished doctoral dissertation, Nnamdi Azikiwe University, Awka, Nigeria.

Danjuma,A.(2017).Psycho-Productive Skills Multiple Choice Tests Items For Assessing Students In Technical Colleges – A Review - Danjuma A . Ombugus, Ph.D. and Rebecca I. U m aru, Ph.D World Educators Forum, Vol. 9 No. 1, July, 2017 ISSN: 2350-2401 16

Epenyong, L.E. (2011).Foundations of Technical and Vocational Education: Evolution and Practice for Nigeria Students in TVE and adult education, Policy makers & Practitioners: AMBIK PRESS LIMITED BENIN CITY, NIGERIA.

Federal Ministry of Education (FME), (2004), National Policy on Education (Revised), Lagos: Federal Ministry of Information printing Division

Fraenkel, J. R. & Wallen, N. E. (2009). How to Design and Evaluate Research in Education. Boston: MacGraw-Hill.

Jing, Y., Hu, M., & Zhao, L. (2023). The effect of heterogeneous environmental regulations on the employment skill structure: The system-GMM approach and mediation model. PLOS ONE, 18(8), e0290276–e0290276. https://doi.org/10.1371/journal.pone.0290276

Lars Mommers, Verstegen, D., Dolmans, D., & Mook, van. (2023). Observation of behavioural skills by medical simulation facilitators: a cross-sectional analysis of self-reported importance, difficulties, observation strategies and expertise development. Advances in Simulation, 8(1). https://doi.org/10.1186/s41077-023-00268-x

Lima, L., Pantovic, M., Clingo, M., Fischer, K., Jalene, S., Landers, M., Mari, Z., & Poston, B. (2023). A Single Application of Cerebellar Transcranial Direct Current Stimulation Fails to Enhance Motor Skill Acquisition in Parkinson's disease: A Pilot Study. Biomedicines, 11(8), 2219–2219. https://doi.org/10.3390/biomedicines11082219

Macdelyn Mosalagae, & Bekker, T. L. (2021). Education of students with intellectual disabilities at Technical Vocational Education and Training institutions in Botswana: Inclusion or exclusion? African Journal of Disability, 10. https://doi.org/10.4102/ajod.v10i0.790

Matsumoto, S., Hiroshi Kawahira, Kosuke Oiwa, Maeda, Y., Nozawa, A., Alan Kawarai Lefor, Yoshinori Hosoya, & Sata, N. (2022). Laparoscopic surgical skill evaluation with motion capture and eyeglass gaze cameras: A pilot study. Asian Journal of Endoscopic Surgery, 15(3), 619–628. https://doi.org/10.1111/ases.13065

NABTEB (2013). NABTEB newsletter, 2 (1) Benin City: National Business and Technical Examination Board.

NABTEB (2013). Syllabus for engineering trade for the national technical certificate examination level. Benin City National Business and Technical Examination Board.

NABTEB (2019). NABTEB Chief Examiner 2019 newsletter, 2 (1) Benin City: National Business and Technical Examination Board.

National Examination Council 2018 NABTEB newsletter, 2 (4) Benin City: National Business and Technical Examination Board. [21]. Obe P. (2019), Development and Validation of Competency-Based Based Instrument for Assessing Metalwork Students in

Technical Colleges in Enugu and Abonyi States in Nigeria. (Unpublished Ph.D. Thesis) Department of Industrial Technical Education, University of Nigeria Nsukka.

Okeke B. C. Okwelle P. C., , & Ayonmike C. S (2013). Towards quality technical vocational education and training (TVET) programs in Nigeria: challenges and improvement strategies. International

Okeme, I. (2011). Development and Validation of Psycho Productions Skills Multiple Choice Items for students in agricultural Science in Secondary Schools. (Unpublished Ph.D. Thesis) submitted to the Department of Vocational Teacher Education, University of Nigeria. Nsukka.

Okwelle & Okoye, 2012).Development and Validation of Instruments for Assessing Practical Skills in Building Electronics Systems in Nigeria Technical Colleges. Journal of Emerging Trends in Engineering and Applied Sciences JETEAS 3 (5)779-785.

Okwelle P. C., Ayonmike C. S, & Okeke B. C. (2013). Towards quality technical vocational education and training (TVET) programs in Nigeria: challenges and improvement strategies. International

Okwelle, P. C. (2011). Development and validation of instruments for assessing practical skills in radio and television systems in technical colleges. Unpublished Doctoral Dissertation. Nnamdi Azikiwe University, Awka, Anambra State, Nigeria.

Ombugus, D.A. & Umaru, R.I. (2016). Psycho Productive Skills Multiple Choice Test Items for Assessing Students in Mechanical Engineering Craft in Technical Colleges. European Journal of Education Studies Vol. 2/issued 2/2016 available online at www.oapub.org/edu

Ombugus, O. A. (2013). Development and validation of workshop-based process skill test in mechanical engineering Craft for assessing students in technical colleges in Nassarawa State. Unpublished Ph.D. Thesis VTE, University of Nigeria Nsukka.

Ruth Cardoso Rocha, Valéria, F., Pereira, W., Araújo, C., Augusta, M., & Vilar, M. (2023). Nursing technicians' professional training in patient safety: A mixed-methods study. PubMed Central, 31. https://doi.org/10.1590/1518-8345.6214.3819

Tabachnick, B. G., & Fidell, L. S. (2001). Using Multivariate Statistics (4th ed). New York: Harper Collins**.**

Traub, R. (2017). Classical test theory in historical perspective educational measurement: Issues and practice, 16(4), P.1745 – 1820.

Yalams, S. M. (2005). Development and validation of metalwork process evaluation scheme. Unpublished PhD Thesis. University of Nigeria, Nsukka..org/10.1186/s41077-023-00268-x

EFFECTS OF CAN BUS AND OBD- II CONNECTION SKILLS ON STUDENT PERFORMANCE IN AUTOMOBİLE REPAIR: A COMPARATIVE STUDY

ORIE, C. JOHN
School of Secondary Education Technical, Federal College Education Technical OmokuI

Abstract
The goal of this study is to examine the relationship between CAN bus and OBD -11 connections repair opportunities in automobile technology industry using a qualitative descriptive technique. A structured questionnaire was employed as a measuring instrument to assess the influence of skills and attitudes on whether or not they succeeded in the corporate and industrial worlds. A total of 70 students participated in the study, and 45 had completed their practice satisfactorily, while the remaining 25 had not. The findings of the study revealed that attitudes and skills have a significant impact on the success of students in the company workshop and industry because they possessed the following talents, which contributed 48% of the total: a), b), c), and d). The low self-discipline/Bus Load (44%) and low enthusiasm for practicing Diagnostic Trouble Codes (20%) attitude and skill indicators, respectively,/ Parameter IDs (PIDs), impact the reasons why students are not well received at the practice site. The primary indicators of attitude are persistence and openness to receiving feedback from the practice workshop's supervisor. Collaborative learning produced far higher achievement and retention of learning outcomes than competitive and individualistic learning, according to a meta-analysis of all the studies. In order to enhance learning outcomes, boost retention rates, and facilitate the utilization of advanced reasoning techniques, educators ought to motivate students to choose for cooperative approaches instead of competitive or individualistic ones.
Keywords: CAN bus , OBD- II Connection ,Student Performance and Automobile Repair

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

THERMAL, RHEOLOGICAL, AND MECHANICAL PROPERTIES OF POLYSTYRENE (PS) COMPOSITES REINFORCED WITH SNAIL SHELL POWDER (SSP) BIOFILLER

Z. El Hamri
Team of Innovative Materials and Mechanical Manufacturing Processes, ENSAM, University Moulay Ismail

M. Karaoui
Team of Innovative Materials and Mechanical Manufacturing Processes, ENSAM, University Moulay Ismail

I. Maouhoubi
Solid Physics Laboratory, Group of Nanomaterial and Renewable Energies, Department of Physics, Faculty of Sciences Dhar El Mahraz, Sidi Mohamed Ben Abdellah University

M. Alami
Team of Innovative Materials and Mechanical Manufacturing Processes, ENSAM, University Moulay Ismail

M. Assouag
Team of Innovative Materials and Mechanical Manufacturing Processes, ENSAM, University Moulay Ismail

ABSTRACT
This work aims to elaborate composites based on polystyrene (PS) reinforced with $CaO/CaCO_3$ particles produced from snail shell powder (SSP) using the free air casting method. The developed composites (PS/SSP) with diferent percentages of SSP (1, 5, 7, and 10% (by wt)), were characterized in terms of thermal, fow, mechanical properties, and structural and morphological examinations using diferential scanning calorimetry (DSC), viscometry, tensile and hardness tests, and Fourier transform infrared (FTIR) and optical microscopy, respectively. Addition of SSP particles increased the viscosity of the PS matrix by 8.21%, and the mechanical tests indicated 70% and 40% rise in Young's modulus and hardness, respectively, for the PS/SSP composite containing 10% (by wt) SSP particles. Thermal analysis revealed 36 and 16% rise in the glass transition (Tg) and the degree of cristallinity (X_C) of the composites compared to pure PS, respectively. The morphological examinations showed that a 10% (by wt) of SSP particles were well dispersed within the PS matrix confrming, thus, the results obtained in the previous analyses. $CaO/CaCO_3$ particles produced from SSP by mechanochemical process and heated thermally improved the PS properties. Therefore, SSP can be considered as a cheap and renewable biosource of $CaO/CaCO_3$ particles that can be used for PS and other polymer matrices.
Keywords: Composites, CaO/CaCO3 particles, PS, Snail shell powder, Thermoplastic polymer.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

INVESTIGATION OF TRIAZOLE'S CORROSION INHIBITION ON E24 STEEL IN 1M HCL THROUGH GRAVIMETRIC AND ELECTROCHEMICAL METHODS

Z. El Hamri
Team of Innovative Materials and Mechanical Manufacturing Processes, ENSAM, University Moulay Ismail

M. Karaoui
Team of Innovative Materials and Mechanical Manufacturing Processes, ENSAM, University Moulay Ismail

M. Alami
Team of Innovative Materials and Mechanical Manufacturing Processes, ENSAM, University Moulay Ismail

M. Assouag
Team of Innovative Materials and Mechanical Manufacturing Processes, ENSAM, University Moulay Ismail

ABSTRACT
The current study investigates the corrosion inhibition of E24 carbon steel in 1M hydrochloric acid in the presence of different concentrations of the triazole molecule as inhibitor, ranging from 10^{-3}M to 10^{-6}M. The results obtained by gravimetric and electrochemical (stationary and transient) methods show that the molecule tested is a highly effective inhibitor of corrosion. Indeed, inhibitory efficacy increased with increasing molecule concentration, reaching maximum values of 95.02% and 94.43% for the 10^{-3} M concentration, for gravimetric and electrochemical measurements, respectively. In addition, the study of inhibition efficiency as a function of temperature ranging from 303°K to 343°K revealed that adsorption of the molecule to the metal surface obeys the Langmuir isotherm. This molecule has characteristics that facilitate adsorption to the metal substrate surface, notably the existence of aromatic rings and heteroatoms (O and S).
Keywords: *Inhibition, Carbon steel, Hydrochloric acid, Molecules, EIS/PDP.*

Graphical Abstract

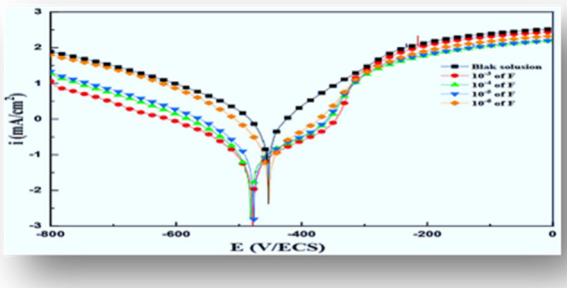


Figure 2: Potentiodynamic polarisation curves for E24 steel in 1M HCl solution in the presence of different concentrations of the 4F inhibitor used (triazole molecule).

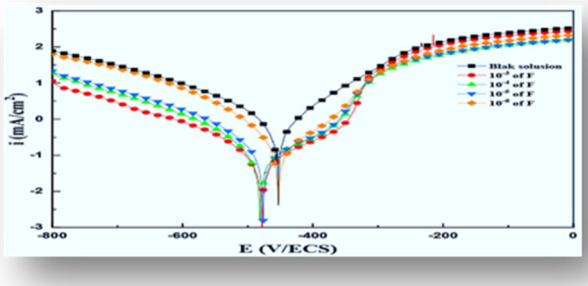


Figure 01: Nyquist graphs for steel electrode with and without inhibitor at Ecorr after immersion

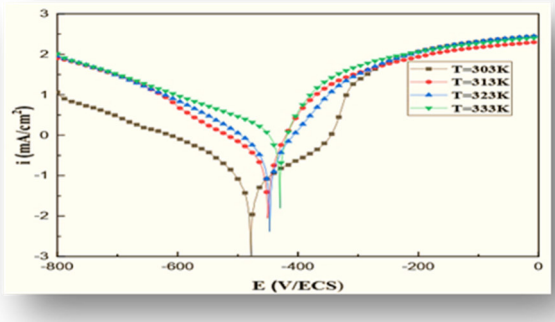


Figure 04: Plot of the Langmuir adsorption isotherm at 303°K for the adsorption of the 4F inhibitor on the surface of E24 carbon steel in a 1 M HCl solution.

