

AN APPRAISAL OF OCCUPATIONAL SAFETY AND ENVIRONMENT IN
POWER HOLDING COMPANY OF NIGERIA (PHCN) Plc. ABUJA
DISTRIBUTION ZONE.

BY

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CERTIFICATION

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APPROVAL PAGE

This project has been read and approved as meeting the requirement for the award of B. Tech. degree in Industrial and Technology Education of the department of Industrial and Technology Education, School of Science and Science Education, Federal university of technology, Minna.

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DEDICATION

This project is wholly dedicated to Almighty Allah, the Lord who endowed me with His divine guidance, protection, knowledge, wisdom, understanding and success in my course and in whom I trust for all my life Endeavour's; and to my wonderful and beloved parents Engr. and Mrs. Babakolo Mohammed and family.

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ABSTRACT

The research was carried out to appraise the present state of occupational safety and environment in Power Holding Company of Nigeria, Plc, Abuja Distribution Zone, with the view to elicit pertinent information for the study. Five out of the nine business units was randomly sampled from the zone, and used for these study. Four research questions were drawn and two null hypotheses were formulated and tested at 0.05 level of significance on areas of availability of personal protective equipments and facilities, extents of compliance with Occupational Health and Safety, extent of safety enlightenment programs, and possible ways of promoting Occupational Health and Safety in PHCN. The instrument was validated by three (3) lecturers in Industrial and Technology Education (ITE) programme, Federal University of Technology, Minna. The targeted population for the study was 50 engineers/supervisors and 90 technicians from the five business units. A total of 160 questionnaire was administered to the respondent at the five business units, 100 out of the administered questionnaire was randomly sampled and used for analysis. The data was analyzed using percentage mean, mean, variance, degree of freedom and t-test as a statistical tools. The findings revealed that; workers are not obeying safety rules and regulation, using personal protective safety equipments and facilities, obeying occupational health and safety standards at PHCN work environment. In its benefits to both the respondents and the country at large, it was recommended that management should penalize workers who violate safety rules and regulations and also provision of personal protective equipments and facilities such as the hand gloves, helmets, first aid kits etc at PHCN work environments.

CHAPTER I

INTRODUCTION

1.1 Background of the study

Millions of workers die or are injured or fall ill every year as a result of workplace hazards. The suffering in terms of human life is enormous, while the economic cost of the failure to ensure occupational health and safety are so great that they may undermine national aspiration for sustainable economic and social development. As a result of introduction of new technology and automation of industries, the work environment is undergoing rapid transformation. The chemicals, equipments and machines used in either service or production industries bring varying degrees of hazards which threaten the health and safety of the workers.

The rate of work-related accidents and diseases is particularly worrisome in developing countries such as ours. ILO (2001) observed that many developing countries are experiencing an increase in occupational accidents and diseases as a result of rapid industrialization and they require the reinforcement of national prevention efforts. Progress in protecting workers health has always been and continue to be the priority objectives for the International Labour Organization (ILO).

Despite immense efforts made since 1970's, Occupational accidents are still too frequent. Their cost to society and the enterprises, as well as to the workers affected and their families, continue to be unacceptable. There are more than 250 million work related accident every year. Workplace hazards and exposure causes over 160 million workers to fall ill annually, while it has been estimated that more than 1.2 million workers die as a result of occupational accidents and diseases (ILO 2001). The social cost can no longer be tolerated as the inevitable price of

progress. Reducing the toll of occupational accidents and diseases has obvious implication in terms of the alleviation of human suffering. The related economic cost place a considerable burden on the competitiveness of enterprises. It is estimated that annual losses resulting from work related diseases and injuries, in terms of compensation, lost of work days, interruption of production, training and retraining, medical expenses and so on, routinely amount to over 4 percent of total Gross National Product (GNP) of all countries in the world.

For instance, the annual cost of manufacturing sector of United State alone is more than US\$ 190 billion, the direct cost of work accidents and diseases in Deutsche Mark (DM) 56 million per year in Germany and Norwegian Krone (NOK) 40 billion in Norway. In Australia, the cost of workplace injuries and work related accidents has been tagged at A\$ 15 billion to A\$ 37 billion. According to the European Agency for Safety and Health, the loss to GNP cause by workplace accidents and work related ill health in European Union Member States in the range of 2.6 to 3.8 percents. The estimates are sufficient to demonstrate beyond any doubt that a significant reduction in the incidence of occupational accidents and diseases over reasonable period of time will produce valuable economic benefits.

According to Oranu (1996) cited in Oke (2002), 17 thousand workers are killed every year, over 2 million received injuries, while 300 thousand workers are permanently impaired. The trend of injuries and diseases from work environment is particularly frightening in developing countries such as ours because of the absence of reasonable research into the economic implication of occupational accidents occasioned by epileptic accidents reports. Various forms of accidents in workplace are observed in industries and factories in Nigeria including the Power Holding Company of Nigeria (PHCN) ,Plc which is of concern to the researcher. On 15th

February, 2010, the Daily Trust Newspaper reported on how a 42 years-old staff of PHCN was electrocuted at Kubwa while trying to work on electric fault.

According to Mr. Sunday Obi who made a paper presentation on ‘ Health and Safety’ said not less than 187 people died in accident occurring on the Power Holding Company of Nigeria (PHCN) installation and other power infrastructure nationwide, a report released by Nigeria Electricity Regulatory Commission (NERC) has highlighted covers from 2008 to 2010. This account for 27 percents out of the accidents, 318 people suffered various degree of injuries (Daily Trust 20th September, 2011). Violation of safety regulation in power installation are rife in Nigeria as unauthorized persons are often reported electrocuted while tempering with PHCN facilities laden with high voltage.

In 2008, 171 cases of accidents were received by the NERC, out of which 45 deaths and 141 injuries were recorded. Out of this, 17 deaths were as a result of public disregard for safety regulations, 3 died due to vandalism of facilities, operators regards for safety regulation was responsible for the death of 15 while 10 died due to employees bad working practices, the report said. In 2009, also, a total of 244 reports were received, 49 deaths was recorded representing 17 percents while 106 were injured. 12 died due to disregards for safety regulation, 15 public disregards for safety regulation and 8 died vandalizing public utilities, the report affirmed. In 2010, a total of 288 reports were received out of which 93 deaths and 73 injuries were recorded. According to the report, a copy of which the daily trust obtained, 23 died due to employees bad working practices, 25 were due to operators disregards for safety regulations, 42 died due to public disregards for public safety regulation and 3 died in vandalism incidents (Daily Trust 20th September, 2011).

Occupational accidents and diseases does not only cause pain, suffering or death to victims, but also threaten the lives of other workers and their dependants. This is to say that individuals are at greater or lesser risk at different times in their working careers due to this situational considerations. Therefore, this study is designed to appraise the present state of occupational safety and environment in Power Holding Company of Nigeria (PHCN) Plc.

1.2 Statement of the problem

The background of the study highlighted occupational accidents resulting from various levels of disability and disturbing sources of loss of skilled and unskilled but experience labour, material loss and high operational cost through medical care, payment of compensation, repairing or replacing damage equipment or machines.

