Environ

JOURNAL OF ENVIRONMENTAL STUDIES

Vol. 6 No. 1 APRIL 2024

ISSN: 1110 - 457X

FACULTY OF ENVIRONMENTAL DESIGN
AHMADU BELLO UNIVERSITY, ZARIA-NIGERIA

ENVIRON
JOURNAL OF ENVIRONMENTAL STUDIES

ISSN: 1110-457X

Cover design and Text Layout: Dr. E.M. Alemaka, Department of Glass and Silicate Technology, ABU – Zaria

This journal is typeset on MS Word (Times New Roman 11/12/14) at the Faculty of Environmental Design. Articles published in this journal represent neither the views of the Editorial Board nor the Faculty of Environmental Design. Responsibility for opinions expressed and for the accuracy of facts rests solely with the individual authors.

Published by
FACULTY OF ENVIRONMENTAL DESIGN
AHMADU BELLO UNIVERSITY, ZARIA – NIGERIA

NOTES FOR CONTRIBUTORS

Submission of Manuscripts

ENVIRON Journal of Environmental Studies is published by the Faculty of Environmental Design, Ahmadu Bello University, Zaria. This journal is a scholarly peer reviewed publication and welcomes original articles exploring topics including but not limited to, any of the following areas:

Architecture, Innovative and Sustainable Design Solutions; Art and the Design of Resilient Infrastructure; Artificial Intelligence; Building Information Modelling; Building Services and Technology; Fine and Applied Arts; Gender-based Issues in Construction and Environmental Management; Geomatics and Surveying; Glass & Silicate Technology; Global Construction Education in Environmental Management; Housing affordability and Sustainable Development Problems; Industrial Design (Ceramics, Graphics and Textiles)

Industry 4.0 and 5.0; Innovative Design Thinking; Procurement Management; Quantity Surveying; Urban & Regional Planning; Urban Ekistics; Urban Management and Sustainable Development.

This journal guide aims to provide authors with a comprehensive overview of the standard practices and expectations when preparing and submitting a manuscript for publication in ENVIRON. Following these guidelines will enhance the chances of your manuscript being considered for publication and ensure a smooth and efficient review process.

Manuscript Structure and Formatting:

Title

The title should be concise, informative and should accurately reflects the content of your manuscript (preferably not longer than twenty words).

Author information

- The full name(s) of the author(s) (first name-middle name-surname)
- The affiliation(s) of the author(s), i.e., institution/organisation, full postal address (including e-mail if available), should be provided.
- A clearly indicated and actively used email address of the corresponding author should be provided.
- If authors are currently not affiliated with any institution, they should include their city and country of residence.

Abstract

Kindly submit an abstract consisting of 150 to 200 words. Ensure that the abstract does not include any abbreviations without proper definitions or references that are not specified.

Keywords

Please provide 4 to 5 keywords suitable for indexing the manuscript.

Competing Interests: Authors are required to disclose financial or non-financial interests that are directly or indirectly related to the work submitted for publication.

Text Formatting

- Manuscripts should be submitted in Microsoft Word format.
- The manuscript should be formatted with double spacing, Times New Roman font size 12, and typically span between 15 and 20 pages when typed on A4-sized paper.
- Use the equation editor or for equations.
- Equations should be written using MS Word equation editor or MathType and numbered consecutively using Arabic numerals in parenthesis in the right-hand margin. All units shall be in SI.

Headings
Please limit the use of displayed headings to a maximum of three levels.

Abbreviations
Ensure that abbreviations are defined upon their first mention and consistently used throughout the manuscript.

Acknowledgments
Acknowledgments of people, grants, funds, etc. should be placed in a separate section on the title page. The names of funding organizations should be written in full.

References
The APA format of citation within the text should be adopted thus; as Okeke (2001) points out, Ahmed and Bola (2001) or a recent study (Okeke, 2001) shows... while references should be listed alphabetically without numbering. In situations where manuscripts have been accepted but not yet published yet, such should be referred to as being "in press" as a referencing format.

Books:
Strunk, W., Jr., & White, E.B. (1979): *The elements of style* (3rd ed.). New York: Macmillan American Psychiatric Association (1990). *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington, DC: Author.
(Note: "Author" is used as above when author and publisher are identical)
Freud, S. (1961): The ego and the id. In J. Stachey (Ed. and Trans.), *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 19, pp. 3-66). London: Hogarth Press. (Original work published 1923) In text this would be cited as (Freud, 1923/1961)

Journal article
Spitch, M.L., Verzy, H.N., &Wilkie, D.M. (1993): Subjective shortening: A model of pigeons' memory for event duration. *Journal of Experimental Psychology*: *Animal Behaviour Processes*, 9, 14-30

Article in an Internet-only Journal
Fredrickson, B.L. (2000, March 7): Cultivating positive emotions to optimize health and well-being. *Prevention & Treatment,* 3, Article 0001a. Retrieved November 20, 2000, from http://journals.apa.org/prevention/volume3/pre0030001a.html

Internet articles based on a print source
VandenBos, G., Knapp, S., & Doe, J. (2001): Role of reference elements in the selection of resources by psychology undergraduates [Electronic version], Journal of Bibliographic Research, 5, 117-123.
Referencing an online article that you have reason to believe has changed (e.g. the format differs from the print version or page numbers are not indicated) or that includes additional data or commentaries, will require that the date the material was retrieved be added to the document and the universal resource locator [URL], e.g.,
VandenBos, G., Knapp, S., & Doe, J., (2001): Role of reference elements in the selection of resources by psychology undergraduates [Electronic version]. *Journal of Bibliographic Research*, 5*,* 117-123. Retrieved October 13, 2001, from http://jbr.org/articles.html

Discussion list (listserv) archives
Friedman, K (2000) 'Eight theses on advising and supervising the PhD. *DRS Mailbase Archives.* Date: 25th April 2000. Available at http://www.mailbase.ac.uk/lists/drs/2000-04/0105 html (Accessed 2nd May, 2000)

CD-ROMS
Steers, J (2000) 'InSEA: Past, Present and Future' [CD-ROM] Congress proceedings of 30th World congress of InSEA, Brisbane, Australia. Elsternwick, Victoria: AIAE.

Reference list
The references should consist solely of cited works that have been published or accepted for publication, while personal communications and unpublished works should only be acknowledged within the text.

Tables
• Arabic numerals should be used for numbering all tables.
• Tables should be cited in the text in consecutive numerical order.

• Please provide a table caption (title) for each table, explaining its components.
• If any material in the table has been previously published, include the original source as a reference at the end of the table caption.

Figure Captions

- Ensure that each figure is accompanied by a succinct caption that precisely describes its content.
- The caption of each figure should commence with the bolded term "Figure," followed by the corresponding figure number in bold as well.
- When referring to previously published material, provide a reference citation at the conclusion of the figure caption, indicating the original source.