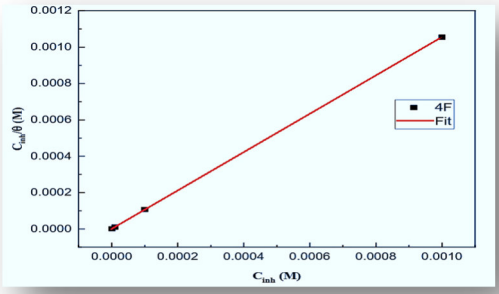


Figure 03: *Potentiodynamic polarisation curves for E24 steel in 1M HCl solution in the presence of10-3 of the inhibitor used (triazole molecule) at different temperatures.*

PHYSICO-CHEMICAL ANALYSIS OF SNAIL SHELL POWDER PREPARED THROUGH MECHANOCHEMICAL PROCESSING AND THERMAL TREATMENT

Z. El Hamri
Team of Innovative Materials and Mechanical Manufacturing Processes, ENSAM, University Moulay Ismail

M. Karaoui
Team of Innovative Materials and Mechanical Manufacturing Processes, ENSAM, University Moulay Ismail

M. Alami
Team of Innovative Materials and Mechanical Manufacturing Processes, ENSAM, University Moulay Ismail

M. Assouag
Team of Innovative Materials and Mechanical Manufacturing Processes, ENSAM, University Moulay Ismail

ABSTRACT
Natural particles are the most abundant resources exist in nature. Bio-sources of $CaCO_3$ particles have attracted the attention of researchers for multiple cosmetics, industrial, and medical applications. This work investigates the structural evolution of $CaCO_3$ containing in snail shell particles prepared by a mechanochemical process using methods of characterization as well as Differential scanning calorimeter (DSC), Thermogravimetric analysis (TGA), X-ray diffraction (X-RD), Fourier transformation infra-red (FT-IR), and Scanning microscopy equipped with Energy-dispersive X-Ray spectroscopy (SEM-EDXS). The result obtained from the above analysis indicates that SSP calcined between 200°C to 400°C undergoes an elimination of water molecules, followed by a phase transformation from Aragonite to $CaCO_3$ Calcite. At 800°C, the SSP decomposes $CaCO_3$, giving rise to calcium oxide crystals CaO, which release CO_2 molecules. These eliminations and transformations represent a loss of 47.08% of the initial mass at 800°C. The morphological analysis shows the surface of SSP calcined at 800°C with $CaO/CaCO_3$ crystal formation. Also, the mechanochemical process leads to obtaining an SSP with a size between 3.311 µm to 10.140 µm. Snail shells can be a natural source of $CaCO_3$ and CaO, thanks to their ease of extraction and processing.
Keywords: Composites, Snail shell; Thermal treatment; DSC; XRD; FT-IR.

INVESTIGATION OF NI DOPING ON STRUCTURAL, MICROSTRUCTURAL, AND OPTICAL PROPERTIES OF TIN OXIDE FILMS VIA PSP METHOD

Sabrina Roguai
Department science of the matter, Abbes Laghrour university khenchela

Abdelkader Djelloul
Department science of the matter, Abbes Laghrour university khenchela

Abstract
In this study, we employed a pneumatic spray pyrolysis (PSP) technique at a deposition temperature of 450°C to synthesize $Sn_{1-x}Ni_xO_2$ thin films, with the nickel doping concentration varying from 0.0 to 0.10, on glass substrates. The effects of different Ni doping levels on the structural and optical properties of the films were thoroughly investigated. Structural characterization using X-ray diffraction (XRD) confirmed the presence of the rutile phase of SnO_2 in all the thin films. The crystallite sizes were estimated to range between 27 and 47 nm. Optical measurements revealed that the bandgap energy increased from 3.83 eV to 4.01 eV with increasing dopant content, consistent with the Burstein-Moss effect. Additionally, it was observed that both the electrical resistivity and the thickness of the thin films were influenced by the doping levels. The study provides a comprehensive analysis of how Ni doping modifies the intrinsic properties of SnO_2 thin films, highlighting the potential for tuning these materials for specific applications through controlled doping.
Keywords: Thin films, X–ray diffraction, Optical properties.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

DEVELOPMENT OF COPPER OXİDE NANOPARTİCLES FOR ENHANCED PHOTOCATALYTİC PERFORMANCE

Sabrina Roguai
Department science of the matter, Abbes Laghrour university khenchela

Abdelkader Djelloul
Department science of the matter, Abbes Laghrour university khenchela

Abstract
Today, wastewater treatment and the sanitation of potable water supplies are major concerns. Among the most recent advances in water treatment, advanced oxidation processes (AOPs) offer effective solutions for the mineralization of toxic organic molecules in aqueous media. One such process is heterogeneous photocatalysis, which involves a photo-sensitized reaction based on the adsorption of light radiation by a catalyst, typically a semiconductor like CuO. This method has the advantage of not introducing chemical compounds other than CuO into the medium to be treated.
In this study, copper oxide (CuO) nanoparticles were synthesized using a simple co-precipitation method. The synthesis involved heating the reaction mixture at 80°C, specifically for photocatalytic applications. The resulting nanopowder underwent microstructural characterization using X-ray diffraction (XRD) and scanning electron microscopy (SEM). XRD analysis confirmed the formation of the CuO monoclinic phase, with an average grain size of the CuO crystallites measured at 30 nm. SEM images revealed a three-dimensional flower-like morphology, indicating that the structure was successfully prepared for subsequent degradation of methylene blue (MB) in photocatalytic tests.
The study highlights the synthesis procedure and detailed characterization of CuO nanoparticles, demonstrating their potential effectiveness in photocatalytic applications, particularly in the degradation of organic pollutants in water. The results suggest that the synthesized CuO nanoparticles, with their unique microstructure, are promising candidates for enhancing the efficiency of photocatalytic processes in environmental remediation.
Keywords: CuO NPs, X-ray diffraction, SEM; Photocatalytic

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

THE ROLE OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN ENHANCING EMPLOYEE EXPERIENCE AND ENGAGEMENT

Assistant Professor M. K. GANESHAN
Department of Management Studies, MIET Engineering College
ORCID: 0000-0003-2407-1527

Abstract
Artificial intelligence is bringing about a revolution in the workplace, changing the way companies function and engage with their workforce. AI is already having a big impact on human resources and employee engagement, and this trend is continuing. Artificial Intelligence (AI) and Machine Learning (ML) are revolutionizing Human Resource Management (HRM) through significantly enhancing employee experience and engagement. AI-driven tools enable personalized recruitment, optimize learning and development, and monitor employee well-being through advanced analytics. ML algorithms predict engagement trends and adapt interventions, creating a more responsive and supportive work environment. Still, the integration of these technologies also raises concerns about data privacy and ethical implications. This study explores the transformative potential of AI and ML in HR practices, highlighting their impact on employee satisfaction, productivity, and organizational effectiveness. Organizations continue to integrate advanced technologies into their HR practices, seeking ways to enhance employee experience and modernize HR operations.
Keywords: HRM, Artificial Intelligence, Machine Learning, Employee Engagement, Personalization.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

EXPLORING MICROGRID ENERGY MANAGEMENT: A DETAILED REVIEW OF CONTROL STRATEGIES

Öğr. Gör.Muhammed Cihat ALTIN
Van Yuzuncu Yil University, Van Vocational High School, Electric and Energy
ORCID: 0000-0002-5224-8978

Prof. Dr. Mehmet Salih MAMİŞ
Inonu University,Engineering Faculty, Elektrical-Elektronical Mühendisliği
ORCID: 0000-0002-6562-0839

ABSTRACT
Various problems associated with the enlargement of the grid and the growing use of intermittent power supplies have been reported, such as the need for costsly transmission lines and cascading blackouts, which could have a negative impact on critical infrastructure. Microgrids (MGs) are a viable solution to increase the desired grid reliability and stability with growing energy demand and provide continuous power supply to consumers. MGs need to be Energy Management and Control Systems (EMCS). However, MGs need Energy Management and Control Systems (EMCS) to guarantee the efficient operation of Distributed Energy Resources (DERs). In this respect, considerable studies have been carried out to achieving a uniform configuration of grid parameters during functioning at optimum running cost. This study introduces a short introduction to the following subjects of EMCS developments in recent years. First, the structure of microgrids is discussed in past studies. MGs are categorized with regard to the features below in their different implementations and their control systems are revised to achieve reliable functioning. In this review,_storage degradation, transaction revenues with the grid and greenhouse gas emissions or other parties, This document also highlights IEEE standards on MG use and control to facilitate other participants to establish a standardized framework and to improve the interoperability of various EMCS Technologies.
Keywords: Distributed energy resources, energy management control systems, energy storage systems, microgrid optimization, renewable energy resources,

I. INTRODUCTION
A. BACKGROUND
In the recent past, power grids around the world have experienced many major power outages, causing millions of dollars in losses to their respective economies [1], [2], [3], [4]. In the US alone, millions of lives are impacted each year, resulting in billions of dollars in lost revenue [3]. The sources of power grid disruptions range from isolated outages caused by transmission line outages and technical failures at power plants to Major disruptions triggered by extreme meteorological disturbances. The main problem with these events is that important load centers such as healthcare facilities, airports and continuous production sectors are affected for up to 5 to 10 hours, in many cases even longer Furthermore, in the case of major electricity blackouts, the network takes a long time to recover. Sometimes it is even necessary to shut down intact transmission lines to restore the grid [5]. Therefore, concerns about the future of electricity grids around the world need to be addressed. FirstlyIt is expensive to build long power transmission lines to bring populations closer together in developing regions with low population density, such as Sub-Saharan states.

Therefore, the conventional way of owning centralized energy plants does not seem to be the way to go. Second, the challenges posed by rapid population growth and industrialization. [6], [7], [8], [9], [10]. In addition, growing global awareness of rising greenhouse gas emissions has forced many governments to set ambitious targets for the integration of renewable energy into their energy grids [11], [12], [13]. On the other hand, renewable power sources are mostly unregulated and can cause problems such as staggered outages and system instability.

B. MICROGRIDS

Based on the described problems, it makes sense to consider some reorganization of the grid. One such reorganization is the creation of microgrids (MGs), which are implemented in relatively small geographical areas and are usually on the distribution side. MGs can be grid-connected and operate independently in operation. This allows the application in remote areas such as rural areas, which makes expensive transmission lines unnecessary [14],[15],[16],[17],[18],[19]. Beyond If a microgrid is cascaded, it can isolate itself It is fed from the grid in case of power failure or failure in the nearby grid. This improves the reliability and resilience of the local system, which is essential for crucial loads, especially during natural hazards. However, due to their small size, any failure of a distributed energy resource (DER) can affect the entire system: poor backup options such as energy storage systems (ESS) have been implemented. In addition, some works classify structures such as nanogrids and open energy systems [20], which are slight variations of the microgrid concept. Table 1 presents the differentiation between traditional grids and microgrids.

C. Literature Review and Contributions

Microgrids need complicated energy management systems (EMS) As they need to take into account the optimal operation and simultaneous management of distributed energy resources to ensure that the balance and other requirements of the microgrid are met. In addition, metaheuristics have also become fully applicable to the optimal deployment of distributed energy resources to reduce the total cost of ownership. In this context, real-time control techniques have also been investigated in detail. A literature review on this topic shows Numerous scientific studies have been conducted on this subject. In [21], EMCS for MG building applications is discussed, combining research on heat supply and power generation. However, optimization methods are mainly limited to mathematical methods and meta-heuristics. In [22], MG EMCS is extensively studied with a primary focus on MG control techniques. DC MG EMS has been studied in [15] and [23]. The latter deals more extensively with optimization approaches, while Al-Ismail [15] provides a critical evaluation of EMCS methods. Various authors in [24], [25], [26], [27] and [28] have discussed EMCS for MGs using different classifications and contents. It is clear that most studies lack a comprehensive critical analysis of the reviewed papers or only partially address them. A thorough critical literature review is important to ensure readers have a better meaning of the content and to identify research gaps in the field. Furthermore, most studies have categorized control system strategies according to methods. This approach helps researchers identify areas for improvement and potential avenues for innovation.

TABLE 1. Contrasts of electricity grid configurations (derived from [170], [171]).