Mr. Clyed Brandon (2010) from the U.S. on his visit to Nigeria lamented that lots of lives were being lost annually in workplaces where there were no workable occupational safety. Consequently , the vital contribution of this group of skilled manpower to the economic development is lost. Mr. Ini Nwoko (2010) also added that, there is urgent need for the government to come up with regulations that would make corporate and public organizations provide conducive working environment in their workforces. According to him the cost for medical treatment of the injures, compensation and repairing and replacing damaged materials and infrastructure constitute another area of concern which spells the difference between staying in business or going bankrupt.

In general, high rate of accidents tends to tarnish the image of an organization or job. Sequel to this , the study was designed to investigate the unsafe acts and unsafe conditions in the work place that are hazardous to the workers in Power Holding Company of Nigeria (PHCN),

Plc with a view to proffer a possible solution to the menace of incessant loss of her skilled manpower through death and disability.

1.3 Purpose of the study

The main aim of this study was to appraise the present state of occupational safety and environment in Abuja Distribution Zone of the Power Holding Company of Nigeria (PHCN) Plc. Most especially, the study aimed at investigating;

1. The availability of personal protective equipments and facilities in PHCN
2. The extent of compliance to occupational health and safety standard in PHCN
3. The extent of safety enlightenment programs in PHCN work environment.
4. Possible ways of promoting occupational safety and environment in PHCN.

1.4 Significance of the study

This study will be of very great significance to the industrial workers in PHCN, Plc, because it will identify all the unsafe acts and unsafe condition in the work place as well as assess the availability of personal protective equipment facilities, thereby, providing opportunities for evolving methods of improving the health of the workers. This study will equally be of benefit to the management because it would employ prevention of damage to equipment, loss of production time, compensation claims, loss of skilled manpower through death or incapacitation. The work will no doubt, mean well for the consumers as the management will be better positioned to focus on its mandate of the much talked about “uninterrupted and sustainable power supply”. Above all, the study will greatly enhance the corporate image of the company if the results are fully implemented.

1.5 Scope of the study

This study was delimited to the scope of occupational safety as it is made for the technical staffs and their supervisors/engineers of PHCN, Plc that are involved in installation, repairs, testing, maintenance and operation of electrical equipment, and may not be generated to all staff of PHCN. The study was also limited to the business units within the Abuja Distribution Zone of the PHCN.

1.6 Assumption of the study

The following assumption are inherent in the study

1. That the technical and engineering staffs are in better position to provide the needed answers.
2. That a significant number of the distributed questionnaire will be returned
3. That the questionnaire returned will be objectively completed

1.7 Research questions

The following research questions were asked to guide the study

1. What are the available personal protective equipments and facilities in PHCN?
2. What is extent of compliance with occupational health and safety (OHS) standards in PHCN work environment?
3. To what extent is safety enlightenment activities carried out in PHCN?
4. What are the possible ways of improving occupational safety and environment in PHCN?

1.8 Hypotheses

The following hypotheses formed the basis for the study:

HO₁: There is no significant difference between the mean responses of technicians and supervisors/engineers on the extent of compliance with occupational health and safety (OHS) standard in PHCN.

HO₂: There is no significant difference between the mean responses of technicians and supervisors/engineers on the possible ways of improving occupational safety and environment in PHCN.

CHAPTER II

A REVIEW OF RELEVANT LITERATURE

LITERATURE REVIEW

This chapter focus on review of literature that are relevant to the study: “ An Appraisal of Occupational Safety and Environment in Power Holding Company of Nigeria (PHCN), Plc”. The chapter is discussed under five distinct parts:

1. Historical background of PHCN, Plc.
2. Development of occupational health in Nigeria.
3. Occupational Safety
4. The concept of Work Environment
5. Summary of review of relevant literature

2.1 Historical background of PHCN, plc.

The Power Holding Company of Nigeria (PHCN), formerly the National Electric Power Authority (NEPA) is an organization governing the use of electricity in Nigeria.

The history of electricity development in Nigeria can be traced back to the end of the 19th century when the first generating power plant was installed in the city of Lagos in 1898. From then until 1950, the pattern of electricity development was in the form of individual electricity power undertaken scattered all over the town. Some of the few undertaking were Federal Government bodies under the Public Works Department, some by the Native Authorities and others by the Municipal Authorities. In 1950, Electricity Corporation of Nigeria (ECN) was formed, in order to integrate electricity power development and make it effective, then the colonial Government passed the ECN ordinance No. 15 of 1950. With this ordinance in place, the electricity department and all those undertakings which were controlled came under one body.

The ECN and the Niger Dam Authority (NDA) were merged to become the National Electric Power Authority (NEPA) with effect from the 1st of April 1972. The actual merger did not take place until the 6th of January 1973 when the first General Manager was appointed. Despite the problems faced by NEPA, the Authority has played an effective role in the nations socio-economic development thereby steering Nigeria into greater industrial society. The success story is a result of careful planning and hard work. The statutory function of the Authority is to develop and maintain an efficient co-ordinate and economical system of electricity supply throughout the Federation. The decree further states that the monopoly of all commercial electric supply shall be enjoyed by NEPA to the exclusion all other organizations. This however, does not prevent privy individuals who wish to buy and run thermal plants for domestic use from doing so. NEPA, from 1989, has since gained another status-that of quasi-commercialization. By this, NEPA has been granted partial autonomy and by implication, it is to feed itself. The total generating capacity of the six major power stations is 3,450 megawatts. In spite of considerable achievements of recent times with regards to the generating capability, additional power plants would need to be committed to cover expected future loads. At present, effort are made to complete the ongoing power plant projects. The period from 1972 to 2005 saw the three Regions changed from directorate of Jos, Kaduna, Kano, Lagos, Ibadan, Enugu and Bauchi into eleven distribution zones and about sixty business units to enhance efficient service delivery to the grassroots.

The Abuja distribution zone, being the area of coverage for the study is one of the eleven distribution zones. The zone currently has nine business units namely, Wuse, Garki, Gwagwalada, and Kubwa business units, all located within the Federal Capital Territory; others are Suleja and Minna business units in Niger state, Lafia and Karu business units in Nassarawa

state, and Lokoja business unit in Kogi state. Hence, the industry has nine power stations (six thermals and three hydro). The three hydro power stations are Kainji, Jebba and Shiroro, all are located in Niger state (the power state).

The creation of occupational health and safety department by HQ Circular No. 19/91 of 6th may, 1991 emphasizes a new dispensation in Security/Safety management in NEPA known PHCN. The department was charged with the enormous responsibility of ensuring corporate health and safety of lives and property in the Authority. In order to raise the level of security/safety consciousness among the workforce, the department designed modalities aimed at stimulating the desired enthusiasm and drive.