Manuscript Submission

By submitting a manuscript, the author(s) affirm the following: the described work has not been previously published, it is not being considered for publication elsewhere, all co-authors (if applicable) and responsible authorities at the institute where the research was conducted have approved its publication either explicitly or implicitly. The ENVIRON bears no legal responsibility for any claims of compensation that may arise.

Permissions

Authors must seek permission from the copyright owner(s) for any previously published figures, tables, or text passages they wish to include in their manuscript. This permission is required for both the print and online formats. If material is received without the necessary evidence, it will be assumed that the material originated from the authors themselves.

Guidelines for the submission of papers:

Please submit your full manuscript to The Editor at: environjournal@abu.edu.ng with evidence of payment of a non-refundable assessment fee of N6, 000 (Six Thousand Naira Only) to the United Bank for Africa (UBA) Account number: **2304533864** Account name: **ENVIRON Journal of Environmental Studies**. Authors of accepted manuscripts will be required to submit reviewed manuscripts with evidence of payment of a non-refundable publication fee of N24, 000 (Twenty-Four Thousand Naira Only). All submitted manuscripts will be double-blind peer-reviewed to ensure academic rigour, integrity and ethical soundness.

Ethical Responsibilities of Authors

- Submitting the manuscript to multiple journals simultaneously is not permissible.
- The submitted work must be original and should not have been previously published in any form or language, except in cases where it represents an expansion of earlier work. Please provide transparency regarding the reuse of material to avoid concerns of text-recycling or self-plagiarism.
- It is not acceptable to divide a single study into multiple parts and submit them to different journals or submit them sequentially to the same journal (also known as salami-slicing or publishing).
- Results should be presented transparently and accurately, without any fabrication, falsification, or improper manipulation of data, including images. Authors should follow discipline-specific guidelines for data collection, selection, and processing.
- Plagiarism, which involves presenting someone else's data, text, or theories as one's own, is strictly discouraged. Authors must appropriately acknowledge and give credit to other works, whether through direct quotations, close copying, summarization, or paraphrasing. Permission is necessary for the use of copyrighted material (Please beware that the journal may employ the use of plagiarism detection software during the review process)

Role of the Corresponding Author

It is possible to delegate the task of managing communication between the journal and co-authors during submission and proofing to a designated Contact or Submitting Author. In such instances, it is essential to clearly indicate the Corresponding Author in the manuscript.

The responsibilities of the Corresponding Author include:

- Securing approval from all listed authors, including their names and order, before manuscript submission.
- Overseeing all communication between the Journal and co-authors, both pre- and post-publication.
- Transparently indicating any re-use of material and mentioning unpublished material (e.g., manuscripts in press) in a cover letter to the Editor.
- Ensuring the inclusion of appropriate disclosures, declarations, and data statements from all authors in the manuscript (as described above).

Enquiries:

Please address all enquiries to: 08091859400; 08069229320; 08031530228
Professor Kulomri J. Adogbo
ENVIRON Editor-in-Chief

ENVIRON
Volume 6 No. 1 Journal of Environmental Studies April, 2024

CONTENTS **Page**

EDITORIAL

ENVIRON Journal of Environmental Studies aims to create an avenue for the dissemination of academic researches which cover the creation of built environments and landscapes that are designed to improve the artistic, natural, socio-cultural and physical quality of life and the natural environment. ENVIRON is an inter-disciplinary scholarly peer reviewed publication and welcomes original articles exploring wide range of topics in the built environment discipline. In an era marked by rapid technological advancements and growing environmental challenges, the disciplines within Environmental Design and Management stand at a pivotal crossroads. The disciplines represented in this Journal—from Architecture to Urban Ekistics—are more interconnected than ever, each contributing uniquely to the creation of resilient, sustainable, and innovative built environments.

The role of architecture in shaping our world is undeniable. Today, architects are not merely creators of aesthetic structures but are also key players in promoting sustainability. The need for buildings that are not only beautiful but also eco-friendly and resilient to climate change cannot be over-emphasised. The integration of Fine and Applied Arts into architecture enriches our environments, adding cultural and aesthetic value that enhances human well-being. Building Information Modelling (BIM) has revolutionised project planning and execution, offering a collaborative platform that enhances accuracy and efficiency. Beyond technology, there is a pressing need to address socio-economic issues within the built environment. Housing affordability and Sustainable Development Problems remain critical challenges worldwide. As urban populations grow, the demand for affordable, quality housing intensifies, necessitating innovative solutions and policies. Gender-based Issues in Construction and Environmental Management highlight the importance of inclusivity and diversity in creating equitable spaces.

The diverse topics covered in this journal reflect the multidisciplinary nature of modern Architecture, Quantity Surveying, Design, Art and Urban Management. Collaboration across these fields is essential to address the complex challenges of our time. By fostering a dialogue between technology, socio-economic considerations, material science, and creative design, we can pave the way for a future that is innovative, inclusive, and sustainable.

On behalf of the Editorial Board, I wish to express our profound gratitude to the distinguished academics who have sacrificed their time to review the articles in this and all previous issues. The Authors who conducted researches and submitted articles for publications have made this issue rich in content and we are most appreciative of your faith and trust in the Journal as a medium for disseminating your researches.

Professor Kulomri Jipato Adogbo

Editor-in-Chief

ASSESSMENT OF OCCUPATIONAL HEALTH AND SAFETY REGULATIONS IN THE NIGERIAN PORT ENVIRONMENT

Ibrahim Damana Abubakar[1], Shekwobagwu Paul Galadima[1], Abdulmalik M. Mustapha[1]
Yusuf Ndagi Baba[1] and Araoye Olarinkoye Ajiboye[2]
1. Department of Transport Management,
Ibrahim Badamasi Babangida University, Lapai.
2. Department of Logistics and Transport Technology,
Federal University of Technology, Minna
Corresponding author: ibrahimdamana2015@gmail.com

Abstract
Container cargo-handling techniques involve hazardous and dangerous operations that require strict compliance with safety regulations, effective monitoring, and implementation of improved laws in accordance with the International Maritime Organization (IMO) in order to reduce occupational and health hazards. This study employs primary data collection and stratified sampling technique to obtain responses from 332 port workers affiliated with various maritime agencies to investigate the nature of occupational hazards present at port terminals and the compliance levels to safety regulations by administrators. Findings indicate that poor leadership responsibility, lack of proper communication, proper incident reporting and monitoring were perceived to be the highest contributors to setbacks encountered in achieving effective safety compliance at container terminals in Nigeria. It is therefore recommended that technological systems and expertise should be deployed in monitoring port terminal operations to ensure compliance with regulations in order to mitigate health and safety risks.