Structure type	Advantages	Disadvantages
Conventional Grid	The least capital is reduced as additional costs of power converters and Energy Management and Control Systems equipment. Created guidelines and protocols for system operation	• Transmission errors affect large parts of the network, causing system instability and cascading blackouts. • The black start operation process is time-consuming and complex • Inefficient handling of distributed energy resources • High maintenance costs for old power plants • Reduced complexity of operational coordination • Large investments are required to provide service areas
Microgrid	• Can be isolated in the event of a main grid failure, improving the reliability and resilience of the microgrid. • Self-sustainability ensures application in far away regions • Can provide additional services to network operators, such as voltage and frequency support • Improved system performance • Better response to instability through faster dynamic response of distributed energy resources and energy management control systems • Easier and cheaper to maintain due to smaller networks and distributed energy resource scale • Faster recovery from power outages	• Requires sophisticated and costly conservation Technologies • Ability to be self-sufficient during power outages requires increasing production and storage capacity • More expensive due to rising use of power converters and controllers Remarkably less number of norms and other arrangements for system management

However, for researchers looking to pursue a more practical approach to microgrids, the literature lacks an application-based overview. This would also help provide valuable insights to non-academics in the energy field. Furthermore, When consideration is given to a more coherent attempt to stimulate investigations in this field, investigators have to work within a unified context. This is achieved through various standards published by various agencies.

The topic of microgrids and related work in energy management control systems is also significantly standardized. This enables investigators to contrast new survey techniques with standardized benchmarking systems based on parameters described in different standards. Therefore, it is necessary to revise the relevant IEEE standards and the documents based on these standards to prove that the work can meet the multiple requirements of the standards. This also gives the readers a real understanding of what is missing in the research of microgrid energy management control systems based on relevant applications. This paper aims to fill these blanks by providing a comprehensive and critical brief overview of state-of-the-art knowledge on microgrid energy management control systems. Therefore, the contributions of this work include an overview of microgrid fundamentals to provide the reader with an overview of all components of a microgrid, a critical overview of energy management optimization methods published in recent years, an overview of real-time energy management optimization methods, a classification of microgrid control methods according to the microgrid application, and an overview of IEEE standards related to microgrid energy management control systems. In isolated operations, they are often used as backup power for other distributed energy sources during times of low generation, as distributed energy sources to form the grid, and in some cases for black start operations. The type of microgrid and the installation area also influence the choice of installed distributed energy resources. Large and rural microgrids are more likely to install wind energy than urban and small residential areas, which are more likely to install rooftop photovoltaic systems. In addition, depending on the installation site and type of research, wind energy is also widely used in microgrids. Another important decentralized energy source is diesel generators. Some studies refer to it as the stand-alone base generation, while others refer to it as an emergency generator to meet peak loads. This is mainly due to the short start-up time and stable and consistent generation conditions. However, fuel costs and carbon emissions are disadvantages. The topology of the microgrid and the selection of distributed energy resources are part of microgrid planning and design. Several factors should be considered when deciding on the microgrid architecture [29]. In this context, the most important decision is whether to build an AC/DC or a hybrid microgrid. This also depends on various factors such as the existing local power type, load type, power infrastructure, etc. For example, if you plan to convert part of the existing AC distribution grid into a microgrid, it is better to have an AC microgrid. Considering that there is no grid in remote areas and fuel supply is also difficult, it is better to adopt a DC microgrid. This is because renewable energy sources are widely used and the total cost of not using DC and AC-DC converters can be reduced. Also, decisions can be made based on the type of loads served, whether the microgrid is close or far from population centers, and the local climate. Climate analysis determines the type of renewable energy generation to be used. In addition, depending on the purpose of the microgrid and its proximity to the existing distribution grid, a decision needs to be made whether to install a grid-connected microgrid or an islanded system. In recent literature, the concept of multiple microgrid systems has also been proposed [30], [31], [32], [33], [34], [35]. The main objective of organizing such a structure is to further improve operational and economic performance, especially during outages caused by intermittent renewable resources [34]. In such systems, microgrids and multiple microgrids often operate with different objectives. For example, in [33], a distribution network operator (DNO) manages a multi-microgrid system to maximize its revenue by trading with the main grid. At the same time, the objective of each microgrid is to maximize the total net value derived from the electricity consumption traded by the DNO.

For more research on microgrid structures, see [36]. In this paper, the widely used microgrid architectures in the literature are analyzed and compared in detail, divided into AC, DC, and hybrid architectures.

B. Energy Management and Control Systems

The EMCS is an integral part of a microgrid, primarily due to the distributed nature of its energy sources. The EMCS is designed to optimize the use of various resources through centralized, decentralized, or distributed computing to achieve specific goals within system constraints. Second, the EMCS must effectively apply previous computations to the microgrid system. This is achieved by using a real-time control system that incorporates the operating set points generated by the EMCS. The operational flow of most EMCSs typically consists of forecasting data, feeding the results into the EM optimization, and establishing operating set points that are implemented by the real-time control stage. This section describes various EMCS structures and focuses on their operation in a microgrid.

1) Energy Management System Structure

The classification of EMCS structure depends on how the computing platform and related communication networks are organized and operated. For example, it can be a centralized, decentralized, or distributed structure. In a centralized system, the management system is located at the central station and connected to the distributed energy resources through communication lines. The measurement and status data from the DER are sent to the EMCS server, where monitoring and control calculations are performed. Then the command is sent to the DER for execution. Depending on the system architecture, the EMCS can also be connected to other auxiliary workstations, such as B. with the distribution network operator or forecasting station. Although this configuration is more suitable for overall system monitoring and global optimization, if an EMCS or communication failure occurs, system expansion problems and overall system failure may occur. In a decentralized system, each DER operates independently and manages itself using a local controller, eliminating the need for communication. The controller makes local measurements such as bus voltage, frequency, and DER power output. The DER uses this data to achieve proportional power allocation and maintain the stability of the microgrid. However, after long periods of operation and outages, DER operating set points may deviate from stable values and require resynchronization between DERs. Distributed systems can combine the advantages of centralized and decentralized structures and compensate for their disadvantages. Each DER has its computing power in a local controller while communicating with neighboring DERs and possibly a central EMCS server. This approach generally requires minimal communication bandwidth and can also provide improved system redundancy because neighboring controllers can calculate with each other in the event of a failure. To make this easier, multiple communication paths can also be set up. However, this option also requires redundant communication links and additional work for distributed computing. Although these three can be considered the basic classification of control structures, most microgrid EMCS use a combination of these elements for applications at different time scales. This is called hierarchical control and includes primary, secondary, and tertiary levels based on the operating time scale. The primary control operates in the millisecond range and includes control objectives such as voltage, frequency, current regulation, maximum power point tracking (MPPT), and power distribution. This control is usually decentralized because it is implemented locally in each distributed energy resource.

In secondary control, time scales can range from seconds to minutes and include applications such as voltage and frequency reference correction, power distribution, and transient control. This control can also be centralized or distributed. Finally, tertiary control operates over periods ranging from hours to days and includes energy trading applications, unit obligations, and generation and load demand forecasting. 2) Forecasting The EMCS must ensure that microgrid resources are used as efficiently and cost-effectively as possible. To do this, it needs to forecast three types of profiles with reasonable accuracy: load demand, generation, and grid electricity prices. With this information, the EMCS can optimize the allocation of resources such as ESS and diesel generators. The EMCS must predict load consumption for the day ahead, analyze the expected weather and subsequent renewable energy generation, and then decide when to prioritize ESS charging and trading with the main grid. This leads to better stability and reliability and ensures a consistent performance profile. The forecast horizon for a microgrid can range from a week in advance to a day, hour, or minute, depending on the methodology used in the EMS. A large body of work in the literature deals with forecasting methods for microgrid applications. For example, Aguilar-Perez et al. [37] provided an overview of the use of meteorological data for weather forecasting in microgrids for generation and load forecasting and the resulting impact on EMCS. A detailed comparison and discussion of the existing literature on the topic was also presented. Aslam et al. [38] presented and discussed state-of-the-art intelligent learning methods for solar energy forecasting for EMS. [39] reviewed wind energy forecasting techniques for microgrids, classifying the different approaches into statistical and intelligent algorithms.
According to this work, very "Shortterm" forecasting aims to achieve dynamic control and lo ad following of renewable generators. Short-term forecasting is used to plan the energy flow between sources, loads, and storage devices, while medium-term and long-term forecasting are responsible for pricing, load distribution, and maintenance planning, respectively. In addition, Aybar-Mejía et al. [41] reviewed algorithms for forecasting generation and demand to achieve efficient energy balancing in microgrids. This is because an efficient energy balance depends on reliable energy production and readily available reserves to ensure supply and meet expected demand.

2) System Modeling and Mathematical Formulations

Although this part is not necessarily during the operation of the EMCS, the predicted data from various profiles are fed into the mathematical model of the microgrid system in the controller. System modeling and mathematical formulation are usually performed during the design phase of the EMCS. However, some systems can be designed to have problems during operation, such as when loads/DERs are connected or removed or the network topology changes. In addition, this phase may include the formulation of the problem theory into objective functions and system constraints and the subsequent development of the code required for the EMCS controller. The general problem formulation is (1).

$$\textit{minimize Objective function} = \sum_{i=1}^{T} \sum_{i=1}^{N} \square F\text{i}(t)$$

$$\textit{subjected to (s.t.): } g_i\,(t,\, t - 1) = 0 \quad \forall \text{i}, \forall \text{t}$$
$$hi(t,t\text{-}\ 1) \leq 0 \quad \forall \text{i}, \forall \text{t}$$
$$b_j\,(t)=0 \quad \forall j \qquad (1)$$

Where Fi represents the cost function of device I, N represents the number of devices, and T represents the time horizon of planning. gi and hi are the equality and inequality constraints of device i, respectively. bj represents the power balance equation of bus j. The main goal of the optimization problem is to minimize or maximize the objective function according to the nature of the problem. During operation, the data from the prediction stage can affect various variables or constants of equation (1).

III. EM Optimization

Microgrids consist of multiple sources of power generation, all with different operating costs and technical limitations. To maintain continuous supply and ensure the cost-effectiveness of the microgrid, it is important to operate the distributed energy resources in a way that provides the greatest benefit. In grid-connected mode, the goal is usually to maximize the profit of the microgrid system by trading with the grid and effectively utilizing the available distributed energy resources. In islanded mode, the goal may change, such as ensuring the maximum uptime without external network support. All of this is achieved through an energy management system that uses various optimization algorithms to dispatch resources according to predefined objectives. Figure 6 shows the methods used to solve optimization problems in recent years. In this section, the current literature on various EM optimization techniques is reviewed.

A. MATHEMATICAL METHODS

1) MILP and MINLP

Mixed integer linear programming (MILP) is an optimization and system analysis tool that applies to problems with a mixture of integer and non-integer variables, thus providing a flexible and robust approach to solving large and complex problems [42], [43], [44]. In microgrids, continuous variables such as power generation or exchange with the grid form non-integer values, while the states of microgrid components such as grid-connected/isolated operation, charge/discharge state of ESS, etc. can be represented as binary or integer variables. Reference [45] proposed an EMS for power nodes to reduce operating costs according to the optimal scheduling of the next day. The objective function of the problem statement is shown in (2).

$$\min \sum_{t=1}^{T} \left(C_t^{CHP} + C_t^{ST} + C_t^{shed} + C_t^{Heat} \right) \tag{2}$$

C_t^{CHP} represents the cost of the combined heat and power plant, C_t^{ST} represents the cost of purchase and sale to the grid/sales, C_t^{shed} represents the load shedding cost, and C_t^{Heat} represents the heat load cost. In addition, this paper adopts the linearization method for the line flow equations of the AC grid model, as shown in (3) and (4).

$$l^{P}_{(i,k)t} = g^{L}_{(i,k)}(V_{it} - V_{kt} - \Psi_{ikt} + 1) - b^{L}_{(i,k)}\, \phi_{ikt} \tag{3}$$

$$l^{Q}_{(i,k)t} = -b^{L}_{(i,k)}(V_{it} - V_{kt} - \Psi_{ikt} + 1) - g^{L}_{(i,k)}\, \phi_{ikt} \tag{4}$$

Where $l^{P}_{(i,k)t}$ and $l^{Q}_{(i,k)t}$ are the line power flow equations from busi to bus k, $g^{L}_{(i,k)}$ and $b^{L}_{(i,k)}$ are the line conductivity/susceptance, and V and φ are the voltage and angle difference between the buses.