2.2 Development of Occupational Health in Nigeria

Development of occupational health in Nigeria followed the pattern in other developing countries. Originally, the main occupation was un-mechanized agriculture and animal husbandry. The workforces were mainly women and children. Payment for work was not known. Workers were exposed to many types of health hazards. Treatment then was not organized. Later, manufacturing including construction came into being. Modern occupational health, reported Achalu, (2000, p. 25) started as a result of colonization and industrialization by Britain. The first occupational health services in Nigeria was introduced by the Medical Examination Board of Liverpool In-ferminary in 1789 with the main aim of caring for the health of British slave dealers from Africa to Britain. However, after the abolition of slave trade, the Royal Niger Company of Britain increased its exploration and trading activities in Nigeria. The Company organized its own health services which were later inherited by the United African Company (UAC).

During the British colonial rule, many of their soldiers were dying of malaria. This led Colonel Lugard to establish health services to take care of the health and welfare of soldiers and

other colonial administrators. Later, during the Second World War, the Medical Corps was separated to cater for the military alone leading to the creation of Public Health Service which became the nucleus of the National Health Service.

After the world war, many industries started emerging chief among them were construction of rail lines and coal mining. This attracted employment of many Laborers especially young men. These workers commonly worked 12-14 hours shift; 7 days a week under unspeakable conditions of grime, dust, physical hazards, accidents, smoke, heat and noxious fume among others. Feeding was very poor; workers were dying in their forties and fifties. People had no knowledge between work conditions and health. They accepted work related illnesses and injuries as part of the job and lived shorter lives. Employers attributed workers' poor health and early death to workers' personal habits on the job and their living conditions at home. Little or no attention was paid to prevention of the hazards in work places. Payment was very poor and dismissal very common because job seekers were many. Workers' reaction to poor conditions at work resulted in killing of coal miners in Enugu. That exposed the working conditions of coal miners and the origin of worker's day in Nigeria. These developments and awareness lead to the establishment of some occupational health services in some Nigerian industries and occupational health legislations Act in Nigeria.

The earliest practices that can be regarded as occupational health services in Nigeria were carried out by British Companies like UAC, John Holt. This was followed by establishment of some occupational health services by Nigerian governments in the Railway Corporation and Coal Mines. Such services included pre-employment and periodic medical examination, treatment of minor illnesses and accidents. In some cases, general practitioners were hired on part time basis, especially in urban centre's to take care of the sick injured workers. The

increased industrialization and its impact on health, safety and welfare of workers lead to the creation of occupational health unit in the Federal Ministry of Health and the Institute of Occupational Health in Oyo State Ministry of Health. These agencies organized courses for managers, safety officers, medical officers, occupational hygienists, and other personnel involved with the protection, maintenance and promotion of health and welfare of workers in Nigeria.

2.3 Occupational Safety

The safety of a worker's life in any paid occupation has been a major concern to all governments. The advent of industrialization made people to divert their attention for survival away from agriculture. The essential means of survival could not be achieved without careful technology as a new productive economic approach (Reich and Okubo 1992). Industrialization brought about a change in survival order caused by environmental pollution, industrial accidents and diseases, and unhealthy working conditions. Morbidity and mortality especially among the young and women became a serious issue. Employers of labour were insensitive to the sufferings of workers. This brought about enactment of policies as legislation by both governments implemented by regulatory bodies to save the life of workers.

According to the web dictionary, Safety is the state of being certain that adverse effects will not be caused by some agent under defined conditions. Safety can also be define as the practical certainty that injury will not result from the use of substance or agent under specified condition or quality and manner of use. Occupation on the other hand , can be define as the job (role), a regular activity performed for payment, that occupies ones time.

Occupational safety is a cross-disciplinary area concerned with protecting the safety, welfare of the people in work or employment. Since 1950, the International Labour Organisation

(ILO) and the World Health Organisation (WHO) has shared a common definition of occupational safety and health. It was adopted by the joint ILO/WHO Committee on Occupational Health at its first session in 1950 and revised at its twelfth session in 1995.

The definition reads: “ occupational health should be aimed at the promotion and maintenance of the highest degree of physical, mental and social well being of workers in all occupations; the prevention among workers of the departures from health caused by working conditions; the protection of workers in their employment from risk resulting from factors adverse to health; the placing and maintenance of workers in an occupational environment adapted to his psychological physiological capabilities; and, to summarize, the adaptation of work to man and each man to his job.

Occupational safety and health department was created by HQ Circular No. 19/19 of 6th may, 1991 emphasizes a new dispensation in security and safety management in NEPA. The department was also charged with enormous responsibility of ensuring corporate health and safety of lives and properties in the Authority. The purpose of occupational safety and health, therefore, is try to achieve and maintain a safe and healthy environment for the workers.

2.3.1 Roles of the Government

1. Making legislation concerning Occupational Health and safety.
2. Enforcement of the legislations.
3. Health and safety education of the public.
4. Preparation of “codes of practice” and Guidelines on safety and health in variation operations.
5. Investigation of reported cases of occupational accidents and diseases.

6. Co-operation with various national and international organization concerned with occupational health and safety environment.
7. Provision of technical advice on Occupational Health and Safety matters.
8. Prosecution of defaulting employers who contravene the Factory Decree and other subsidiary legislations.

2.3.2 Roles of Employers.

1. Registration of factories with Factory Inspectorate Department of the Federal Ministry of Labour, Employment and productivity.
2. Preparation and adaptation of an Occupational Health and safety Policy.
3. Establishment of Occupational Health and Safety Service Programmes.
4. Compliance with the various provisions of the Factories Decree and Subsidiary legislation.

2.3.3 Roles of the Employees.

1. Obeying all safety and health instructions.
2. Wearing all protective equipment and clothing as provided.
3. Avoiding Unsafe practices or Acts.
4. Submitting themselves for all necessary medical examinations.

In order words, occupational health and safety encompasses the social, mental and physical well-being of workers, which is the 'whole person'. Successful occupational health and safety practice requires the collaboration and participation of the employees, employers and workers in health and safety programmes, and involve consideration of issues relating to occupational medicine, industrial hygiene, toxicology, education, engineering safety, ergonomics, psychology etc.

As a result of these poor ergonomic in both developed and developing countries the ILO at its Occupational Safety and Health Convention, 1981 (NO, 155), adopted a resolution that called for policies at national as well as enterprises level which seek to minimize so far as is reasonably practicable, the causes of hazards inherent in the working environment.

NEPA (1980) identified a broad number of occupational diseases among which are:

- ❖ Viral infections
- ❖ Gastro-intestinal problems
- ❖ Leukemia (blood cancer)
- ❖ Heat stroke
- ❖ Heat rashes
- ❖ Nausea
- ❖ Cancer of the lungs
- ❖ Silicosis etc.

The Annual Reports of safety activities in Abuja Distribution Zone of PHCN showed that several workshops and enlightenment programs on safety have been organized for staff of the company across all trades till date. And all these is aimed at promoting a high degree of physical, mental and social well-being of the workers.

2.4 The Concept of Work Environment

It is the responsibility of every employers to provide a safe work environment for all employees, free from any hazards and complying with all state and federal laws. Health and safety in the workplace is about preventing work-related injury and disease, and designing an environment that promotes well-being for everyone at work. According to Akinyele (2010), about 80% of productivity problems reside in the work environment of organizations. Business is

full of risks and uncertainties and the ability of any organization to respond successfully to the challenges posed by the present dynamic nature of economic situations will largely depend on how well the organization can effectively and efficiently utilize the human resources at its disposal. It is a generally accepted fact that the success of any business organization will largely depend upon the effective and meaningful utilization of its financial and physical resources. The performance of a corporate organization, which determines its survival and growth, depends to a large extent on the productivity of its workforce.