Keywords: Hazards, Maritime, Operations, Safety and Technology

INTRODUCTION

Ports play a significant role in connecting sea and land transportation because of the various kinds of vessels and cargoes that may be handled; hence they are regarded as complex terminal system. Therefore, the proper management of occupational health and safety in theports services requiresa consistently monitored system that would uphold best practice for an effective system. Failure to do so would mean encouraging the thriving of the dangers associatedwith vulnerabilities ofearly detection risks and perhaps, mitigation and control measures (Antao *et al.*, 2016). Risk management has been efficient, thorough and comprehensive procedure that supplements and complements the general management of all parts of our life at work (Mohammad, 2017). The Supervisors of port operations services are frontline stakeholders who partake in risk management by ensuring that they provide necessary leadership that is proactive in mitigating operational hazards (Pallis, 2017).

Occupational risk management in maritime ports take up high significance, as accidents in container terminal ports can result in fatal injury or mortality, as well as severe environmental damages (Fabiano *et al.*, 2010).Globally, ports have experienced major changes in the last decades because of advancements in shipping, cargo-handling technology and

working culture, specifically in the presentation of standard-size cargoes, in the intermodal shipping containers (Beresford *et al.,* 2002).The advantages of operating in a safe and sound working environment are vital in expanding work efficiency and subsequently enhance organizational operational performances. Many skilled workers are often comfortable and attracted to working under standard compliance to safety practices as the social andeconomic expenses of accidents can be disposed of or decreased(Oxenburgh*et al.,* 2004).

In Nigeria, occupational health and safety remain an essential issues in our daily work environment. This is a consequence of the different types of infrastructural equipment used at container terminalswithin ports, including ship-to-shore cranes, mobile harbour cranes, reach-stackers and material handling equipment, which could cause various accidents in the port environment. Lack of proper leadership for the implementation of an effective health and safety policy is void in some aspects and the management of the portsoften overlook these lapses as they pursue after their personal benefits, until mishaps occur.In recent years, the general level of maritime safety has been improved globally. Although, current and significant improvements are still required in Nigeria especially in terms of compliance with global standard practice.The best safety practice is to anticipate hazards rather than respond to them when they occur.Therefore, the international shipping industry has already begun to move from a responsive to a proactive approach to safety through what is known as Formal Safety Assessment (FSA). This was introduced by the International Maritime Organization (IMO) as "a rational and systematic process" for assessing risksassociated to maritime safety including line handling, heavy lifting, severe weather conditions, chemical hazards, etc., and the protection of the marine environment. It is also aimed at assessing the costs and benefits of IMO options in order to reduce these risks (Mohammad, 2017).

A major means of promoting health and safety compliance involves not only satisfactory information about accidents but also the views of workers on safety ethics as well as how they perceive a company's practices concerning this term. The science of safetyis paramount to the evolution and development of any enterprise and thus, represents a multidisciplinary approach that focuses on the preservation of lives at work as well as other scopes including, safe cargo transport distribution and other fields of man's hazardous activities (Zorba and Kisi, 2007).

This research aimed at assessing compliance with occupational health and safety measures within container port terminals in Nigeria. The specific objective was to determinethe responsibilities of port authorities and highlight the implications of limited adherence to safety regulations that could hamper the efficiency of Nigerian port services at container terminals.

LITERATURE REVIEW

Risk Management and Safety Overview

The International Maritime Organization (IMO) has a goal aimedat enhancing maritime operations safety, including the protection of life, and health as well as safeguarding the marine environment. According to the formal safety regulation

approved by the IMO in the year 2020, there stipulates a 0.5% global sulphur cap of fuel content as against 3.5% for shipping vessels. This recent regulation by the IMO was borne out of necessity in response to heightening environmental and health concerns, contributed in part by harmful emissions from ships. Seaport risk management plays an increasingly important role in ensuring port service resilience in the context of supply chain systems. As a result, it is attracting much attention from different operational, organizational and economic perspectives (Legato and Monaco, 2004).

Van *et al.* (2008) stated that a "risk assessment is an essential and systematic process for assessing the impact, occurrence and the consequences of human activities on systems with hazardous characteristics and establishes a needful tool for a safety policy". According to Alyami *et al.* (2016), maritime infrastructure such as container terminals presents critical and costly engineering systems that enable economic activities through the transfer of goods and services between national and international destinations, given their significance in ensuring the prosperity of the world economy, these container terminals face a variety of operations vulnerable to hazards (Mansouri *et al.*, 2009).

Management commitment to law enforcement and proactive leadership are effective tools necessary for fostering adherence to safety measures at port terminals (Sheehan *et al.*, 2016). Workplace supervision by employers thus plays a major influence on safety performance. Researchers including Sheehan *et al.* (2016) and Conchie (2013) have opined that lack of leadership responsibility as an index for safety compliance eventually culminates into lagging indicators that show high injury rates and exposure to hazards at workplaces. Griffin and Hu (2013), suggest that the degree to which a leader encourages and promotes safety reduces accident rates inthe workplace.

It is imperative for all companiesto always review and evaluate the effectiveness of their safety management system in accordance with global standards (ISM Code, 2015). The company is responsible for ensuring that adequate resources and shore-based support are provided to enable the designated person or persons to carry out their functions (ISM Code, 2015). Leaders are powerful actors and play a key role in the social communication process within organizations, therefore they are usually vital sources of such indications through their clear statements and behaviour. The leaders provide followers with important information about organizational practices and policies as well as other work-related issues. Table 1 highlights some empirical studies on portsand inland waterways safety and risk assessment.

Table 1: Empirical Review of Port Safety and Risk Assessment

Authors	Paper Title	Findings and Recommendations
John *et al.* (2023)	Robust practices for managing maritime supply-chain risks: A survey of Nigeria's Seaports	Increased level of investment in port digital technologies and regular capacity building in supply chain risk management is required to ensure resilient seaport operations in Nigeria.
Mohammadfam *et al.* (2016)	Developing an integrated decision-making approach to assess and promote the effectiveness of occupational health and safety management systems.	Management commitment, workers' participation, allocation of financial resources, training, risk assessment, definite responsibility, communication and dissemination are all vital to occupational health and safety results.
AlYami *et al.* (2013)	An advanced risk analysis approach for container port safety evaluation (using Fuzzy Rule-Based Bayesian Networks).	This method of analysis was used to facilitate the implementation of the new technique for Container Terminal Risk Evaluation (CTRE) in practice.
Donatus (2013)	Determinants of acidents involving marine vessels on Nigeria's waterways.	A combination of human and environmental factors significantly determines risk factors (injuries, accidents) on waterways.
Lu and Shang (2005)	An empirical investigation of safety climate in container terminal operators.	Safety training and management-oriented terminal operators had the best safety performance.

Source: Authors Compilation (2023).

These studies highlighted have capturedgeneral risk assessment and recommendations for effect management in the maritime sector cutting across ports and terminal systems globally. However, the emphasis of this study is limited to occupational health and safety risks that cuts across container port terminals in Nigeria, thus identifying key factors deemed as setbacks to effective risk mitigation.