Reference [46] uses MILP to optimize BESS in a grid-connected microgrid to reduce energy costs. The power flows between the grid, loads, and PV panels are considered as non-integer variables, and the ESS state (charging/discharging) is considered as binary variables. Mixed integer nonlinear programming (MINLP) is similar to the MILP described above, except that it is used when the possible domain of the problem is nonlinear and more accurately represents real-world problems [47]. In microgrid applications, nonlinear models of the network will be used in the problem formulation. For example, (5-6) represents the nonlinear equations in reference [56], from which equation (3-3) is derived.

$$l^{P}_{(i,k)t} = g^{L}_{(i,k)}(V^{2}_{it} - V_{i\,t}\,V_{k\,t}\text{-}\cos(\phi_{ikt}) - b^{L}_{(i,k)}\,V_{ikt}\,V_{kt}\cos(\phi_{ikt})) \quad (5)$$

$$l^{Q}_{(i,k)t} = b^{L}_{(i,k)}(V^{2}_{it} - V_{i\,t}\,V_{k\,t}\text{-}\cos(\phi_{ikt}) - g^{L}_{(i,k)}\,V_{ikt}\,V_{kt}\sin(\phi_{ikt})) \quad (5)$$

In [48], an EMS for household-level grid-connected microgrids was developed and designed for thermal and electrical load handling. Due to the nonlinear nature, a MINLP was used using an objective cost function and performance flow. Reference [49] proposed an EMS for urban microgrids to maximize self-consumption and provide additional services to the grid.

$\text{Cost} = a_0 + a_1P + a_2P^2$

Where a_0, a_1, and a_2 are cost coefficients and P is the active power output of the generator. In [50], a planning framework for residential microgrids consisting of energy-based and comfort-based controllable loads, ESS, and renewable energy sources is proposed. MIQP is used to optimize the controllable loads and charging/discharging strategies of ESS and PEV due to a quadratic dynamic pricing scheme. Reference [51] considers diesel generator fuel consumption, battery ESS degradation, carbon emissions, load shifting, and load reduction in the formulation of the MIQP problem A practical application is presented at Pulau Semakau near Singapore. Reference [52] provides a complementary convex QP approach that can reduce the computational effort when applied to a district heating system compared to mixed integer programming.

2) Lagrange Multipliers

Lagrange multipliers are one of the most fundamental methods in mathematical optimization. They are suitable for finding the local maxima and minima of a function without first solving the constraint equation for one of the variables [53]. In [54], a real-time EMS for rooftop PV modules with battery ESS (BESS) was proposed to maximize the yield. Lagrange multipliers were used to solve the optimization problem and compared with a dynamic programming method using the Lagrangian function as shown in (8):

$$L = \sum_{t=1}^{T}\left(P_{g,t}\pi_{g,t}\Delta t\right) + \sum_{t=1}^{T}(\lambda_t\pi\emptyset_t + \gamma\varphi) \quad (8)$$

where λ_t and γ are Lagrange multipliers, $\emptyset_t$ and phi are equality constraints, and $P_{g,t\pi g,t}\,\Delta t$ is the cost/revenue of the grid. The partial derivatives of (8) concerning the independent variables are then set to zero to find the solution to the problem. A two-level EM for a multi-microgrid system was proposed in [30]. The goal of the system is to maximize the profit of the microgrid and then fairly distribute the profit using the profit-quantity curve. Alsalloum et al. [55] aimed to solve the microgrid local consumption optimization problem using the Stackelberg game approach and used Lagrange multipliers to define the optimal energy demand.

3) Convex Optimization

Convex optimization seeks to minimize a problem that can be represented as a convex function. The generator cost function is one of the most common convex functions in power systems. Convex optimization is a larger field whose subsets include linear programming and least squares methods [56]. An overview of convex optimization methods for implementing near-zero energy buildings can be found in [57]. In [58], convex optimization is used to minimize the daily operating costs of a microgrid and smooth the power exchange curve with the utility company. Rahim et al. [59] proposed a robust, decentralized, and real-time EM system in which the power allocation problem is formulated using a convex optimization problem and solved using a subgradient method. In [60] and [61], the problem is initially solved using a non-convex formulation of the unit commitment problem, which is then converted to a convex problem using relaxation methods.

4) Dynamic Programming

Dynamic programming (DP) is a method that decomposes a problem into sub-problems to reduce complexity and then solves the sub-problems separately. Reference [62] uses DP to implement optimal day-ahead planning for a DC microgrid. The results show that the DP-based approach reduces the complexity of the problem while providing reasonable results. In [63], an EMS for a residential hybrid renewable energy system using a two-level control system is proposed. First, an optimization stage based on offline predictive DP reduces the operating cost by determining the optimal charging/discharging time of the BESS and hydrogen ESS. A rule-based real-time controller is then used to determine the real-time operation of the system based on the calculations in the first step. The ESS set point is optimized. Finally, reference [64] proposes a multi-parameter and multi-objective dynamic optimization problem to solve economic and environmental goals.

5) Stochastic And Robust Programming

According to [66], stochastic optimization problems can have two properties. First, there is random noise in the variables being optimized. Second, when the algorithm iteratively seeks a solution, the search direction can be chosen arbitrarily. In other words, stochastic optimization deals with problems where the variables or the objective function have some degree of randomness. This approach is widely used in EMCS due to the randomness of renewable energy production, the uncertainty of load demand, and the introduction of dynamic pricing systems. In [67], an EMS is implemented in an energy center to minimize costs and reduce emissions. This is done in two steps: stochastic optimization to account for the uncertainty of renewable energy (RES) generation and load consumption, and fuzzy methods to reduce the multi-objective optimization to a single-objective optimization and solve the final problem. Reference [68] proposes an EMS for MGs to reduce operating costs while taking into account the comfort of consumers/households. In [69], stochastic risk-constrained programming is performed for island MGs to maximize the operator's profit. An EMS was proposed in [31] for a multi-microgrid system that uses stochastic optimization to minimize operating costs and unexpected power exchanges with the grid. System-level control determines the plan content Based on the performance trend of the current account forecast, the MG-level controller determines the charging/discharging process of the energy storage unit according to the load and renewable energy system (RES) forecast. Finally, local control is responsible for the real-time performance of the generator set according to voltage and frequency.

C. Fuzzy Optimization

Fuzzy optimization deals with problems involving uncertainty and uses logical thinking to make decisions. However, the parameters involved do not necessarily have to be binary, as fuzzy programming can handle values between two extremes, allowing for greater flexibility. A fuzzy-based microgrid is proposed in [70]. The power management system calculates different power references based on the state of charge (SoC) of the ESS and the load requirements and feeds these references to the lower control level, where a first-order sliding mode control based on a nonlinear barrier function (NBF) - SOSMC) regulates the current of the connected power sources. In [71], low-complexity fuzzy logic control is applied to an electric-thermal microgrid with uncontrollable loads to smooth the power exchange curve with the grid and perform demand control of the electric water heater.

D. Artificial Neural Networks

Artificial neural network (ANN) algorithms have also been applied to troubleshoot EMS for microgrids. These algorithms mimic the problem at hand by creating a parameterized input-output network, thus mirroring the workings of the brain. An optimization process is performed to obtain the best variables of the network. Once the network has been optimized (or trained), an optimal solution to the problem can be found in a short time. A neural network usually contains three main stages: an input layer (receives input data), a hidden layer (processes the data according to various predefined functions), and an output layer. Depending on the design of the neural network, the hidden layer may contain several other layers.

Wang et al. [72] proposed a Lagrangian programming neural network to optimize the scheduling of MGs, combining variable neurons with Lagrangian neurons to minimize the total operating cost and maximize the energy produced by renewable energy. In addition, radial basis function neural networks were used to predict renewable energy production and load demand. Reference [73] proposed an evolutionary adaptive dynamic programming and reinforcement learning framework to train the EMS of MGs online. The method uses two neural networks: the first provides the optimal control signal, while the second evaluates the performance and "criticizes" the first network. Both networks are implemented using multilayer perceptron feedforward neural networks. Reference [74] implemented a recurrent neural network for optimizing the operation of MGs in the context of a multi-agent system, where each source is modeled as an agent that sends information to a central EMS.

In [75], the EMS was modeled as a Markov decision process. Then, a deep reinforcement learning algorithm was used to solve the problem of minimizing the operating cost of the MGs. In [76], a parallel neural network estimated the daily operating cost of a multi-MG system. The authors of [77] proposed a data-driven deep neural network and model-free reinforcement learning technique to optimize the peak-to-average ratio and maximize the profit of a multi-MG system. Model predictive control (MPC) is a process control scheme in which the model itself is used to predict the future model state for a time window, the so-called time horizon. It is also called receding horizon control. In [78], an EMS is developed for a set of isolated MGs to obtain optimal energy planning taking into account the uncertainty of renewable energy production and load. To this end, a robust approach based on Tube MPC is proposed. The problem is formulated as a multi-stage optimization model and solved using a newly developed decentralized compound alternating direction multiplier method algorithm. In [79], MPC is used to plan interconnected microgrids to optimally plan the energy distribution of the grid in a real-time market, taking into account the emergency in which the microgrid may be penalized by the operator due to the intermittent nature of

renewable energy sources if it fails to agree to supply power as desired. A local energy market can be established to trade between MGs when islands appear in the event of grid failure. In [80], control of a distribution network in a microgrid structure is proposed, with the main goal of providing flexible services using available BESS and hydrogen ESS. Reference [81] also proposed a two-level EMS, which focuses on reducing the operating cost of the microgrid and maximizing local energy consumption while maximizing the benefits for users and distribution system operators. Reference [82] proposed real-time optimization using a data predictive control framework. Collaborative distributed MPC optimization is used for the scheduling of multi-microgrid systems. The authors of [83] used MPC-based energy scheduling, which showed better performance compared to fuzzy-based heuristic schemes because it can take into account future generation and load demand to make decisions. However, in terms of computational cost, MPC is more demanding than fuzzy schemes.

C. Power Sharing

When multiple DERs are operated in parallel, there must be a mechanism for the DERs to share the load in proportion to their rated power. This can be achieved through communication between DERs or through central management. However, in a decentralized MG structure, or when updated setpoints from the EMS are not available in a centralized MG structure, each DER must have a mechanism to calculate the best response without communication and coordination, which is usually achieved through droop control. In [84], an adaptive droop-based cooperative scheme is adopted to share the load of BESS installed on a PV-BESS-based DC microgrid. Reference [86] uses virtual impedance-based droop control to share the load between parallel voltage source inverters. This also eliminates the need for communication to coordinate service allocation. Aguiar et al. [87] proposed an adaptive power distribution method for fuel cells (FC) and a common ESS in a DC microgrid based on the K-sharing method. The K-sharing method has high stability and minimal interference to the FC port. In [88], a fuzzy adaptive compensation controller is proposed to manage the disproportionate reactive power distribution that may occur due to impedance mismatch of distributed generation. The controller achieves this by changing the voltage reference signal of the DER in real-time. Reference [89] focuses on the superimposed frequency droop control of power distribution in a DC microgrid. This paper develops two parameters to improve the stability and load issues of this method: adaptive voltage coupling gain and adaptive amplitude of injected AC voltage. Controlling these parameters can improve the operation of the system under various load conditions. In [90], a secondary control system for frequency restoration and active power sharing is implemented using a nonlinearly constrained controller formulated by a dynamic Lipchitz continuous function. Reference [91] focuses on isolated microgrids, where a decentralized primary DC controller is proposed for accurate proportional distribution of active power and frequency deviation, which outperforms the traditional droop controller. In addition, a consensus-based distributed orthogonal controller is implemented to share reactive power under mismatched feeder impedances using minimal communication. Pergami et al. [92] focus on improving the reliability of DC microgrid operation by proportionally distributing the thermal load of the DC converter. According to the proposed strategy, the higher the thermal load on the converter, the lower the power supply of the converter. In [93], a distributed power flow controller is proposed for power allocation between DERs in the secondary control layer. In addition, the control ensures power and voltage regulation for each phase. In [85] and [94], distributed control is implemented in isolated microgrids to achieve optimal power control.

This is achieved by using droop control in combination with an auxiliary MAS controller to manage set point deviations. Reference [95] proposes a reactive power allocation method based on an event-driven communication protocol with a consensus principle for MGs. A MAS-based ring network is established to form communication between DGs, aiming to reduce communication between adjacent DGs, thereby saving resources and improving system reliability.

V. IEEE Standards For Emcs For Microgrids

These standards help researchers to work within the context of a common system and to compare new approaches to standardized benchmark systems based on variables specified in different standards. EMCS research has also led to significant standardization, from interconnection and interoperability guidelines to standardization of microgrid controllers and DERMS.

A. IEEE Std. 1547: Standard for the Interconnection of Electric Distributed Resources to Power Systems The focus of this standard is to provide specifications and test requirements for interconnection and interoperability between utility power systems (EPS) and DERs with a maximum total capacity of 10 MVA [96]. This provides a common standard to ensure interoperability of all technical aspects of connecting DERs to the primary or secondary grid. While the standard was not created specifically for microgrids, it is widely followed in the microgrid literature, primarily using distributed generation. The transition to microgrids is one of the topics addressed and implemented in this standard and [97], [155], [99]. In [97], Wang et al. implemented the transition operation logic according to the recommendations of this standard to provide automatic and smooth transition between various states of microgrid operation. In [98], an algorithm is developed on real-time simulation hardware to test the planned and unplanned islanding of a microgrid considering frequency and voltage constraints. In [99], IEEE Standard 1547 was used to develop a control method to island a microgrid when certain disturbances (such as faults or power quality events) are detected in the main grid. In addition, a reverse power test was performed based on Test 6.1.2, which specifies the islanding requirements to ensure that there is no reverse current flow to the transmission grid or adjacent distribution grid when the microgrid loses power. Avoiding reverse power is important to ensure the safety of maintenance workers.