The need to provide a safe work environment for employees has had a long history in human resource management. Spector and Beer (1994) acknowledged that work systems cannot only affect commitment, competence, cost effectiveness and congruence but also have long term consequence for workers' well being, there are some evidences to indicate that work systems designs may have effects on physical health, mental health and longevity of life itself. Conducive work environment ensures the well being of employees which invariably will enable them exert themselves to their roles with all vigour that may translate to higher productivity (Akinyele, 2007).

The Encarta Dictionary defines environment as the surrounding influence i.e. all the external factors influencing the life and activities of people, plants and animals. Environment can also be referred to as the medium in which an organism exists. It is made up of raw materials of life and the conditions, both favorable and unfavorable, that affect the use of those materials.

Man has created the artificial environment or alter the natural environment with its attendant consequences on our well-being. The 19th century European Industrial Revolution which led to the development of various technologies is often blamed for the present day problems that afflict the environment (Olagunju and Adepoju, 1994). The automation of

technologies has resulted in climatic changes as well as environmental pollution. The concern for environmental problems prompted the creation of Federal Environmental Protection Agency (FEPA) by decree 58 of 1988. Since then, corporate organizations and institution have been championing the course of ensuring safe environment for mankind. In collaboration with FEPA, the Manufacturing Association of Nigeria (MAN) organized a national workshop with the theme: “ Ensuring a safe Environment” in six of the geopolitical zone s between July and September, 1993.

The objectives of the workshop as cited in Olagunju and Adedapo (1994) were:

1. To create a forum for the exchange of ideas between Industrialists and FEPA on sustainable environment protection mechanism in developing economy;
2. For participating to keep abreast of the new technologies and approaches to environmental protection measures;
3. To sensitize participants on environmental waste management and National Policy on Environment.

The problem of uncontrolled human activities on the environment and its attendant repercussions on human life have attracted concern from the academic world over the years. In 1997, the college of Environmental Studies, Kaduna Polytechnic organized a seminar on Environmental Creation, Education and Management for Sustainable Development. The same drive must have the choice of the theme of the 15th Annual National Conference of Nigerian Association of Teachers of Technology (NATT) tagged: Technology Education and Environmental Issues in Nigeria. While delivering a key note address of the conference held in Minna, the director, National Centre for Climatic Changes (linkage program, Federal Ministry of Environment) FUT Minna, stressed that human activities has resulted in the emission of green

house gas primarily CO_2 above natural levels from burning fossil fuels, forest fires and other forms of deforestation which has altered the composition of the atmosphere and caused an enhanced green house effect (FUTM 2002).

The increased demand of electricity over the years has given rise to the construction of new generating stations, particularly in developing nations such Nigeria. Unfortunately, most of such projects are embarked upon without adequate provision for the reduction of the accompanying and resulting environmental hazards to the bearest minimum (Adeniran and Onwuka, 1997). According to them, in terms of contribution to environmental hazards, the non-renewable energy sources in power stations are the worst culprits. The common non-renewable energy sources in power stations, particularly, coal, gas and fuel oils. Among the environmental hazards posed by these energy sources are oil pollution, acid rain and mining.

Work environment, according to Opperman (2002), is a composite of three major sub-environments via: the technical environment, the human environment and the organizational environment. Technical environment refers to tools, equipment, technological infrastructure and other physical or technical elements. The technical environment creates elements that enable employees perform their respective responsibilities and activities.

The human environment refers to peers, others with whom employees relates, team and work groups, interactional issues, the leadership and management. This environment is designed in such a way that encourages informal interaction in the work place so that the opportunity to share knowledge and exchange ideas could be enhanced. This is a basis to attain maximum productivity. Organizational environment include systems, procedures, practices, values and philosophies. Management has control over organizational environment. Measurement system where people are rewarded on quantity, hence workers will have little interest in helping those

workers who are trying to improve quality. Thus, issues of organizational environment influence employee's productivity. Knowledge is the key ingredient in providing a safe work environment. If everyone knows the correct procedures then accidents and injuries can be kept to a minimum.

2.5 Summary of Review of Related Literature

The literature review presented an overview of the historical background of the Power Holding Company of Nigeria (PHCN), Plc right from its inception till date. The major activities of the power industry that gave rise to the reform and transformation of the different sectors into companies were highlighted. Also, included in the literature was the efforts of various government agencies and corporate organizations including the ILO/WHO, PHCN have demonstrated appreciable interest in the fight against appalling loss of lives and properties through occupational accidents.

According to Yesufu (1984), the nature of the physical condition under which employees work is important to output. There should be enough supply of good protective clothing, drinking water, restrooms, toilets, first aids facilities etc. Both management and employees should be safety conscious at all times and minimum or requirement of the organizations act must be respected. These factors may be important; yet believing that the attitude and management style of mid-level managers are what really influence employee productivity. Though one of the primary tasks of the managers is to motivate people in the organization to perform at high levels (Steers & Porter, 2000; Christensen, 2002). The tripartite responsibilities of the government, employers and the employees respectively in ensuring a highest degree of physical, mental and social well being of workers in their occupations were identified in the overview.

Therefore, the researcher felt that there cannot be a better time than now to undertake a study of this nature which is aimed at exploring possible ways of preventing loss of human

resources and the high cost of rehabilitating injured workers, thereby enabling the power industry to throw her weight towards a better and improved service delivery to the people.

CHAPTER III

RESEARCH METHODOLOGY

This chapter describe the research design of the study, area of the study, population, sample, instrument for data collection and validity of the instrument, method of data collection and method of data analysis.

3.1 Research Design

The research design used in this study was the descriptive survey research type. Descriptive design involves collecting data in order to test hypotheses and answer research questions raised in the study (Ofo, 1994 and Sambo, 2005). A survey method was used through the application of questionnaire.

3.2 Area of the Study

The study was conducted in Abuja Distribution Zone of the Power Holding Company of Nigeria (PHCN), Plc. This zone entails nine business units, simple random sample was used in selecting five business units from the zone. Therefore, Wuse, Garki, Kubwa, all situated within the FCT, Abuja, and the other two are the Suleja and Minna business units in Niger State are the business units used for the research work.

3.3 Population of the Study

The target population for the study was 160 respondents from the nine business units of Wuse, Garki, Gwagwalada, Kubwa, Lafia, Karu, Suleja, Minna and Lokoja which consist of two groups of respondent, among which are the Technicians and their Supervisors/Engineers in the selected nine business units.

3.4 Sample

Simple random sampling was used in selecting five out of the nine business units in the zone, among which are the Wuse, Garki, Kubwa, Suleja and Minna. In selecting units, the random sampling method was applied so as to avoid bias. Basically, there are different methods of random sampling, among which are simple random sampling, stratified random sampling, systemic random sampling and cluster or whole group random sampling.