Occupational Health and Safety Management in Port Operations in Nigeria

Safety management in port zones includes the different proofs of the most critical dangers and the systematic assessment of the dangers that these risks pose under predictable conditions. In ports, hazards related to dock structures, lifting and cargo handling equipment and machinery, combustible and hazardous substances, access to ships and ship holds, and working with compartments and hazardous substances, form some of the general hazard groups that ought to be considered (Robinson and Stoyanov, 2015).

According to Mohammad (2017), the Nigeria Port Authority (NPA) risk assessment and job incidents analysis report in the seaport environment from 2009 to 2015, indicates that the levels of risks including physical hazards, ergonomic hazards, noise, vibrations, environmental hazards and mechanical hazards sum up to 55% of total exposure to occupational and workplace hazards that seaport workers encounter annually in Nigeria. The human resourceelements

of the seaports which represent the seaport employees, public port authority employees, stevedores, employees of private terminal operators, shipping company staff, employees of other port service providers and general port users often get exposed to occupational injuries and workplace health hazards of various forms prevalent in the seaports.

Occupational hazards of seaports and maritime workers have over time, replaced dangerous working conditions and practices (endangerment) that caused injuries, illness or harm to port employees (Theophilus *et al.,* 2017). According to Idubor and Osiamoje (2013), the lack of adequate employee training and strict enforcement of occupational health and safety regulations continue to enable poor compliance which has invariably contributed significantly to the poor state of workplace safety in Nigeria.

However, in recent times there have been renewed efforts and increased commitment by port authorities to safety compliance through effective supervision and periodic training for staff. On a company-broad basis, Mohammad (2017), reported that container port terminals such as APM port terminal, Port & Cargo Handling Service (P&CHS), Tin-Can Island Container Terminal (TICT), and ENL Consortium have been appraised. APM Terminal in Lagos which houses Nigeria's largest container terminal operations was credited by its management for maintaining high standards in occupational health and safety. According to Leadership News Online (2022), the terminal recorded a 400-day zero Loss-Time Incident Frequency (LTIF) rateper million man-hours worked in the year 2022.

RESEARCH METHODOLOGY

Data Collection

Primary data collection involving the use of questionnaire method was explored. The questionnaire was designed using Survey Monkey software (a widely popular survey tool). This tool was selected for its effective and simplistic nature of application and the minimal cost required. Also,an online link was generated and administered to the relevant port operators after prior visits and phone conversations were made. The link for the questionnaire designed online was sent to dockworkers, stevedores, and other employees in the container terminals. The impact of this assessment aimed at indicating whether theterminal operators in Nigeria were sufficient in complying with safety standards.A set of 15 structured questions were developed and administered for data collection. These questionnaires were structured to generate relevant information with respect to the specific research objective of this study.

The total population drawn for the study was 1557. A targeted sample size of 400 was selected from the five organizations identifiedusing the Yamane formula. The stratified random sampling technique was employed for the data collection. The following constitute the study population across five departments from the relevantport stakeholders:

i. Nigeria Port Authority (NPA) 230
ii. Nigeria Shippers Council (NSC) 143
iii. Nigeria Maritime Administration and Safety Agency (NIMASA) 350
iv. Indigenous Ship-owners Association of Nigerian (ISAN) 450
v. Nigeria Shipping Companies Association (NSCA) 384
Total population 1557

The following formula was adopted to determine the sample size (Yamane, 1973):

$$n = \frac{N}{1+N(e)^2} \quad (1)$$

Where;
n =sample size
N= population size
e= level of significance = 0.05 confidence level
Hence:

$$n = \frac{1557}{1+1557\ (0.05)2} = \frac{1557}{1+1557\,(0.0025)} = \frac{1557}{3.895} = 399.74$$

Therefore,the sample size (*n*) for this study was 400 approximately. Although, 400 copies of the questionnaires were distributed to the respondents across five departments from the relevant port stakeholders in Nigeria, only a total ofthree hundred and thirty-two (332) responses were obtained, constituting 83% of the sample size.

RESULTS AND DISCUSSION

Analysing Health and Safety in Port Operations
Health and Safety in Port Operations

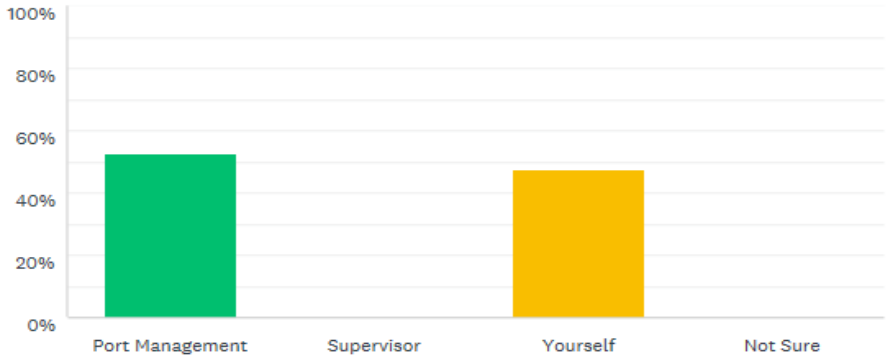

Figure 1: Individuals responsible for port health and safety.
Source: Authors survey, (2023)

From Figure 1 above, 52.38% of the respondents agreed that port managers are responsible for ensuring health and safety in the ports, while 47.62% believe that each individual is responsible for his/her personal safety. The pattern of response indicates a shared responsibility for safety as the ideal standard for operations involving workers in the maritime environment. This is in tandem with the provisions and guidelines as stipulated by the International Maritime Organization (IMO, 2015).

Analysis of Personal Protective Equipment (PPE) Use by Field Operators

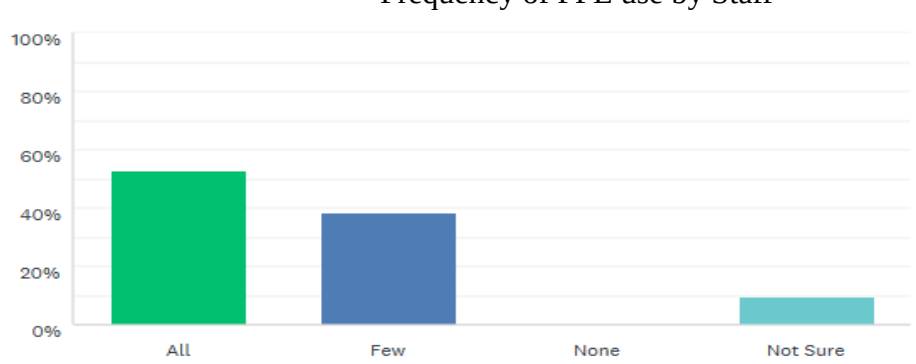

Figure 2: Operational staff who wear PPE regularly.
Source: Authors survey, (2023).