VI. DISCUSSION AND RECOMMENDATIONS

Microgrids consist of different types of DERs with different characteristics of power output and availability factors. EMCS is vital for the stable operation of microgrids. Despite the many research areas in this field, it is decided that some aspects of the proposed methods and strategies have not been sufficiently considered and require further attention and in-depth research. This chapter includes a general discussion of EM optimization and provides specific recommendations for real-time control. First, given the increasing use of renewable energy in the grid and the large use of renewable energy in the MG study, it would make more sense to use shorter intervals in the forecasting and optimization calculations. This is because forecasts can change significantly within a few minutes due to the random nature of wind and photovoltaic energy sources. Most studies use 1-hour and 24-hour intervals. Therefore, it is recommended to reduce the interval to 5 to 15 minutes. Given the increasing demand for smaller computational intervals, the increasing number of functions required for smart microgrids, and the very different DERs being considered for microgrids, there is a need to develop more efficient EMCS algorithms that require less computational power.

This study revealed that there is not much work that considers computational complexity analysis and/or performance comparisons with other existing algorithms. Therefore, there is a need to consider computational complexity and compare various parameters with other methods proposed in the literature for a more coordinated and efficient effort to boost EMCS research for microgrids. This will also help the industry to save costs associated with upgrading the computational power.

Microgrids range from the residential level to large MGs at the regional level. Microgrids of different sizes need different strategies to achieve efficient and stable operation. First, considering the EMCS structure, centralized systems are more suitable for small microgrids. This is because the number of distributed energy resources is smaller, hence less computing power is needed and the opportunity for future expansion is lower. On the other hand, decentralized, distributed EMCS structures are more suitable for medium and large microgrids because they can better realize system expansion. As systems become more interdependent, this reduces the risk of decentralized and distributed systems cyber-attacking a single EMCS point, reducing the risk of failure of the entire system. The current review of real-time control methods shows that most of these methods are decentralized. This is probably because most control systems are integrated into DERs. Also, while the majority of research focuses on AC systems, there is an increasing trend in research on DC control systems. Areas of study in microgrid control systems include improving performance in the presence of communication delays, providing a faster and more stable transient response, simplifying control structure complexity for smoother and faster response, and effectively managing BESS charge/discharge to minimize distortion. In addition, several studies have tested their proposed control methods on hardware setups and compared the results with software simulations for better validation.

Other recommendations for EMCS research in microgrids can be summarized as follows:

- Since isolation capability is the main characteristic of microgrids, isolation should always be evaluated and tested in addition to the identified methods.
- It is important to consider BESS failure costs when formulating optimization problems, as this will help in planning to extend the lifetime of the BESS, which is a costly interference in microgrids.
- The impact of communication failures on the proposed algorithms should be thoroughly studied and strategies to ensure system stability and availability during such scenarios should be developed.
- Times for RES and market price forecasts should be short (5-15 minutes).
- In the case of islanded microgrids, fuel-fired generators should be used for emergency backup.

VII. CONCLUSION

As a result, the need for grid expansion and integration of renewable energy sources is becoming increasingly prevalent worldwide with increasing energy demand. This brings with it various challenges, such as the need for significant reinforcements to the transmission structure and issues related to cascading outages. In light of these challenges, microgrids are emerging as a promising alternative for grid restructuring to meet future enlargement and conversion requirements. However, due to the distributed nature of their resources, microgrids require complex energy management and control systems to operate stably and cost-effectively. This paper critically reviews newly proposed EMCS methods in microgrids, covering microgrid fundamentals, forecasting methods and various distributed energy sources.

In addition, the paper classified the proposed methods for microgrid operation and control, including grid-connected and islanded systems and provided a review of classical and smart methods for energy management optimization. Finally, the paper discusses IEEE standards for microgrid operation and control, along with related topics such as technical parameter boundaries and communication protocols.

REFERENCES

[1] World Development Indicators—Power Outages in Firms in a Typical Month, World Bank, Washington, DC, USA, 2021.

[2] O. P. Veloza and F. Santamaria, "Analysis of major blackouts from 2003 to 2015: Classification of incidents and review of main causes," Electr. J., vol. 29, no. 7, pp. 42-49, Sep. 2016, doi: 10.1016/j.tej.2016. 08.006.

[3] H. H. Alhelou, M. E. Hamedain-Golshan, T. C. Njenda, and P. Siano, "A survey on power system blackout and cascading events: Research motivations and challenges," Energies, vol. 12, no. 4, pp. 1-28, 2019, doi: 10.3390/enl2040682.

[4] M. Shafiullah, M. I. Hossain, and M. Q. Ahsan, "Impact of sizes of islands on the stability of a faulted power system," in Proc. Int. Conf. Electr. Eng. Inf. Commun. Technol. (ICEEICT), May 2015, pp. 1-6, doi: 10.1109/ICEEICT.2015.7307354.

[5] L. Che, M. Khodayar, and M. Shahidehpour, "Only connect Microgrids for distribution system restoration," IEEE Power Energy Mag., vol. 12, no. 1, pp. 70-81, Jan./Feb. 2014.

[6] S. D. Ahmed, F. S. M. Al-Ismail, M. Shafiullah, F. A. Al-Sulaiman, and I. M. El-Amin, "Grid integration challenges of wind energy: A review," IEEE Access, vol. 8, pp. 10857-10878, 2020, doi: 10.1109/ACCESS.2020.2964896.

[7] G. Venkataramanan and C. Mamay, "A larger role for microgrids," IEEE Power Energy Mag., vol. 6, no. 3, pp. 78-82, May 2008.

[8] Investing in Climate, Investing in Growth, Organisation Econ. Co-Operation Develop. (OECD), Paris, France, 2017.

[9] Power Sector—World Energy Investment, IEA, Paris, France, 2020.

[10] M. Shafiullah, S. D. Ahmed, and F. A. Al-Sulaiman, "Grid inte¬gration challenges and solution strategies for solar PV systems: A review," IEEE Access, vol. 10, pp. 52233-52257, 2022, doi: 10.1109/ACCESS.2022.3174555.

[11] X. J. Yang, H. Hu, T. Tan, and J. Li, "China's renewable energy goals by 2050," Environ. Develop., vol. 20, pp. 83-90, Nov. 2016, doi: 10.1016/j.envdev.2016.10.001.

[12] Renewable Energy Targets for 2020 and 2030, Eur. Commission, Brussels, Belgium, 2020.

[13] S. M. Rahman, F. S. M. Al-Ismail, M. E. Haque, M. Shafiullah, M. R. Islam, M. T. Chowdhury, M. S. Alam, S. A. Razzak, A. Ali, and Z. A. Khan, "Electricity generation in Saudi Arabia: Tracing opportuni¬ties and challenges to reducing greenhouse gas emissions," IEEE Access, vol. 9, pp. 116163-116182,2021, doi: 10.1109/ACCESS.2021.3105378.

[14] F. S. Al-Ismail, "DC microgrid planning, operation, and control: A comprehensive review," IEEE Access, vol. 9, pp. 36154—36172, 2021, doi: 10.1109/ACCESS.2021.3062840.

[15] M. S. Alam, F. S. Al-Ismail, and M. A. Abido, "Power management and state of charge restoration of direct current microgrid with improved voltage-shifting controller," J. Energy Storage, vol. 44, Dec. 2021, Art.no. 103253, doi: 10.1016/J.EST.2021.103253.

[16] M. Shafiullah, M. E. Haque, S. Hossain, M. S. Hossain, and M. J. Rana, "Community microgrid energy scheduling based on the grey wolf optimization algorithm," in Artificial Intelligence-Based Energy Man-agement Systems for Smart Microgrids, B. Khan, P. Sanjeevikumar,
H. H. Alhelou, O. P. Mahela, and S. Rajkumar, Eds., 1st ed. Boca Raton, FL, USA: CRC Press, 2022, pp. 47-73.

[17] M. Ahmed, S. Kuriry, M. D. Shafiullah, and M. A. Abido, "DC micro-grid energy management with hybrid energy storage systems," in Proc. 23rd Int. Conf. Mechatronics Technol. (ICMT), Oct. 2019, pp. 1-6, doi: 10.1109ZICMECT.2019.8932147.

[18] M. Ali, M. I. Hossain, and M. Shafiullah, "Fuzzy logic for energy management in hybrid energy storage systems integrated DC microgrid," in Proc. Int. Conf. Power Energy Syst. Appl. (ICoPESA), Feb. 2022, pp. 424-429, doi: 10.1109/ICOPESA54515.2022.9754406.

[19] M. S. Alam, A. A. Almehizia, F. S. Al-Ismail, M. A. Hossain, M. A. Islam, M. Shafiullah, and A. Ullah, "Frequency stabilization of AC microgrid clusters: An efficient fractional order supercapacitor con¬troller approach," Energies, vol. 15, no. 14, p. 5179, Jul. 2022, doi: 10.3390/EN15145179.

[20] A. Werth, N. Kitamura, I. Matsumoto, and K. Tanaka, "Evalua¬tion of centralized and distributed microgrid topologies and com¬parison to open energy systems (OES)," in Proc. IEEE 15th Int. Conf. Environ. Electr. Eng. (EEEIC), Jun. 2015, pp. 492-497, doi: 10.1109/EEEIC.2015.7165211.

[21] H. Fontenot and B. Dong, "Modeling and control of building- integrated microgrids for optimal energy management—A review," Appl. Energy, vol. 254, Nov. 2019, Art. no. 113689, doi: 10.1016/j.apenergy.2019.113689.

[22] M. F. Rosian, M. A. Hannan, P. Jem, and M. N. Uddin, "Micro¬grid control methods toward achieving sustainable energy man¬agement," Appl. Energy, vol. 240, pp. 583-607, Apr. 2019, doi: 10.1016/j.apenergy.2019.02.070.

[23] S. Ali, Z. Zheng, M. Aillerie, J. P. Sawicki, M. C. Pera, and D. Hissel, "A review of DC microgrid energy management systems dedicated to residential applications," Energies, vol. 14, no. 14, pp. 1-26, 2021, doi: 10.3390/enl4144308.

[24] M. F. Zia, E. Elbouchikhi, and M. Benbouzid, "Microgrids energy management systems: A critical review on methods, solutions, and prospects," Appl. Energy, vol. 222, pp. 1033-1055, Jul. 2018, doi: 10.1016/j.apenergy.2018.04.103.

[25] L. Meng, E. R. Sanseverino, A. Luna, T. Dragicevic, J. C. Vasquez, and J. M. Guerrero, "Microgrid supervisory controllers and energy management systems: A literature review," Renew. Sustain. Energy Rev., vol. 60, pp. 1263-1273, Jul. 2016, doi: 10.1016/j.rser.2016. 03.003.

[26] A. Elmouatamid, R. Ouladsine, M. Bakhouya, N. El Kamoun, M. Khaidar, and K. Zine-Dine, "Review of control and energy manage¬ment approaches in micro-grid systems," Energies, vol. 14, no. 1, p. 168, Dec. 2020, doi: 10.3390/enl4010168.

[27] Y. E. Garcia Vera, R. Dufo-Lopez, and J. L. Bemal-Agustm, "Energy management in microgrids with renewable energy sources: A liter¬ature review," Appl. Sci., vol. 9, no. 18, p. 3854, Sep. 2019, doi: 10.3390/app9183854.

[28] S. Parhizi, H. Lotfi, A. Khodaei, and S. Bahramirad, "State of the art in research on microgrids: A review," IEEE Access, vol. 3, pp. 890-925, 2015 doi: 10.1109/ACCESS.2015.2443119.

[29] X. Wei, X. Xiangning, and C. Pengwei, "Overview of key microgrid technologies," Int. Trans. Electr. Energy Syst., vol. 28, no. 7, pp. 1-22, 2018, doi: 10.1002/etep.2566.

[30] F. Khavari, A. Badri, and A. Zangeneh, "Energy management in multi-microgrids considering point of common coupling constraint," Int. J. Electr. Power Energy Syst., vol. 115, Feb. 2020, Art. no. 105465, doi: 10.1016/j.ijepes.2019.105465.

[31] N. Bazmohammadi, A. Anvari-Moghaddam, A. Tahsiri, A. Madary, J. Vasquez, and J. Guerrero, "Stochastic predictive energy manage¬ment of multi-microgrid systems," Appl. Sci., vol. 10, no. 14, p. 4833, Jul. 2020, doi: 10.3390/appl0144833.

[32] K. Thirugnanam, M. S. E. Moursi, V. Khadkikar, H. H. Zeineldin, and M. Al Hosani, "Energy management of grid interconnected multi-microgrids based on P2P energy exchange: A data driven approach," IEEE Trans. Power Syst., vol. 36, no. 2, pp. 1546-1562, Mar. 2021, doi: 10.1109/TPWRS.2020.3025113.