In the course of this study, the simple random sampling was used in selecting the group of respondent required by the researcher. Simple random sampling is a method that gives every subject or sample member in a population an equal chance of appearing in the selection. This, in effect, means no member is deliberately omitted except by chance. In other words, everybody will be given equal chance of being selected since limited questionnaires are available.

Therefore, the sampling size of this study was one hundred (100) which was selected from the five business units within the study area. The questionnaire was administered to technicians and engineers in the field of study.

3.5 Instrument for Data Collection

The instrument for data collection will be a structure questionnaire made up of items. The questionnaire employed for the appraisal of occupational safety and environment at PHCN, Plc of Abuja Distribution Zone. The questionnaire was divided into Part 'A' and 'B'. Part 'A' contains the personal data of the respondent. Part 'B' contained fifty (50) questionnaire items which was sub-divided into four sections as follows:

Section I: contains 14 items dealing with the availability of safety equipments and facilities at PHCN

Section II: contains 14 items dealing with level of compliance with the occupational health and safety (OHS) standard at PHCN work environment

Section III: contains 7 items dealing with the extent of safety enlightenment activities carried out in PHCN

Section IV: contains 15 items dealing with the possible ways of promoting occupational health and safety in PHCN.

3.6 Validation of the Instrument

The instrument for data collection was given to (3) three expert in Industrial and Technology Education (ITE) programme, Federal University of Technology, Minna. For both face and content validity. The essence of this is to correct, comments and suggest on appropriateness and suitability of the instrument.

3.7 Method of Data Collection

The questionnaire was administered by the researcher and collected accordingly. The respondents were given time to returned the questionnaire.

3.8 Method of Data Analysis

Data collected was analyzed using mean and standard deviation, variance and t-test statistical tools. The first 14 items of the questionnaire were however, analyzed using the mean percentage to ascertain the respondents opinion on the availability of safety equipment and facilities. The 2nd, 3rd and 4th sections contained (36) thirty six items using four points like scale type. the scale as follows.

Strongly agreed (SA)	= 4	Very high extent (VHE)	= 4
Agreed (A)	= 3	High extent (HE)	= 3
Strongly Disagreed (SD)	= 2	Low extent (LE)	= 2

Disagreed (D) = 1 Very low extent (VLE) = 1

The interpretation of the mean depends on the cut-off point computed by the researcher, the cut-off point was obtained by adding the weighting of the response categories divided by the numbers as follows e.g.

$$\frac{4 + 3 + 2 + 1}{4} = \frac{10}{4} = 2.5$$

The researcher will then take a decision rule that any items having a mean of 2.5 and above were interpreted as positive and therefore, accepted and otherwise if less than 2.5 were interpreted as negative and were rejected. Mean percentage response of 50% and above was considered available while mean response of 50% was considered not available. The t-test was also employed to test the hypothesis at 0.05 level of significance to compare the mean response of the technicians and engineers. Each t-value calculated that was less than the critical value (1.98) at 0.05 level of significance was significance while t-value that is equal to or more than 1.98 was not significance.

CHAPTER IV

PRESENTATION AND ANALYSIS OF RESULT

PRESENTATION OF DATA ANALYSIS

This chapter consisted of summary of analysis and interpretation of result for the data collected. This was organized using table in-line with research questions used.

4.1 Research Question 1: What are the available personal protective equipments and facilities in PHCN?

Table 1: Mean Percentage Response of the Supervisors/Engineers and Technicians on the Availability of Personal Protective Equipments and Facilities in PHCN

S/N	ITEMS	P ₁	P ₂	P _t	Remark
1	Eye protector/ goggles	47	34	40.5	Not Available
2	Fault alarms	67	66	60.5	Available
3	Fire extinguishers	100	100	100	Available
4	First aid kits	87	89	88	Available
5	Fuse pullers	80	86	83	Available
6	Grounding devices	100	89	94.5	Available
7	Hand gloves	80	89	84.5	Available
8	Helmets	47	49	48	Not Available
9	Leg guards	27	49	38	Not Available
10	Operating rods	67	83	75	Available
11	Potential test indicators (voltmeter, ammeter and ohm's meter)	80	94	87	Available
12	Respirators	14	60	37	Not Available
13	Safety belts	80	94	87	Available
14	Safety boots	87	86	86.6	Available

$N_1 = 30, N_2 = 70$

Key: N_1 = Total number of supervisors/engineers used for the study

N_2 = Total number of technicians used for the study

P_1 = Mean percentage responses of supervisors/engineers used for the study

P_2 = Mean percentage responses of technicians used for the study

P_t = Average mean response of the technicians and supervisors/technicians

From Table 1, it shows the availability of some personal protective equipments and facilities from the response of both the technicians and supervisors/engineers. Fault alarms, Fire Extinguishers, First Aid kits, Fuse pullers, Grounding devices, Hand gloves, Operating rods, Safety belts and Safety boots with mean percentage above 50% are all available at PHCN, while others such as the Eye protectors/goggle, Helmets, Leg guards and Respirators with mean percentage below 50% are not available at PHCN.

The results indicates that some personal protective equipments and facilities such as Eye protectors, helmets, leg guards and respirators were not available in the selected business units. The Eye protectors that protect the eyes from the hazard associated with the job are not present, which implies that nothing is worn while working with machines and equipments that are prone to electric sparks. The helmets, leg guards are also absents and it indicates that both equipments are not worn by the staffs while working on transmission cable on scaffolds. The results also shows that the respirators was also absent, which serve as an emergency source of oxygen in case of any fatal accidents.

4.2 Research question 2: What is the extent of compliance with occupational health and safety (OHS) standards in PHCN work environment?

Table 2: Mean responses of supervisors/engineers and technicians on the extent of compliance with occupational health standards

S/NO	ITEMS	\bar{X}_1	\bar{X}_2	\bar{X}_t	DECISION
1	Compartments such as the control rooms, servicing and testing rooms are adequately lighted	3.13	3.20	3.17	Accepted
2	There are functional fire extinguishers where fire outbreak can evolved	3.20	2.89	3.05	Accepted
3	There are proper emergency exit in the workshop	3.27	2.83	3.05	Accepted
4	Cautions signs and safety posters are well displayed in the appropriate positions and locations where high voltage is involved	3.80	3.60	3.70	Accepted
5	Caution / prohibition tags are displayed on equipments that must not be operated	3.47	3.67	3.56	Accepted
6	Every workers is provided with protective wears such as hand gloves, safety boots, goggles etc.	2.73	2.60	2.67	Accepted
7	Adequate working space and means of access, free from danger, is provided for all apparatus that has to be worked or attended to by any person.	3.84	3.73	3.79	Accepted
8	Approved protective wears are always worn by all workmen in an environment prone to hazards	2.54	2.34	2.44	Rejected
9	Distribution substations are properly fenced and floored with gravels	2.71	2.73	2.72	Accepted
10	Distribution substations are kept clean and not allowed to be overgrown with weeds	2.84	2.54	2.69	Accepted
11	There are proper emergency exits in compartments housing equipments	2.94	2.70	2.82	Accepted
12	The workmen ladders are in good working conditions	3.20	3.20	3.20	Accepted
13	The workmen vans are in good condition	3.0	2.86	2.94	Accepted
14	The servicing and testing rooms are well ventilated	3.1	2.93	3.02	Accepted

$N_1= 30, N_2= 70$

Key: N_1 = Total number of supervisors/engineers used for the study

N_2 = Total number of technicians used for the study

\bar{X}_1 = Mean responses of supervisors/engineers used for the study

\bar{X}_2 = Mean responses of technicians used for the study

\bar{X}_t = Average mean response of the technicians and supervisors/technicians

Table 2, shows the responses of the two group of respondents used for the study, they accepted all the items except item 8, while the mean score of item 8 falls below the cut-off mark of 2.5 and was considered not accepted. The results shows the extent of compliance of the staff's with the Occupational Health and Safety standards at PHCN. Approved protective wears are not always worn by the PHCN staff's even where moving and falling objects creates hazard, as result of shortage or inadequate protective wears at PHCN.