The extent to which the PPE is used at various container terminals by staff was evaluated. The response indicated that 52.38% of all staff wear PPE while 38.10% noted that only few staff wear PPE. Also, 9.52% affirmed that they were not sure whether staffwear PPE. Mohammad (2017), had suggested the use of personal protective equipment to be crucial in mitigating industrial mishaps and promoting safety in work environments. It therefore becomes imperative for authorities and operators to enforce their proper use at all times.

Analysis of Deaths occurring from health hazards in the last 2 years

Figure 3: Record of death due to health hazards in the last 2 years
Source: Authors survey, (2023).

From the result of the survey concerning death rate due to occupational health hazard, 19.05% of the respondents agree that at least a case death was recorded due to occupational hazards in the last 2 years, while 80.95% stated that there was no death recorded in the last 2 years. Based on this assessment, it can be deduced that death rates occurring from maritime and port operation hazards in recent times have been minimal. However, human factors and mechanical failures on terminal facilities still result in significant levels of injuries and long-

term safety concerns. For instance, studies conducted by Donatus (2013), Mohammad (2017) and John *et al*., (2023) highlighted slips and trips during operations, lifting mishaps, poor lighting, and cargo spillages as typical hazards that could cause long-term safety concerns.

Analysis of accidents or injuries incurred by operational staff in the last 6 months

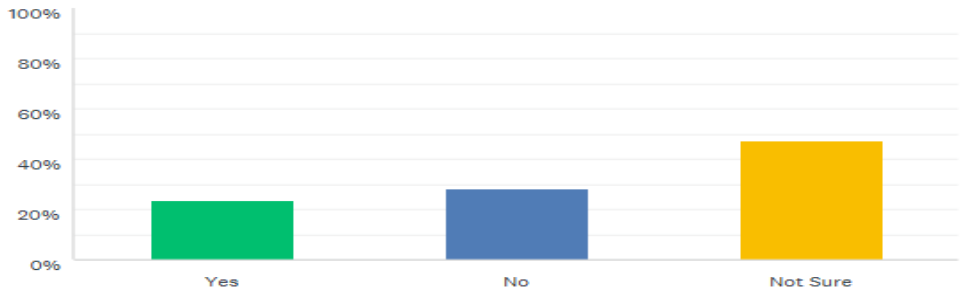

Figure 4: Accident or injury experienced by operational staff in the last 6 months
Source: Authors survey, (2023).

The results from the respondents shown in Figure 4 indicates that 23.81% agreed as operational staffs, they have suffered injury as a result of accident in the last six months, while 28.57% disagreed. As many as 47.62% were undecided about the nature of accidents that resulted in injuries in the last six months. This statistic seemingly confirms the claim that although death cases resulting from operational mishaps were minimal, other forms of injuries and losses were still relatively common. The fact that a large percentage of respondents were unsure about injuries sustained by operational staff in the line of duty show the lack of incident reporting at terminals which is necessary for evaluation and operational improvement.

Training Frequency for Port Terminal Operators

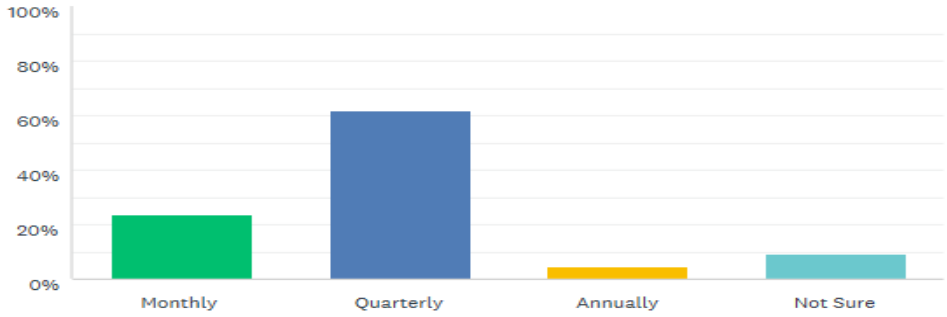

Figure 5: Frequency of port risk assessment training
Source: Authors survey, (2023).

Figure 5 above shows statistically that 23.81% of terminal operators attend monthly trainings whereas, 61.90% attend their training on quarterly basis. Furthermore, only 4.76% stated that they undertake risk assessment trainings on a yearly basis, while 9.52% were undecided about any form of training undergone within an annual time frame. The result shows that most maritime operators facilitate routine training exercises for field workers at least once annually. This is important in developing a strong decision-making approach that improves safety and reduces work related hazards. This finding is in agreement with studies conducted by Mohammadfam *et al.* (2016).

Analysis of health and safety policy communication among staff

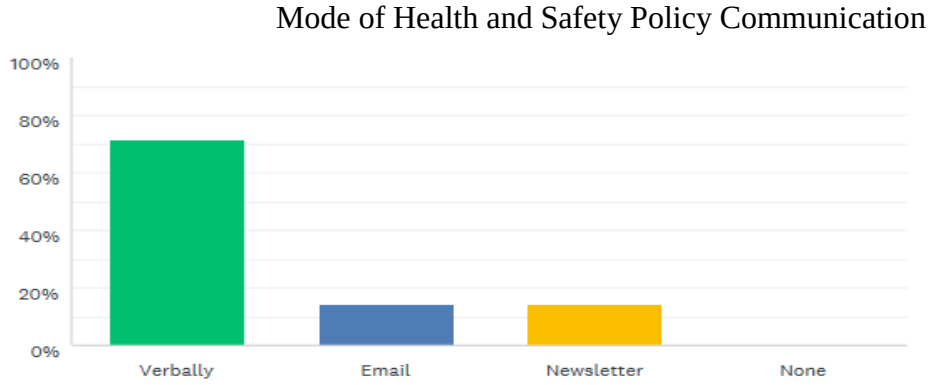

Figure 6: Mode of communicating health and safety policies among staff
Source: Authors survey, (2023).

While 71.43% of the respondents indicated that communications were circulated verbally, 14.29% alluded to the fact that they receive health and safety policies through email. Meanwhile, 14.29% of the staffopined that they had access to health and safety policies through newsletter, while none stated that they do not have access to health and safety policies. From the result it can be deduced that oral communication is the most widely used method in disseminating safety and risk information. However, in ensuring greater effect, as recommended by Mohammedfam (2016), a combination of oral and documented guidelines yields the best result in terms of information delivery in relation to safety policy adherence.

Assessment of health and safety compliance levels within port Terminals

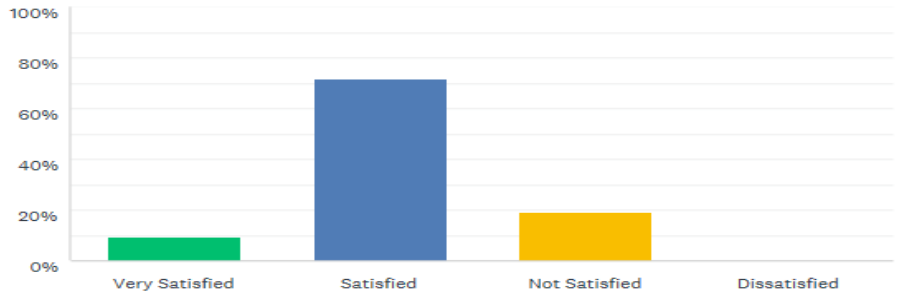

Figure 7: Satisfaction level of health and safety compliance in port terminals
Source: Authors survey, (2023).