[33] W. Y. Chiu, H. Sun, and H. V. Poor, "A multiobjective approach to multimicrogrid system design," IEEE Trans. Smart Grid, vol. 6, no. 5, pp. 2263-2272, Sep. 2015, doi: 10.1109/TSG.2015.2399497.

[34] B. Zhang, Q. Li, L. Wang, and W. Feng, "Robust optimization for energy transactions in multi-microgrids under uncertainty," Appl. Energy, vol. 217, pp. 346-360, May 2018, doi: 10.1016/j.apenergy.2018.02.121.

[35] X. Dong, X. Li, and S. Cheng, "Energy management optimization of microgrid cluster based on multi-agent-system and hierarchical Stackel- berg game theory," IEEE Access, vol. 8, pp. 206183-206197, 2020, doi: 10.1109/ACCESS.2020.3037676.

[36] E. Unamuno and J. A. Barrena, "Hybrid AC/DC microgrids—Part I: Review and classification of topologies," Renew. Sustain. Energy Rev., vol. 52, pp. 1251-1259, Dec. 2015, doi: 10.1016/j.rser.2015.07.194.

[37] A. Agiiera-Pdrez, J. C. Palomares-Salas, J. J. G. De La Rosa, and O. Florencias-Oliveros, "Weather forecasts for microgrid energy management: Review, discussion and recommendations," Appl. Energy, vol. 228, pp. 265-278, Oct 2018, doi: 10.1016/j.apenergy.2018. 06.087.

[38] S. Aslam, H. Herodotou, N. Ayub, and S. M. Mohsin, "Deep learning based techniques to enhance the performance of microgrids: A review," in Proc. Int. Conf. Frontiers Inf. Technol. (FIT), Dec. 2019, pp. 116-121, doi: 10.1109/FIT47737.2019.00031.

[39] J. Ma and X. Ma, "State-of-the-art forecasting algorithms for microgrids," in Proc. ICAC,2017, pp. 1-6, doi: 10.23919/IConAC.2017.8082049.

[40] M. Jie and X. Ma, "A review of forecasting algorithms and energy management strategies for microgrids," Syst. Sci. Control Eng., vol. 6, no. 1, PP- 237-248, 2018, doi: 10.1080/21642583.2018.1480979.

[41] M. Aybar-Mejia, J. Villanueva, D. Mariano-Hernandez, F. Santos, and A. Molina-Garcia, "A review of low-voltage renewable microgrids: Gen¬eration forecasting and demand-side management strategies," Electron., vol. 10, no. 17, pp. 1-25, 2021, doi: 10.3390/electronicsl0172093.

[42] I. Kantor, J.-L. Robineau, H. Butun, and F. Marechai, "A mixed-integer linear programming formulation for optimizing multi-scale material and energy integration," Frontiers Energy Res., vol. 8, p. 49, Apr. 2020.

[43] M. Shafiullah, M. Abido, M. Hossain, and A. Mantawy, "An improved OPP problem formulation for distribution grid observability," Energies, vol. 11, no. 11, p. 3069, Nov. 2018, doi: 10.3390/enl 1113069.

[44] M. Shafiullah, M. I. Hossain, M. A. Abido, T. Abdel-Fattah, and A. H. Mantawy, "A modified optimal PMU placement prob¬lem formulation considering channel Emits under various contingencies," Measurement, vol. 135, pp. 875-885, Mar. 2019, doi: 10.1016/J.MEASUREMENT.2018.12.039.

[45] T. Shekari, A. Gholami, and F. Aminifar, "Optimal energy management in multi-carrier microgrids: An MILP approach," J. Modem Power Syst. CleanEnergy, vol. 7, no. 4, pp. 876-886, Jul. 2019, doi: 10.1007/s40565- 019-0509-6.

[46] M. B. Sigalo, A. C. Pillai, S. Das, and M. Abusara, "An energy man-agement system for the control of battery storage in a grid-connected microgrid using mixed integer linear programming," Energies, vol. 14, no. 19, p. 6212, Sep. 2021, doi: 10.3390/enl4196212.

[47] J. Lee and S. Leyffer, Mixed Integer Nonlinear Programming, 2012th ed. Berlin, Germany: Springer, 2012.

[48] M. Dashtdar, M. Bajaj, and S. M. S. Hosseinimoghadam, "Design of optimal energy management system in a residential microgrid based on smart control," Smart Sci., vol. 10, no. 9, pp. 25-39, 2021, doi: 10.1080/23080477.2021.1949882.

[49] J. Arkhangelsk!, M. Abdou-Tankari, and G. Lefebvre, "Day-ahead opti¬mal power flow for efficient energy management of urban microgrid," IEEE Trans. Ind. Appl., vol. 57, no. 2, pp. 1285-1293, Mar. 2021, doi: 10.1109/TIA.2020.3049117.

[50] S. M. Hosseini, R. Carli, and M. Dotoli, "Robust optimal energy man-agement of a residential microgrid under uncertainties on demand and renewable power generation," IEEE Trans. Automat. Sci. Eng., vol. 18, no. 2, pp. 618-637, Apr. 2021, doi: 10.1109/TASE.2020.2986269.

[51] V. Kumtepeli, Y. Zhao, M. Naumann, A. Tripathi, Y. Wang, A. Jossen, and H. C. Hesse, "Design and analysis of an aging-aware energy man- agement system for islanded grids using mixed-integer quadratic pro-gramming," Int. J. Energy Res., vol. 43, no. 9, pp. 4127-4147, 2019, doi: 10.1002/er.4512.

[52] D. McLarty, N. Panossian, F. Jabbari, and A. Traverse, "Dynamic eco-nomic dispatch using complementary quadratic programming," Energy, vol. 166, pp. 755-764, Jan. 2019, doi: 10.1016/j.energy.2018.10.087.

[53] L. D. Hoffmann and G. L. Bradley, Calculus for Business, Economics, and the Social and Life Sciences, 11th ed. New York, NY, USA: McGraw-Hill, 2012.

[54] C. L. Nge, U. I. Ranaweera, O.-M. Midtgfcd, and L. Norum, "A real¬time energy management system for smart grid integrated photovoltaic generation with battery storage," Renew. Energy, vol. 130, pp. 774—785, Jan. 2019, doi: 10.1016/j.renene.2018.06.073.

[55] H. Alsalloum, R. Rahim, and L. Merghem-Boulahia, "Contribution- based energy-trading mechanism: A multi-level energy management approach," Int. J. Electr. Power Energy Syst., vol. 136, Mar. 2022, Art. no. 107668, doi: 10.1016/j.ijepes.2021.107668.

[56] S. Boyd and L. Vandenberghe, Convex Optimization. Cambridge, U.K.: Cambridge Univ. Press, 2009.

[57] G. S. Georgiou, P. Christodoulides, and S. A. Kalogirou, "Real-time energy convex optimization, via electrical storage, in buildings—A review," Renew. Energy, vol. 139, pp. 1355-1365, Aug. 2019, doi: 10.1016/J.RENENE.2019.03.003.

[58] M. Elkazaz, M. Sumner, and D. Thomas, "Energy management sys¬tem for hybrid PV-wind-battery microgrid using convex programming, model predictive and rolling horizon predictive control with experimen¬tal validation," Int. J. Electr. Power Energy Syst., vol. 115, Feb. 2020, Art. no. 105483, doi: 10.1016/j.ijepes.2019.105483.

[59] S. Rahim, N. Javaid, R. D. Khan, N. Nawaz, and M. Iqbal, "A convex optimization based decentralized real-time energy man¬agement model with the optimal integration of microgrid in smart grid," J. Cleaner Prod., vol. 236, Nov. 2019, Art. no. 117688, doi: 10.1016/j.jclepro.2019.117688.

[60] M. Zolfaghari, N. Ghaffarzadeh, and A. J. Ardakani, "Optimal sizing of battery energy storage systems in off-grid micro grids using convex optimization," J. Energy Storage, vol. 23, pp. 44-56, Jun. 2019, doi: 10.1016/j.est.2019.02.027.

[61] M. F. Zia, E. Elbouchikhi, M. Benbouzid, and J. M. Guerrero, "Energy management system for an islanded microgrid with convex relaxation," IEEE Trans. Ind. Appl., vol. 55, no. 6, pp. 7175-7185, Nov. 2019, doi: 10.1109/TIA.2019.2917357.

[62] K. Park, W. Lee, and D. Won, "Optimal energy management of DC microgrid system using dynamic programming," IFAC-PapersOnLine, vol. 52, no. 4, pp. 194-199, 2019, doi: 10.1016/j.ifacol.2019.08.178.

[63] M. Jafari and Z. Malekjamshidi, "Optimal energy management of a residential-based hybrid renewable energy system using rule-based real-time control and 2D dynamic programming optimization method," Renew. Energy, vol. 146, pp. 254—266, Feb. 2020, doi: 10.1016/j.renene.2019.06.123.

[64] Q. Li, S. Member, X. Zou, Y. Pu, S. Member, and W. Chen, "A real-time energy management method for electric-hydrogen hybrid energy storage microgrid based on DP-MPC," CSEE J. Power Energy Syst., early access, Nov. 20, 2020, doi: 10.17775/cseejpes.2020.02160.

[65] X. Wang, Y. Ji, J. Wang, Y. Wang, and L. Qi, "Optimal energy management of microgrid based on multi-parameter dynamic pro-gramming," Int. J. Distrib. Sensor Netw., vol. 16, no. 6, Jun. 2020, Art.no. 155014772093714, doi: 10.1177/1550147720937141.

[66] J. C. Spall, Introduction to Stochastic Search and Optimization. Hoboken, NJ, USA: Wiley, 2003.

[67] M. M. Bidgoli, H. Karimi, S. Jadid, and A. Anvari-Moghaddam, "Stochastic electrical and thermal energy management of energy hubs integrated with demand response programs and renewable energy: A pri-oritized multi-objective framework," Electric Power Syst. Res., vol. 196, Jul. 2021, Art. no. 107183, doi: 10.1016/j.epsr.2021.107183.

[68] A. A. Bashir, M. Pourakbari-Kasmaei, J. Contreras, and M. Lehtonen, "A novel energy scheduling framework for reliable and economic opera¬tion of islanded and grid-connected microgrids,'' Electr. Power Syst. Res., vol. 171, pp. 85-96, Jun. 2019, doi: 10.1016/j.epsr.2019.02.010.

[69] M. Vahedipour-Dahraie, H. Rashidizadeh-Kermani, A. Anvari-Moghaddam, and J. M. Guerrero, "Stochastic risk-constrained scheduling of renewable-powered autonomous microgrids with demand response actions: Reliability and economic implications," IEEE Trans. Ind. Appl., vol. 56, no. 2, pp. 1882-1895, Mar. 2020, doi: 10.1109/TIA.2019.2959549.

[70] S. S. Zehra, A. Ur Rahman, and I. Ahmad, "Fuzzy-barrier sliding mode control of electric-hydrogen hybrid energy storage system in DC micro-grid: Modelling, management and experimental investigation," Energy, vol. 239, Jan. 2022, Art. no. 122260, doi: 10.1016/j.energy.2021.122260.

[71] D. A. Aviles, J. Pascual, F. Guinjoan, G. G. Gutierrez, R. G. Orguera, J. L. Proano, P. Sanchis, and T. E. Motoasca, "An energy management system design using fuzzy logic control: Smoothing the grid power profile of a residential electro-thermal microgrid," IEEE Access, vol. 9, pp. 25172-25188, 2021, doi: 10.1109/ACCESS.2021.3056454.

[72] T. Wang, X. He, and T. Deng, "Neural networks for power management optimal strategy in hybrid microgrid," Neural Comput. Appl., vol. 31, no. 7, pp. 2635-2647, Oct. 2017, doi: 10.1007/S00521-017-3219-X.

[73] G. K. Venayagamoorthy, R. K. Sharma, P. K. Gautam, and A. Ahmadi, "Dynamic energy management system for a smart microgrid," IEEE Trans. Neural Netw. Learn. Syst., vol. 27, no. 8, pp. 1643-1656, Aug. 2016, doi: 10.1109/TNNLS.2016.2514358.

[74] M. E. G. Urias, E. N. Sanchez, and L. J. Ricalde, "Electrical microgrid optimization via a new recurrent neural network," IEEE Syst. J., vol. 9, no. 3, pp. 945-953, Sep. 2015, doi: 10.1109/JSYST.2014.2305494.

[75] Y. Ji, J. Wang, J. Xu, X. Fang, and H. Zhang, "Real-time energy man-agement of a microgrid using deep reinforcement learning," Energies, vol. 12, no. 12, p. 2291, Jun. 2019, doi: 10.3390/enl2122291.