4.3 Research question 3: To what extent is safety enlightenment activities carried out in PHCN?

Table 3: Mean responses of supervisors/ engineers and technician on the extent of safety enlightenment activities at PHCN

S/NO	ITEMS	\bar{X}_1	\bar{X}_2	\bar{X}_t	DECISION
1	Seminars/workshop on health and safety are organized and attended by PHCN staff on regular basis	3.60	2.97	3.29	Accepted
2	Every staffs undergo safety induction courses upon their employment	2.87	2.46	2.67	Accepted
3	Eliminating physical hazards	3.01	2.69	2.85	Accepted
4	Training and re-training of all workers is mandatory	3.19	2.61	2.9	Accepted
5	Every technical staff is provided with the company's safety manual	3.07	2.67	2.87	Accepted
6	All the workers can operate at least a portable fire extinguisher	3.00	2.40	2.70	Accepted
7	All the workers are trained on how to administer first aid treatment	2.93	2.26	2.60	Accepted

$N_1= 30, N_2= 70$

Key: N_1 = Total number of supervisors/engineers used for the study

N_2 = Total number of technicians used for the study

\bar{X}_1 = Mean responses of supervisors/engineers used for the study

\bar{X}_2 = Mean responses of technicians used for the study

\bar{X}_t = Average mean response of the technicians and supervisors/technicians

Table 3, shows that the supervisors/engineers and technicians agreed with the safety enlightenment activities carried out at PHCN, with each of the item having an average mean of above the bench mark mean of 2.5 and above.

4.4 Research Question 4: What are the possible ways of improving occupational safety and environment in PHCN?

Table 4: Mean responses of the supervisors/engineers and technicians on the possible ways of improving occupational safety and environment in PHCN?

S/NO	ITEMS	\bar{Y}_1	\bar{Y}_2	\bar{Y}_t	DECISION
1	All accidents, irrespective of the degree should be reported and documented	3.87	3.77	3.82	Accepted
2	Seminars and Workshops on safety should be organized on regular basis	3.8	3.49	3.65	Accepted
3	Indoctrinating new employees into proper safety culture	3.67	3.86	3.77	Accepted
4	Workers should be train on how to improve their practical skills	3.87	3.51	3.69	Accepted
5	Workers should use correctly, the personal protection clothing and devices provided for it uses	3.8	3.63	3.72	Accepted
6	Encouraging maintenance culture for equipments and machineries	3.73	3.91	3.82	Accepted
7	Training of workers in potential hazard identification	3.67	3.8	3.74	Accepted
8	Every substations should be adequately fenced and free from weeds	3.6	3.71	3.66	Accepted
9	Provision of protective equipments such as hand gloves, helmets, goggles etc.	4.0	3.4	3.7	Accepted
10	De-energizing power equipments and apparatus which are capable of storing charges while testing/working on them	3.93	3.54	3.74	Accepted
11	Supervisors enforce strict compliance with safety rules and regulations.	3.87	3.14	3.51	Accepted
12	Ensure that safety signs and cautions are always mounted at strategic positions	3.87	3.29	3.58	Accepted
13	Establishment of Occupational Health and Safety Department in every Business units.	3.8	3.34	3.57	Accepted
14	Legislation of appropriate laws on safety at work by government	3.93	4.0	3.97	Accepted
15	Encouraging good house keeping	3.53	3.87	3.7	Accepted

$N_1= 30, N_2= 70$

Key: N_1 = Total number of supervisors/engineers used for the study

N_2 = Total number of technicians used for the study

\bar{X}_1 = Mean responses of supervisors/engineers used for the study

\bar{X}_2 = Mean responses of technicians used for the study

\bar{X}_t = Average mean response of the technicians and supervisors/technicians

Table 4, shows that the two group of respondents agreed with the possible ways of promoting occupational health and safety at PHCN. Each item having an average mean of above the cut of point of 2.5. Therefore, they agreed with all the items in table four.

Testing of hypotheses

In testing of hypotheses in this work, two hypotheses were formulated and tested at 0.05 level of significance.

4.5 Hypothesis 1; H₀:

There is significant relationship between the responses of the two group of respondent i.e. the supervisors/engineers and technicians on the extent of compliance with Occupational and Health and Safety standards at PHCN work environments.

Table 5: *t*-test analysis of supervisors/engineers and technician on the extent of compliance with Occupational Health Safety standards Power Holding Company of Nigeria (PHCN).

S/N	ITEMS	\bar{X}_1	\bar{X}_2	\bar{X}_t	σ^2_1	σ^2_2	t-cal	DECISION
1	Compartments such as the control rooms, servicing and testing rooms are adequately lighted	3.13	3.2	3.17	0.38	0.31	-0.37	Significant
2	There are functional fire extinguishers where fire outbreak can evolved	3.2	2.89	3.05	0.504	1.00	1.24	Significant
3	There are proper emergency exit in the workshop	3.27	2.83	3.05	0.46	1.00	1.83	Significant
4	Cautions signs and safety posters are well displayed in the appropriate positions and locations where high voltage is involved	3.8	3.6	3.7	0.16	0.41	1.33	Significant
5	Caution / prohibition tags are displayed on equipments that must not be operated	3.47	3.67	3.56	0.52	0.29	-0.95	Significant
6	Every workers is provided with protective wears such as hand gloves, safety boots, goggles etc.	2.73	2.6	2.67	0.59	1.21	0.48	Significant
7	Adequate working space and means of access, free from danger, is provided for all apparatus that has to be worked or attended to by any person.	3.84	3.73	3.79	0.12	0.203	0.94	Significant
8	Approved protective wears are always worn by all workmen in an environment prone to hazards	2.54	2.34	2.44	1.04	1.02	0.64	Significant
9	Distribution substations are properly fenced and floored with gravels	2.71	2.73	2.72	1.39	1.23	-0.06	Significant
10	Distribution substations are kept clean and not allowed to be overgrown with weeds	2.84	2.54	2.69	0.66	1.44	1.03	Significant
11	There are proper emergency exits in compartments housing equipments	2.94	2.7	2.82	1.25	1.23	0.69	Significant
12	The workmen ladders are in good working conditions	3.2	3.2	3.2	0.563	0.98	0	Significant
13	The workmen vans are in good condition	3.0	2.86	2.94	1.21	1.0	0.42	Significant
14	The servicing and testing rooms are well ventilated	3.1	2.93	3.02	0.87	0.96	0.57	Significant

$$N_1 = 30, \quad N_2 = 70$$

Key: N_1 = Total number of supervisors/engineers used for the study

N_2 = Total number of technicians used for the study

\bar{X}_1 = Mean responses of supervisors/engineers used for the study

\bar{X}_2 = Mean responses of technicians used for the study

\bar{X}_t = Average mean responses of the two respondent for the study

σ^2_1 = Variance population value of supervisors/engineers

σ^2_2 = Variance population value of technicians

t-cal = calculated table value

Table 5, reveals that the hypothesis for all the items was significant, since none of the calculated t-value is equal to or those not exceed 1.98 critical value. Therefore, there is no significant difference between the mean response of the two group of respondent on occupational health and safety standard.