The result from the respondents indicates that 9.52% were very satisfied with health and safety compliance levels in their workplace, while 71.43% opined that they were just satisfied. However, 19% indicated their dissatisfaction towards compliance levels to safety regulations. The results revealed that most of the workers believe that health and safety regulations have been largely complied with but policy consistency and sustainability is still necessary to uphold the gains achieved in recent times.

Anaysis of safety Challenges Encountered in the Port Environment

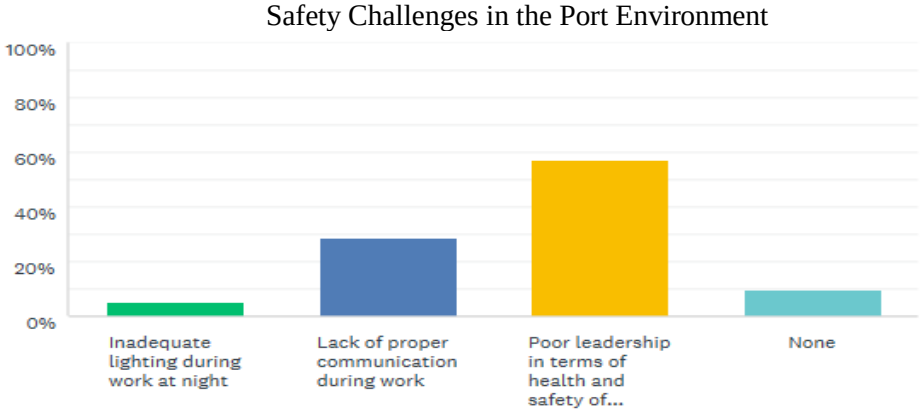

Figure 8: Safety challenges encountered in the port environment
Source: Authors survey, (2023).

From the result obtained, 4.76% believe that inadequate lighting during night work is one of the safety hazards that has been observed to be recurrent. On the other hand, 28.57% believe that lack of proper communication is a safety measure that is not properly put in place in the port environment. In addition, 57.14% opined that poor leadership contributes to the set back of safety policy implementation in the port environment while, only 9.52% believe that none of the above contributes to safety challenges present in the port environment. Based on the result, it is evident that leadership plays a significant role in policy compliance and sustainability. According to the findings made by Mohammad (2017), proactive leadership ensures proper incident reporting, incident investigation and

intervention, training and enlightenment regarding accident prevention as well as an overall improvement in job performance.

Analysing emerging harmful trends in port terminal operatons

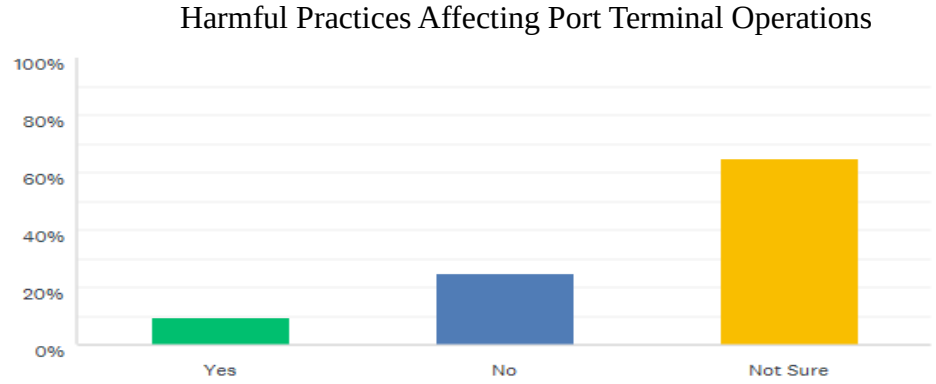

Figure 9: Practices affecting the health and safety of port operators
Source: Authors survey, (2023).

From the total respondents, 10% believe that there are practices affecting the health and safety of port operators such as the use of untrained labour, and increased cargo handling for long hours without adequate breaks. Conversely, 25% opined that port operators do not face any new trends with regards to their health and safety. However, 65% of the respondents were unsure about any harmful or negligent act constituting occupational hazardto terminal workers. In line with guidelines by the IMO (2015), it is important for authorities to regulate working hours and shifts, job description of unskilled port workers and eliminate pollution sources in order to curb hazards.

Comparing Lighting Conditions and Signage in the port environment

Figure 10: Importance level of safety practices in the port environment
Source: Authors survey, (2023).

While 35% agreed that adequate lighting was more important in the port environment, 65% were of the opinion that safety signs are more important in the port environment. An evaluation of the pattern of response depicts that the choice of each option was based on the peculiarities and schedule of work undertaken by the workers. In general, proper lighting and safety signage are necessary tools in a port terminal facility.

Perception of port operators and other employees towards effective health and safety

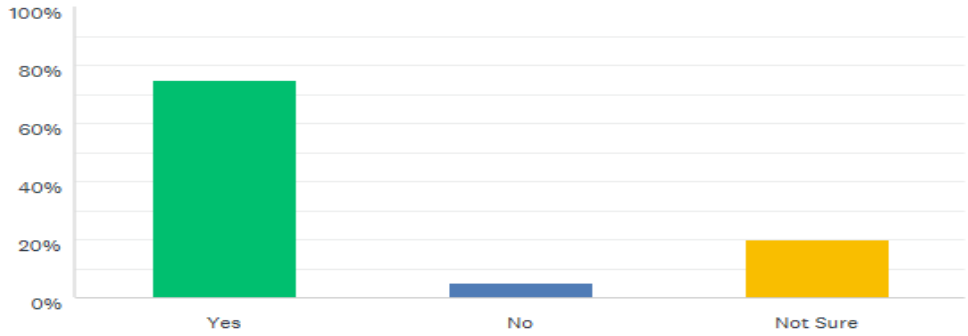

Figure 11: Rights and responsibilities of port operators and other employees for effective health and safety
Source: Authors survey, (2023).

The result from Figure 11 shows that 75% of all respondents believe that port operators and other employees have rights and responsibility for effective health and safety. Only 5% indicated that they don't have such responsibilities, while 20% were unsure. In ensuring safety, all stakeholders must be alive to their responsibilities. If unsafe practices are avoided, the likelihood of mishaps then becomes limited. Empirical studies from John *et al.* (2023), Mohammad (2017) and Conchie (2013) indicate that a combined effort from stakeholders in terms of responsibility is necessary for a safe and hazard-free work environment.