[76] O. Samuel, N. Javaid, A. Khalid, W. Z. Khan, M. Y. Aalsalem, M. K. Afzal, and B.-S. Kim, "Towards real-time energy management of multi-microgrid using a deep convolution neural network and cooperative game approach," IEEE Access, vol. 8, pp. 161377-161395, 2020, doi: 10.1109/ACCESS.2020.3021613.

[77] Y. Du and F. Li, "Intelligent multi-microgrid energy management based on deep neural network and model-free reinforcement learning," IEEE Trans. Smart Grid, vol. 11, no. 2, pp. 1066-1076, Mar. 2020, doi: 10.1109/TSG.2019.2930299.

[78] P. Xie, Y. Jia, H. Chen, J. Wu, and Z. Cai, "Mixed-stage energy man-agement for decentralized microgrid cluster based on enhanced tube model predictive control," IEEE Trans. Smart Grid, vol. 12, no. 5, pp. 3780-3792, Sep. 2021, doi: 10.1109/TSG.2021.3074910.

[79] F. Garcia-Torres, C. Bordons, J. Tobajas, J. J. Marquez, J. Garrido-Zafra, and A. Moreno-Munoz, "Optimal schedule for networked microgrids under deregulated power market environment using model predictive control," IEEE Trans. Smart Grid, vol. 12, no. 1, pp. 182-191, Jan. 2021, doi: 10.1109/TSG.2020.3018023.

[80] F. Garcia-Torres, P. Baez-Gonzalez, J. Tobajas, F. Vazquez, and E. Nieto, "Cooperative optimization of networked microgrids for sup¬porting grid flexibility services using model predictive control," IEEE Trans. Smart Grid, vol. 12, no. 3, pp. 1893-1903, May 2021, doi: 10.1109/TSG.2020.3043821.

[81] L. G. Mann, "Hierarchical energy management system for microgrid operation based on robust model predictive control," Energies, vol. 12, no. 23, pp. 1-19, 2019, doi: 10.3390/enl2234453.

[82] I. Brahmia, J. Wang, H. Xu, H. Wang, and L. D. O. Turci, "Robust data predictive control framework for smart multi-microgrid energy dis¬patch considering electricity market uncertainty," IEEE Access, vol. 9, pp. 32390-32404, 2021, doi: 10.1109/ACCESS.2021.3060315.

[83] U. R. Nair and R. Costa-Castello, "A model predictive control¬based energy management scheme for hybrid storage system in islanded microgrids," IEEE Access, vol. 8, pp. 97809-97822, 2020, doi: 10.1109/ACCESS.2020.2996434.

[84] S. Sahoo, S. Mishra, S. Jha, and B. Singh, "A cooperative adaptive droop based energy management and optimal voltage regulation scheme for DC microgrids," IEEE Trans. Ind. Electron., vol. 67, no. 4, pp. 2894—2904, Apr. 2020, doi: 10.1109/TIE.2019.2910037.

[85] X. Wang, J. Zhang, M. Zheng, and L. Ma, "A distributed reactive power sharing approach in microgrid with improved droop control," CSEE J. Power Energy Syst., vol. 7, no. 6, pp. 1238-1246, Nov. 2021, doi: 10.17775/CSEEJPES.2019.00530.

[86] T. Chen, O. Abdel-Rahim, F. Peng, and H. Wang, "An improved finite control set-MPC-based power sharing control strategy for islanded AC microgrids," IEEE Access, vol. 8, pp. 52676-52686, 2020, doi: 10.1109/ACCESS.2020.2980860.

[87] C. R. de Aguiar, G. H. F. Fuzato, R. Q. Machado, and J. M. Guerrero, "An adaptive power sharing control for management of DC micro¬grids powered by fuel cell and storage system," IEEE Trans. Ind. Electron., vol. 67, no. 5, pp. 3726-3735, May 2020, doi: 10.1109/TIE.2019.2916312.

[88] Y. Mi, L. Yan, H. Cai, Y. Fu, S. Tian, and C. Jin, "Reactive power sharing control for islanded AC microgrid based on fuzzy adaptive compensation method," IET Gener., Transmiss. Distrib., vol. 14, no. 4, pp. 585-593, Feb. 2020, doi: 10.1049/iet-gtd.2019.0668.

[89] M. Jafari, S. Peyghami, H. Mokhtari, and F. Blaabjerg, "Enhanced frequency droop method for decentralized power sharing control in DC microgrids," IEEE J. Emerg. Sei. Topics Power Electron., vol. 9, no. 2, pp. 1290-1301, Apr. 2021, doi: 10.1109/JESTPE.2020. 2969144.

[90] X. Meng, N. Zhou, Q. Wang, and J. M. Guerrero, "A nonlinear, bounded and lipchitz continuous distributed active power sharing control method for islanded AC microgrids," IEEE Access, vol. 7, pp. 36843-36853, 2019, doi: 10.1109/ACCESS.2019.2900172.

[91] C. A. Macana, E. Mojica-Nava, H. R. Pota, J. Guerrero, and J. C. Vasquez, "Accurate proportional power sharing with minimum communication requirements for inverter-based islanded microgrids," Int. J. Electr. Power Energy Syst., vol. 121, pp. 1-11, 2020, doi: 10.1016/j.ijepes.2020.106036.

[92] S. Peyghami, P. Davari, and F. Blaabjerg, "System-level reliability- oriented power sharing strategy for DC power systems," IEEE Trans. Ind. Appl., vol. 55, no. 5, pp. 4865-4875, Sep. 2019, doi: 10.1109/TIA.2019.2918049.

[93] J. Zhou, "Distributed power sharing control for islanded single-/three- phase microgrids with admissible voltage and energy storage con¬straints," IEEE Trans. Smart Grid, vol. 12, no. 4, pp. 2760-2775, Jul. 2021.

[94] A. S. Alsafran and M. W. Daniels, "Adaptive virtual impedance consensus control for reactive power sharing," in Proc. IEEE Kansas Power Energy Conf., Jul. 2020, pp. 1-6, doi: 10.1109/KPEC47870.2020.9167609.

[95] L. Xiong, P. Li, C. Wang, S. Huang, and J. Wang, "Adaptive droop gain¬based event-triggered consensus reactive power sharing in microgrids," Energies, vol. 13, no. 5, p. 1152, Mar. 2020.

[96] Standard for Interconnection and Interoperability of Distributed Energy Resources With Associated Electric Power Systems Interfaces, Stan¬dard 1547-2018, 2018.

[97] J. Wang, C. Zhao, A. Pratt, and M. Baggu, "Design of an advanced energy management system for microgrid control using a state machine," Appl. Energy, vol. 228, pp. 2407-2421, Oct. 2018, doi: 10.1016/j.apenergy.2018.07.034.

[98] F. Baccino, A. Brissette, D. Ishchenko, A. Kondabathini, and P. Serra, "Real-time hardware-in-the-loop modeling for microgrid applications," in Proc. 6th Int. Conf. Clean Electr. Power (ICCEP), Jun. 2017, pp. 152-157.

[99] R. H. Lasseter, "CERTS microgrid laboratory test bed," IEEE Trans. Power Del., vol. 26, no. 1, pp. 325-332, Jan. 2011, doi: 10.1109/TPWRD.2010.2051819.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

FUNDAMENTALS OF FILTERS

K. Thamizhmaran,
Dept. of Electronics Communication Engineering, Government College of Engineering

Abstract
A filter circuit consists of inductance, capacitance, and resistance used singularly or in combination, depending upon the purpose. It may be designed so that it will separate alternating current from direct current, or so that it will separate alternating current of one frequency (or a band of frequencies) from other alternating currents of different frequencies. The use of resistance by itself in filter circuits does not provide any filtering action, because it opposes the flow of any current regardless of its frequency. What it does, when connected in series or parallel with an inductor or capacitor, is to decrease the "sharpness", or selectivity, of the filter.

1. INTRODUCTION

Many practical applications for filters. Examples include: Radio communications: Filters enable radio receivers to only “see” the desired signal while rejecting all other signals (assuming that the other signals have different frequency content).

DC power supplies: Filters are used to eliminate undesired high frequencies (i.e., noise) that are present on AC input lines. Additionally, filters are used on a power supply’s output to reduce ripple.

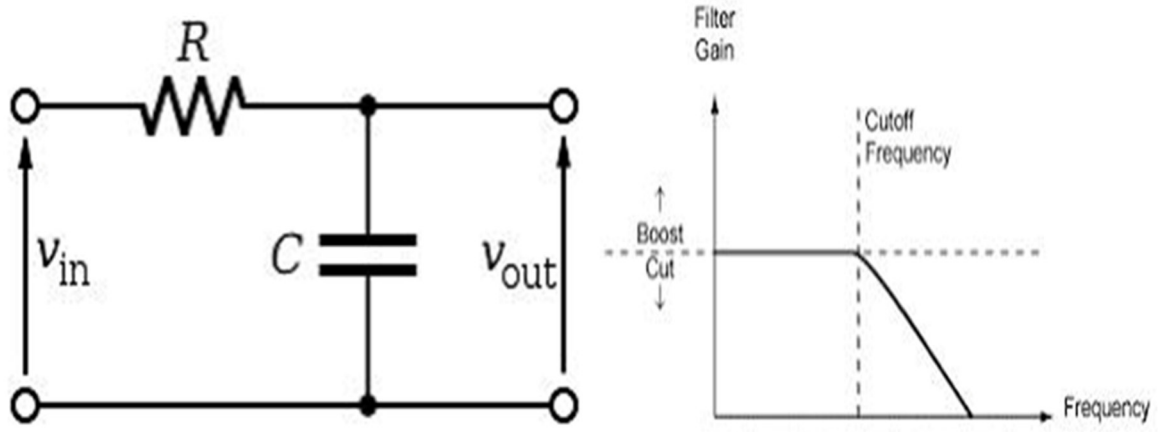
Audio electronics: A crossover network is a network of filters used to channel low-frequency audio to woofers, mid-range frequencies to midrange speakers, and high-frequency sounds to tweeters.

Analog-to-digital conversion: Filters are placed in front of an ADC input to minimize aliasing.

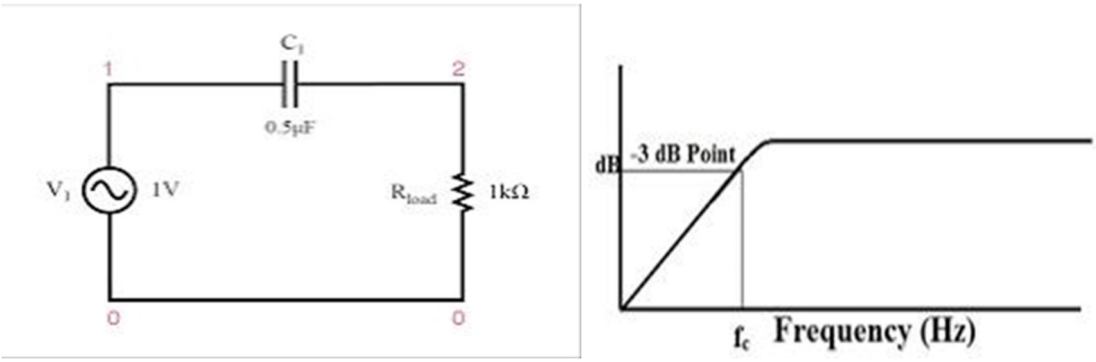
2. FOUR MAJOR TYPES OF FILTERS:

The four primary types of filters include the low pass filter, the high pass filter , the band pass filter, and the notch filter (or the band-reject or band stop filter). Take note, however, that the terms "low" and "high" do not refer to any absolute values of frequency, but rather, they are relative values with respect to the cutoff frequency.

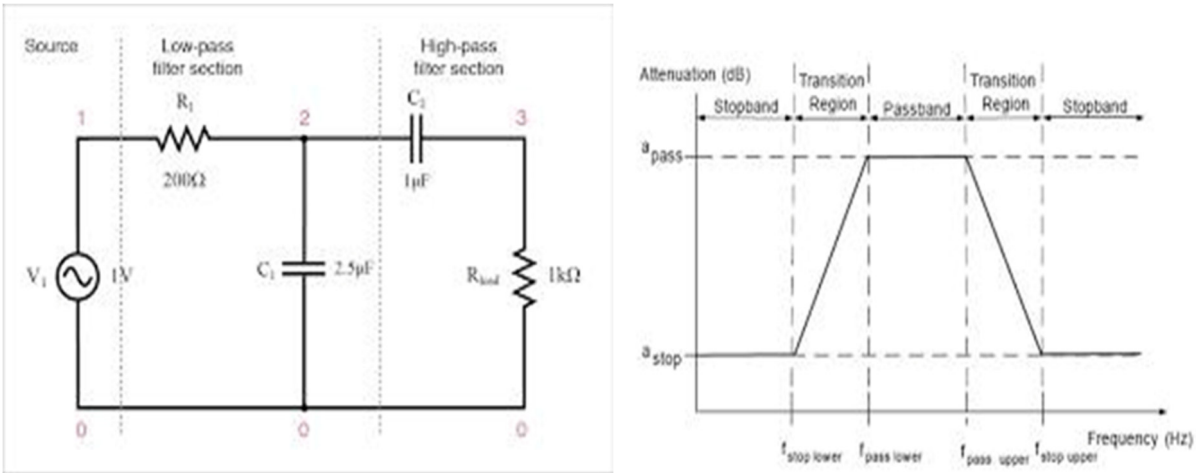
- **LOW PASS FILTER:**A low-pass filter is a filter that passes signals with a frequency lower than a selected cutoff frequency and attenuates signals with frequencies higher than the cutoff frequency. The exact frequency response of the filter depends on the filter design.