4.6 Hypothesis 2; H_0 :

From the data computed and analyzed on the possible ways of promoting occupational health and safety at PHCN, there is no significant difference between their responses.

Table 6: *t-test analysis of supervisors/engineers and technicians on possible ways of promoting Occupational Health Safety at PHCN*

S/N	ITEMS	\bar{Y}_1	\bar{Y}_2	\bar{Y}_t	σ^2_1	σ^2_2	t-cal	DECISION
1	All accidents, irrespective of the degree should be reported and documented	3.9	3.8	3.85	0.12	0.18	0.88	Significant
2	Seminars and Workshops on safety should be organized on regular basis	3.8	3.5	3.70	0.28	0.24	2.17	Not significant
3	Indoctrinating new employees into proper safety culture	3.7	3.9	3.80	0.30	0.07	-1.4	Significant
4	Workers should be train on how to improve their practical skills	3.9	3.5	3.70	0.12	0.25	3.25	Not significant
5	Workers should use correctly, the personal protection clothing and devices provided for it uses	3.8	3.6	3.70	0.16	0.24	1.49	Significant
6	Encouraging maintenance culture for equipments and machineries	3.7	3.9	3.80	0.19	0.08	1.67	Significant

7	Training of workers in potential hazard identification	3.7	3.8	3.80	0.22	0.16	-0.7	Significant
8	Every substations should be adequately fenced and free from weeds	3.6	3.7	3.70	0.24	0.20	-0.6	Significant
9	Provision of protective equipments such as hand gloves, helmets, goggles etc.	4.0	3.4	3.70	0	0.24	1.22	Significant
10	De-energizing power equipments and apparatus which are capable of storing charges while testing/working on them	3.9	3.5	3.70	0.06	0.25	3.64	Not significant
11	Supervisors enforce strict compliance with safety rules and regulations.	3.9	3.1	3.50	0.12	0.12	7.5	Not significant
12	Ensure that safety signs and cautions are always mounted at strategic positions	3.9	3.3	3.60	0.12	0.06	6	Not significant
13	Establishment of Occupational Health and Safety Department in every Business units.	3.8	3.3	3.60	0.16	0.23	3.85	Not significant
14	Legislation of appropriate laws on safety at work by government	3.9	4.0	3.97	0.06	0	-1.4	Significant
15	Encouraging good house keeping	3.5	3.9	3.7	0.76	0.24	-1.7	Significant

Key:

$N_1 = 30,$ $N_2 = 70$

N_1 = Total number of supervisors/engineers used for the study

N_2 = Total number of technicians used for the study

\bar{Y}_1 = Mean responses of the supervisors/engineers used for the study

\bar{Y}_2 = Mean responses of the technicians used for the study

\bar{Y}_t = Average responses of the two group of respondents

σ^2_1 = Variance population value of supervisors/engineers

σ^2_2 = Variance population value of technicians

t-cal = calculated table value

df = Degree of freedom

for t test, $df = N_1 + N_2 - 2$

$$= 15+35-2=50-2= 48.$$

Level of significance = 0.05

The table above shows the null hypothesis that was significant for items 1,3,5,6,7,8,9,14 and 15 with t-value equal to and not above 1.98 critical value while the Hypothesis t-value for items 2,4, 10-13, were greater than the critical value and was not significant. Therefore, there is no difference between the mean responses of the supervisors/engineers and technicians.

4.7 Summary of Findings

The result of the study reveals that 67% indicated that they were satisfied with their present working condition with 16% indicating that they were very satisfied. Only 13% of the respondents indicated that they were dissatisfied while 4% opined that they were very dissatisfied.

The findings further reveals the followings:

1. *The availability of personal protective equipment and facilities in PHCN?*

Based on the research findings collected and analyze, Most of the items such as the fault alarms, fire extinguisher, first aid kits, fuse puller, grounding devices, hand gloves, operating rods, potential test indicators (voltmeter, ammeter and ohm's meter), safety belts and safety boots are all available. While the eye protectors/goggles, helmets, leg guards and respirators were absent.

2. The extent of compliance with occupational health and safety (OHS) standards in PHCN Work environments?

Based on the research findings collected and analyze, All the items under this research question was accepted except item number 8 on “ approved protective wears are always worn by all workmen in an environment prone to hazards” that was rejected.

3. The extent of safety enlightenment activities carried out in PHCN?

Based on the research findings collected and analyze, All the items under this question was agreed to, which signifies that tremendous efforts are been made by PHCN on safety enlightenment activities.

4. The possible ways of improving occupational safety and environment in PHCN?

Based on the research findings collected and analyze, All the items under this research question was agreed to by the two group of respondents. However, there is urgent need of taking some certain measures on improving occupational health and safety environment in PHCN.

4.8 Discussion of the findings

Base on the analysis of the research questions in table 1. The items 1-14 tend to seek the opinion of the supervisors/engineers and technicians on the available personal protective equipments and facilities at PHCN. The data collected from the mean calculation indicate that the supervisors/engineers and technicians agreed to the availability of certain equipments and facilities, in calculating the grand mean percentage of the items it shows, if it's above 50% cut-off percentage, it signifies that such items are available. Whereas, for items such as the eye protectors, helmets, leg guard, respirators who has there mean percentage below the cut-off percentage were considered as not available. This finding was consistent to the report of Yesufu(1984) who stated that there should be enough supply of good protective clothing, first aids facilities etc. lack of this safety equipment can lead to accidents at work environment. However, when those personal protective equipments are not available, the next option is to work with the alternative which in most cases, makes the work personnel more prone to accidents. Spector and Beer (1994) acknowledged that work systems cannot only affect commitment, competence, cost effectiveness and congruence but also have long term consequence for workers' well being, there are some evidences to indicate that work systems designs may have effects on physical health, mental health and longetivity of life itself.

Based on the data's computed and analyzed in table 2, all the items was accepted only item 8 on the extent of compliance with Occupational Health and Safety Standard in PHCN work environment on the use of "approved protective wears are always worn by all workmen in an environment prone to hazard" that was not accepted/rejected.