Perception of rights and responsibilities towards health and safety

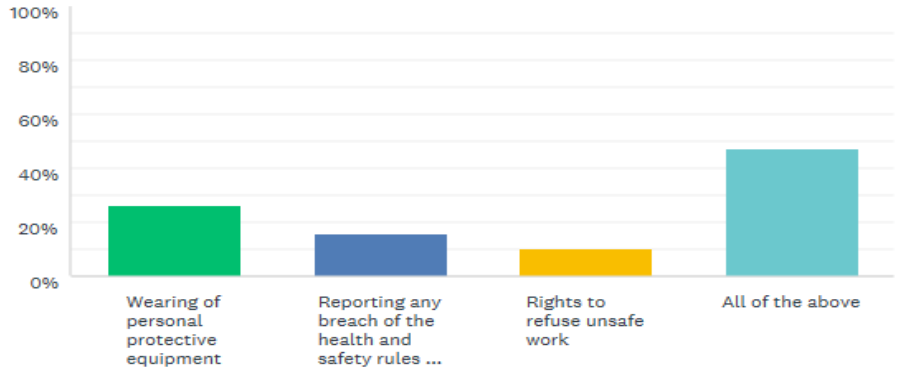

Figure 12: Types of rights and responsibilities of port operators and other employees for effective health and safety. Source: Authors survey, (2023).

From Figure 12 above, 26.32% believe that port operators and other employers are responsible for providing personal protective equipment (PPE). On the other hand, 15.79% believe that they are responsible for taking action against the breach of health and safety policies in the port environment. 10.53% opined that they have rights to refuse unsafe work, while 47.37% believe that they are responsible for all applicable actions pertaining their health and safety. The responses indicate that maritime field workers and operators are aware of their rights and responsibilities. However, what is pertinent is their willingness to take the necessary action in compliance to health and safety regulations.

Perception on causes of accident at ports

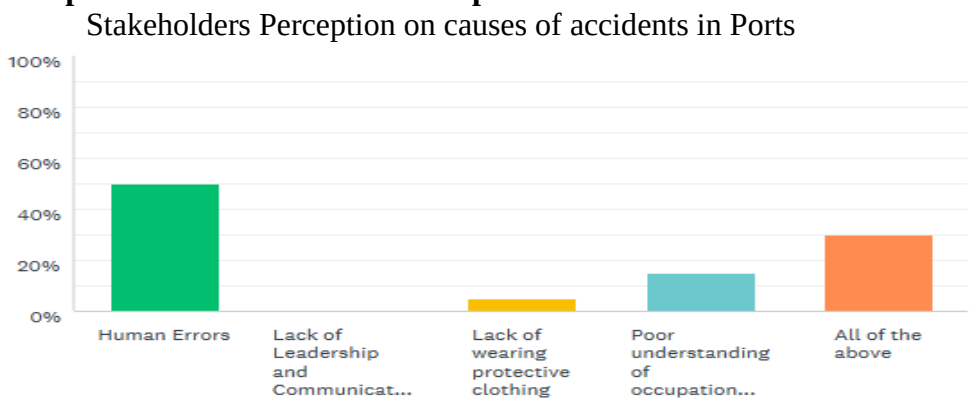

Figure 13: Cause of accidents at the ports. (Source: Authors survey, 2023).

From the findings, 50% of the total respondents allude to the fact that human errors are the main cause of accidents at ports. Only 5% were of the opinion that accidents occur when protective clothing is not worn. 15% believe that the lack of occupational health and safety awareness results in port accidents, while 30% find all of the above factors to be key contributors to accidents at the ports. The assertion that human errors are the most likely cause of accidents at ports is supported by Donatus (2013) and Mohammad (2017).

Monitoring, inspection and evaluation of port safety practices

Stakeholders Monitoring, Inspection and Evaluation of Port Operations

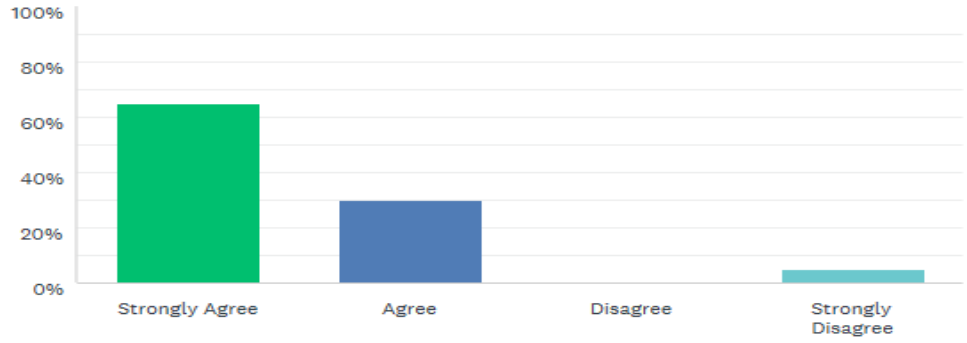

Figure 14: Mandatory practices for effective health and safety regulation at the ports.
Source: Authors survey, (2023).

From Figure 14, 65% of the respondents strongly agreed that monitoring, inspection and evaluation of port safety practices are mandatory for an effective health and safety, while 30% agreed that monitoring, inspection and evaluation of port safety practices are mandatory for an effective health and safety. On the other hand, only 5% strongly disagree that operations in port terminals can be improved by monitoring and inspection. Monitoring and evaluation represent effective measures to check compliance of safety regulations at various port terminals. As earlier observed, terminal evaluations are necessary for appraisal in terms of performance. Personnel supervision on a routine basis represents an effective method to achieve monitoring. The use of technology can also be effective in mitigating safety risks (John *et al.*, 2023).

Benefits of Occupational Health and Safety Policies

Perceived Benefits of Policy Implementation

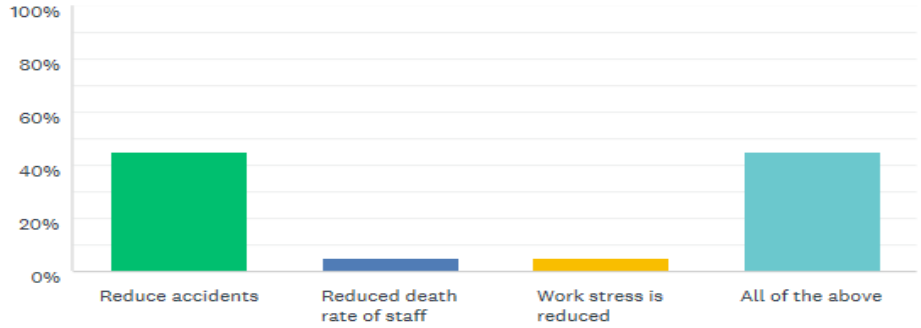

Figure 15: Benefits of effective occupational health and safety policies to the port management and operators.
Source: Authors survey, (2023).