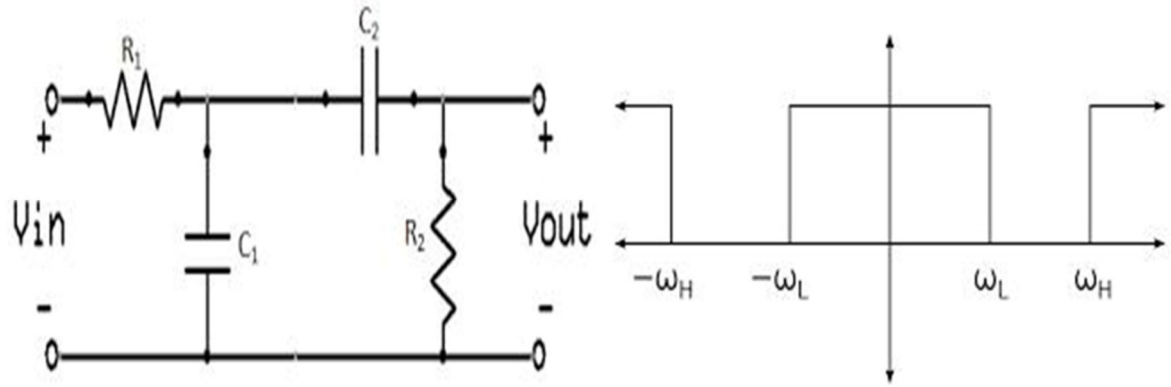
- **HIGH PASS FILTER:** A high-pass filter is usually modeled as a linear time-invariant system. It is sometimes called a low-cut filter or bass-cut filter in the context of audio engineering. High-pass filters have many uses, such as blocking DC from circuitry sensitive to non-zero average voltages or radio frequency devices.



- **BAND PASS FILTER:** Bandpass filters are widely used in wireless transmitters and receivers. The main function of such a filter in a transmitter is to limit the bandwidth of the output signal to the band allocated for the transmission. This prevents the transmitter from interfering with other stations.



- **BAND STOP FILTER:** In signal processing, a band-stop filter or band-rejection filter is a filter that passes most frequencies unaltered, but attenuates those in a specific range to very low levels. It is the opposite of a band-pass filter. A notch filter is a band-stop filter with a narrow stopband (high Q factor).



1. 3. SURVEY

AUTHOR	WORK DONE	MERITS	DEMERITS
R. E. Kalman(1960)	Developed Kalman Filter	Provides optimal estimation	Computationally intensive
L. R. Rabiner(1975)	Proposed digital filter design techinques	Efficient in digital signal processing	Complexity increases with filter order
S. Haykin(1986)	Wrote “Adaptive Filter Theory"	Adaptive to changing environments	Requires extensive parameter tuning
B. Widrow(1975)	Introduced Least Mean Squares (LMS) Filter	Simple and easy to implement	Slow convergence for highly correlated inputs
A.Oppenheim(1975)	Co-authored “Discrete-Time Signal Processing”	Comprehensive treatment of filter theory	Complex mathematical derivations
H. Black (1928)	Invented the “Blackman Filter”	Optimal for certain spectral analysis tasks	High sidelobe levels
J. B. Martens (1997)	Developed “Radial Basis Function Filters”	Effective in nonlinear signal processing	Complexity increases with dimensionality
Y. Huang(2003)	Introduced “Empirical Mode Decomposition” (EMD)	Adaptive to signal characteristics	Subject to mode mixing and endpoint effects
A.Antoniou(2009)	Authored “Digital Filters: Analysis and Design”	Comprehensive guide to digital filter design	May require advanced mathematical background
S. Mallat(1999)	Proposed “Wavelet Transform”	Multiresolution analysis capability	Choice of wavelet basis affects performance

4. SUMMARY

There are many noise filtering techniques available today for filtering images. Most of them are used for filtering impulse noise but few filters are available for additive noise. Fuzzy based image filters are available today for both impulse and additive noise. These fuzzy filters are efficient than traditional filters like averaging filter, median filter or Wiener filter. Future work is to modify this fuzzy technique to effectively maintain the original size of image. Also it focused on the construction of other fuzzy filtering methods for color images to suppress multiplicative noise such as speckle noise.

REFERENCE

1. M.S. Arulampalam, S. Maskell, N. Gordon, T.Clapp, A tutorial on particle filters for onlinenonlinear/non-gaussianbayesian tracking. IEEE Trans. Signal Proc. 50(2), 174–188 (2002)

2. S. Challa, Y. Bar-Shalom, Nonlinear filter design using Fokker-Planck-Kolmogorov probabilitydensity evolutions. IEEE Trans. Aerosp. Electron. Syst. 36(1), 309–315 (2000). https://doi.org/10.1109/7.826335

3. A. Doucet, W. Xiaodong, Monte Carlo methods for signal processing: a review in the statisticalsignal processing context. IEEE Signal Proc. Mag. 22(6), 152–170 (2005). https://doi.org/10.1109/MSP.2005.1550195

4. N.J. Gordon, D.J. Salmond, A.F.M. Smith, Novel approach to nonlinear/non-GaussianBayesian state estimation. IEE Proc. F (Radar and Signal Processing) 140(2), 107–113 (1993). https://doi.org/10.1049/ip-f-2.1993.0015

5. S. Julier, J.K. Uhlmann, Unscented filtering and nonlinear estimation. Proc. IEEE 92(3), 401–422 (2004). https://doi.org/10.1109/JPROC.2003.823141

6. K. Ito, K. Xiong, Gaussian filters for nonlinear filtering problems. IEEE Trans. Autom. Control.45(5), 910–927 (2000)

7. M.S. Grewal, A.P. Andrews, Kalman Filtering: Theory and Practice Using MATLAB, 4thedn.(Wiley-IEEE Press, Hoboken, 2014)

8. B.A. McElhoe, An assessment of the navigation and course corrections for a manned flyby ofmars or venus. IEEE Trans. Aerosp. Electron. Syst. AES-2, 613–623 (1966)

9. H. Cox, On the Estimation of state variables and parameters for noisy dynamic systems. IEEE Trans. Autom. Control 9(1), 5–12 (1964). https://doi.org/10.1109/TAC.1964.1105635.

EFFICIACY OF MICROWAVE TUMOR ABLATION USING THREE ANTENNAS

Nikola Bošković
Institute of Physics Belgrade, University of Belgrade

Marija Radmilović-Radjenović
Institute of Physics Belgrade, University of Belgrade

Branislav Radjenović
Institute of Physics Belgrade, University of Belgrade

ABSTRACT
Microwave ablation is a minimally invasive, highly efficient procedure for treating the various types of cancers, during which tumor cells are destroyed with hyperthermia caused by microwave radiation from small probe inserted in tumor. Procedure is recommended for the tumors up to 3 cm in diameter. With enough power and time much larger tumors can be destroyed at the expense of the significant damage of the healthy tissue, which can be minimized with spatially distribution of the power with multi-probe setup. Finite element method can be used to accurately estimate the processes occurring during the ablation, but due to complexity requires significant computation resources and time. In the multi-probe setup number of possible combination is massive, and with each new probe complexity of the calculation rise significantly. In multi-probe setup, identical probes are typically arranged symmetrically around the center of the tumor in the form equilateral shape such as triangle or square. If have the complete calculations with single probe, we can generate virtual computational domain with any multi-probe setup, and obtain fairly good starting estimation almost instantly. Chosen setups can be than simulated with the full simulation. All procedures involving modeling, meshing, and calculation are done using open-source software.
Keywords: microwave ablation, two antenna configuration, finite element

Authors acknowledge that this research was supported by the Science Fund of the Republic of Serbia, The Program IDEAS, GRANT No. 7739583, SimSurgery.

MUNZUR INTERNATIONAL SCIENTIFIC RESEARCH AND INNOVATION CONGRESS
August 06-07, 2024 / Tunceli, Türkiye
E-MAIL: contact@ubakacademy.org
WEB: www.ubakkongre.com/munzur

SYNTHESIS AND CHARACTERIZATION OF SM-DOPED SNO_2 NANOSTRUCTURES FOR AQUEOUS AMMONIA SENSING APPLICATIONS

Nishu Rani
Department of Physics, Indira Gandhi University

Prof. Vijay Kumar
Department of Physics, Indira Gandhi University

Dr. Sunil Kumar
Department of Physics, Indira Gandhi University

Abstract
This paper reports the synthesis of Sm-doped tin oxide nanostructures using a co-precipitation route to develop an aqueous ammonia sensor. XRD, FESEM, FTIR, UV-visible absorption spectroscopy, and energy-resolved photoluminescence were used to characterize the as-prepared nanostructures. The range of crystallite sizes is 8.86 nm–17 nm. The shape of all samples is almost spherical, with a range of grain sizes between 35 and 70 nm. The FTIR spectra verify the formation of SnO_2 nanostructures by corresponding to functional groups such as O-H, C=O, Sn-OH, and Sn-O-Sn. The energy band gap varies from 2.71eV to 3.09eV. An increase in bandgap observed for 9at% Sm-doped SnO_2 nanostructures may be due to the Moss-Burstein effect. I-V Characterization of pure and Sm-doped tin oxide nanostructures was done to develop an aqueous ammonia sensor. I-V characteristics show a rise in current for pure and Sm-doped SnO_2 nanostructured layers when immersed in water containing ammonia with different concentration.
Keywords: Tin Oxide, Sm doping, aqueous ammonia sensor, Moss-Burstein effect

T.C.
ATATÜRK ÜNİVERSİTESİ REKTÖRLÜĞÜ
Teknik Bilimler Meslek Yüksekokulu Müdürlüğü

Sayı : E-33880316-100-2400158966 15.05.2024
Konu : Kongre Bilim ve Düzenleme Kurulu Üyeliği Talebi (Doç.Dr. Tamer TURGUT)

DAĞITIM YERLERİNE

İlgi : 14.05.2024 tarihli ve E-33880316-100-2400157343 sayılı belge.

Meslek Yüksekokulumuz Gıda İşleme Bölümü Öğretim Üyeleriniden Doç. Dr. Tamer TURGUT'un 6-7 Agustos 2024 tarihleri arasında Tunceli'de düzenlenecek olan Munzur Uluslararasi Bilimsel Araştirmalar ve Inovasyon Kongresi isismli kongrenin düzenleme kurulunda görev alabilmesi Müdürlüğümüzce uygun görülmüştür.

Gereğini bilgilerinize rica ederim.

Prof.Dr. Abdulkadir KAN
Yüksekokul Müdürü

Dağıtım:
Gereği:
Gıda İşleme Bölümü Başkanlığına
Sayın Doç.Dr. Tamer TURGUT

Bu belge, güvenli elektronik imza ile imzalanmıştır.
Doğrulama Kodu: 4cb1fcb4-9f95-4dd8-b48d-3ef64abd399d Doğrulama Adresi: https://www.turkiye.gov.tr/ataturk-universitesi-ebys
Atatürk Üniversitesi Teknik Bilimler Meslek Yüksekokulu Müdürlüğü 25240 Erzurum
E-Posta: umit.yilmaz@atauni.edu.tr

REF : Akademik Teşvik 25/08/2024

İLGİLİ MAKAMA

MUNZUR ULUSLARARASI BİLİMSEL ARAŞTIRMALAR VE İNOVASYON KONGRESİ 6-7 Ağustos 2024 tarihleri arasında Tunceli / Türkiye'de 24 farklı ülkenin (Türkiye-100, Diğer Ülkelerden-115) akademisyen/araştırmacılarının katılımıyla gerçekleşmiştir. Kongre 16 Ocak 2020 Akademik Teşvik Ödeneği Yönetmeliğine getirilen "Tebliğlerin sunulduğu yurt içinde veya yurt dışındaki etkinliğin uluslararası olarak nitelendirilebilmesi için Türkiye dışında en az beş farklı ülkeden sözlü tebliğ sunan konuşmacının katılım sağlaması ve tebliğlerin yarıdan fazlasının Türkiye dışından katılımcılar tarafından sunulması esastır." değişikliğine uygun düzenlenmiştir.

Bilgilerinize arz edilir,
Saygılarımla

Prof. Dr. Florian MOBO
Chairman of the Congress Organizing Committee