From Figure 15, 45% of the respondents believe that an effective occupational health and safety policy in operations will definitely reduce accidents. While on the other hand, 5% believe that death rate among staff resulting from field

operations would be significantly reduced. Also, 5% opined that proper implementation of safety policies would aid in reducing work stress, while 45% believe that accidents, death rates, and work stress would all be curtailed if proper implementation of policy regulations is carried out.

Aside from the direct benefits associated with the proper implementation of health and safety policies, there exists an indirect benefit of increased productivity since all stakeholders would be perceived to be at ease under satisfactory safe working conditions. Also, a system that is proactive in its responsibilities would be capable of anticipating and preventing safety hazards and losses.

CONCLUSION

Based on the assessment of port terminal operations in Nigeria, it can be inferred that despite glimpses of improvement in occupational safety, there is still significant effort required for a sustainable implementation of safe practices in Nigerian ports, especially container terminals. The survey from this study concludes in general that leadership responsibility, proper communication, incident reporting, monitoring and training are key indices that could improve occupational health and safety. However,the lack of strict enforcement of regulatory provisions as well as the review and amendment ofother related HSE laws mitigates excellent safety performance at terminals.

It is therefore recommended that periodic system safety evaluation and the detection of early hazards should be prioritized as part of measures in mitigating performance degradation and damage to human life at container terminals of ports. Also, new preventive strategies involving improved technology, to reduce the effect and rate of accidents and also adverse consequencesshould remain the top priority of terminal operators and port administrators.

REFERENCES

Alyami, H., Yang, Z., Riahi, R., Bonsall, S. and Wang, J., 2016. Advanced uncertainty modelling for container port risk analysis. *Accident Analysis & Prevention*.

Antão, P., Calderón, M., Puig, M., Michail, A., Wooldridge, C. and Darbra, R.M., 2016. Identification of Occupational Health, Safety, Security (OHSS) and Environmental performance indicators in port areas. *Safety science*, *85*, 266-275.

Beresford, A.K.C., Gardner, B.M., Pettit, S.J., Naniopoulos, A. and Wooldridge, C.F., 2004. The UNCTAD and WORKPORT models of port development: evolution or revolution?. *Maritime Policy & Management*, *31*(2), 93-107.

Chlomoudis, C.I., Lampridis, C.D. and Pallis, P.L., 2013. Quality Assurance: Providing Tools for Managing Risk in Ports. *International Journal of Maritime, Trade & Economic Issues (IJMTEI)*, *1*(1), 3-20.

Conchie, S.M., (2013). Transformational leadership, intrinsic motivation, and trust: a moderated-mediated model of workplace safety. *Journal of occupational health psychology*, *18*(2), p.198.

Fabiano, B., Currò, F., Reverberi, A.P. and Pastorino, R., 2010. Port

safety and the container revolution: A statistical study on human factor and occupational accidents over the long period. *Safety Science*, *48*(8), 980-990.

Griffin, M.A. and Curcuruto, M., 2016. Safety climate in organizations. *Annual Review of Organizational Psychology and Organizational Behavior*, *3*, 191-212.

Idubor, E.E. and Oisamoje, M.D., 2013. An exploration of health and safety management issues in Nigeria's effort to industrialize. *European Scientific Journal, ESJ*, *9*(12).

International Safety Management (ISM) code, (2015). *Guidelines on the implementation of ISM code.* Retrieved from, https://puc.overheid.nl/nsi/doc/PUC_2410_14/6/

International Maritime Organization (IMO), (2020).*Synopsis of the report on the impact on Africa of IMO's rules on sulphur.*Retrieved from https://https://www.pwc.com/ng/en/assets/pdf/imo-synopsis-new.pdf

John N., Micheal R., Ogbari M., Ariyo A., Ine B. (2023). Robust practices for managing maritime supply chain risks: A survey of Nigeria's seaports, *The Asian Journal of Shipping and Logistics*, https://doi.org/10.1016/j.ajsl.2023.09.001i

Leadership News Online (2023)."APM Terminals Records 13 Months Without Lost Time Injury". Accessed from https://leadership.ng/apm-terminals-records-13-months-without-lost-time-injury/

Legato P., and Monaco M. F., (2004). Human Resources Management at a Marine container terminal. *European Journal of Operational Research*, 156, (3), 769-781

Lu, C.S., And Shang, K. C. (2005). An empirical investigation of safety climate in container terminal operators. *Journal of Safety Research*, 36(3), 297-308

Mansouri, M., Nilchiani, R. and Mostashari, A., (2009). A risk management-based decision analysis framework for resilience in maritime infrastructure and transportation systems. In *Systems Conference, 2009 3rd Annual IEEE* (pp. 35-41). IEEE.

Mohammadfam, I., Kamalinia, M., Momeni, M., Golmohammadi, R., Hamidi, Y. and Soltanian, A., (2016). Developing an integrated decision-making approach to assess and promote the effectiveness of occupational health and safety management systems. *Journal of Cleaner Production*, *127*, 119-133.

Mohammad U. A. (2017). Assessment of Occupational Health and Safety in a Maritime Container Terminal: Nigeria's ports as a case study. *Unpublished dissertation submitted to the department of Nautical Science, John Moore University Liverpool.*

Oxenburgh, M., Marlow, P.S. and Oxenburgh, A., (2004). *Increasing productivity and profit through health and safety: the financial returns from a safe working environment*. CRC Press.

Pallis, P.L., 2017. Port Risk Management in Container Terminals. *Transportation*

Research Procedia, *25*, 4415-4425.

Reniers, G.L.L., Dullaert, W., Ale, B.J.M. and Soudan, K., (2005). Developing an external domino accident prevention framework: Hazwim. *Journal of Loss Prevention in the process industries*, *18*(3), 127-138.

Robinson, j. and Stoyanov, S.,(2015). *Environmental Health and Safety in Port areas*. Retrieved from,https://www.academia.edu/29035344/Environmental_Health_and_Safety_in_Port_Areas

Sheehan, C., Donohue, R., Shea, T., Cooper, B. and De Cieri, H., (2016). Leading and lagging indicators of occupational health and safety: The moderating role of safety leadership. *Accident Analysis and Prevention Journal*, 92, 130-138.

Theophilus, C., Okoroji, L.I. and Ikeogu, C., (2017). Modeling the Qualitative Relationship among Risks Associated with Occupational and Workplace Hazards in Seaport Environments: The Case of Apapa Port, Nigeria. *NAŠE MORE: znanstveno-stručni časopis za more i pomorstvo*, *64*(2), pp.58-62.

Van Duijne, F.H., van Aken, D. and Schouten, E.G., (2008). Considerations in developing complete and quantified methods for risk assessment. *Safety Science*, *46*(2), 245-254.

Zorba, Y. and Kisi, H., (2007). Safety management for dangerous cargo in container terminal: Safety perception analyses of port-workers. *University School of Maritime Business and Management, Izmir, Turkey*.