According to Akinyele (2010), about 80% of accidents caused reside in the work environment of organizations. Accidents are usually caused by either unsafe act by the workers or unsafe working environments. However, it has been the policy of PHCN to comply with safety, health and environment measures required by law, and also act positively as reasonable practicable to prevent accidents. Additionally, Akinyele (2007), adds that conducive work environment ensures the welfare of employees which invariably will enable them exert themselves to their roles with all vigour that may translate to higher productivity. Secondly, the outcome of employees' perception of reward to those of others is not likely to determine job satisfaction. This is because key factors which determine job satisfaction include among others, the pleasure and satisfaction workers get from their co-workers, job conditions, supervision, benefits and the nature of the work (Spector, 1997; Weiss, 2002).

Data reveal that, there is a general awareness on the extent of safety enlightenment activities at PHCN, since the respondent agreed with all the items in table 3. The supervisors/engineers and technicians agreed with some of the items such as seminars/workshops on health and safety are organized and attended by PHCN staff on regular basis, eliminating physical hazards, training and retraining of all workers is mandatory and every technical staff is provided with the company safety manual. First aid is the first treatment given to accident patient before the service of an expert. Every dollar intelligently spent on safety always returns big dividends (Barber and Donovan, 1988).

Base on the data collected and analyzed in Table 4, data review that the two group of respondent i.e. the supervisors/engineers and technicians agreed with all the items in the research question 4 on possible ways of improving occupational safety and environment in PHCN. It was also noted that indoctrinating new employees into proper safety culture, legislation of appropriate laws on safety by government, training of workers in potential hazard identification, ensuring strict compliance with safety rules and regulation and organizing seminars and workshops on safety should be organized on regular basis are vital tools in promoting occupational health and safety at PHCN.

According to Yesufu (1984), the nature of the physical condition under which employees work is important to output. Offices and factories that are too hot and ill-ventilated are debilitating to effort. Occupational safety and health can be important for moral, legal and financial reasons. Moral obligations involve the protection of the employee's lives and health. Legal reasons for OHS practices relate to the preventative, punitive and compensatory effects of laws that protect workers safety and health. OSH can also reduce employee injury and illness related costs, including medical care, sick leave and disability benefit costs.

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary of the study

The principal aims of this research was to investigate and check the present state of occupational safety and environment in PHCN, to check the availability of personal protective wears and proffer a possible ways of promoting occupational health and safety at work place. The statement of problem, purpose, significance, scope of the study, research questions and hypothesis were all stated, tested and discussed appropriately in line with the research topic.

Related literature were reviewed in the area of historical background of PHCN from origin till date, development of occupational health in Nigeria, occupational safety and the concept of work environment and efforts made by governmental and non-governmental organization toward making the work environments as safe as possible.

The instrument used for data collection was a structured questionnaire contained fifty (50) items. The instrument was grouped into four (4) distinct section, with each section containing a number of items. The instrument was validated by three (3) experts from Industrial and Technology Education Programme in Federal University of Technology, Minna. The questionnaire was administered in five different Business Units of the PHCN, Abuja distribution zone. One hundred (100) respondents from the five (5) business units was randomly sampled, which consist of thirty (30) supervisors/engineers and seventy (70) technicians and used for data analysis. The data were analyze using mean percentage, mean statistics, variance and t-test as a statistical tools for this study. The hypothesis for the research question were discussed in detail based on the responses of the two respondent.

and the degree of freedom for the study was also stated. The data collected for this study were analyzed and interpreted and the result was presented and organized using a table inline.

5.2 Implication of the study

Based on the result of the data analyzed, interpreted and discussed, some certain implication have evolved. The study have some significant implication for both group of respondent, the management and the general public at large.

The study also pin point the absent of some important personal protective equipments and facilities at PHCN. It also review several ways of promoting OHS standards in PHCN. If these findings are accepted and actively implemented by the management, it would imply prevention of loss of skilled manpower through death or incapacitation, prevention of damage to equipment and materials, and the burden of compensation claims. The work environment will in turn become safer for the work personnel.

5.3 Conclusion

Based on the findings of this study, it could however be concluded that work environment and absents of some personal protective equipments affects job satisfaction and achievement of organizational goals. The phenomenon of Occupational Health and Safety is influenced by many factors ranging from unsafe acts and unsafe condition.

Therefore, the work environment of most Nigerian organizations must be accorded with high priority while adequate consideration must be given to compliance with OHS that give positive attitudes to workers in order to be satisfied with their job. Work environment has been found to be necessary condition for the achievement of organizational goal but over emphasis on work environment policies without due monitoring of employees may eventually have a negative effect on achievement of organizational goal.

Deriving from the above, it is recommended among other measures that management need to improve the system of communication with their employees; should create a motivating climate to increase productivity and clear reward system to all members of the organization; since work environment is the key determinant of job satisfaction, emphasis should be on how to improve the work environment, making it more conducive to employees in providing loans and other scheme that uphold and sustain employees' commitment and dedication to their jobs. Lastly, management should clearly set structures and work system as to achieve goals and objectives.

5.4 Recommendations

- ❖ Encouraging maintenance culture for equipments and machineries should be a key note in the power company, in order to reduce the extra cost procure to the repair and replacement of such machines.
- ❖ Seminars and Workshops on occupational health and safety should be organized by PHCN and attended by the technicians and engineers on regular basis.
- ❖ Indoctrinating new employees into proper safety and maintenance culture, in order to prevent accidents and damage of equipments and machinery
- ❖ Due to the automation of modern technology, the training and retraining of the technicians and engineers on how to improve their practical skills should be mandatory at all level of work experience.
- ❖ Workers should use correctly, the personal protection clothing and devices provided for it uses

- ❖ Supervisors enforce strict compliance with safety rules and regulations and establishment of safety and health committee at each business units to ensure that the safety regulations are not violated.
- ❖ Provision of protective equipments such as hand gloves, helmets, goggles etc and the company safety manuals to all staffs.
- ❖ Management should penalize workers who violate safety rules and regulations.

5.5 Suggestions for further research

Based on the finding of the research the following suggestion were made by the researcher for further studies

1. Similar research should be extended to the neighbouring state and the country at large with a view to investigate the impact of occupational health and safety standards in PHCN.
2. Similar research should also be conducted to assess the causes of accidents at PHCN.
3. Appraisal of the need for maintenance culture in all sector of the PHCN.

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APPENDIX II

FEDERAL UNIVERSITY OF TECHNOLOGY MINNA

DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION

(ELECTRICAL AND ELECTRONIC TECHNOLOGY)

Dear respondent,

I am a final year student of the above named department and institution. I am conducting a research on the **Appraisal of Occupational Safety and Environment in Power Holding Company of Nigeria (PHCN), Plc (Abuja Distribution Zone)**. The area covered by this study includes Wuse, Garki, Kubwa, Suleja and Minna Business Units. Therefore, I solicit for your cooperation to enable me to conduct the research successfully.

Please endeavor to respond faithfully and sincerely to all questions asked, as they will be treated with utmost confidentiality.

Thanks in anticipation of your co-operation.

Yours faithfully,

MOH'D B.K ADAMU

PART A: PERSONAL DATA

- Name of the Business Unit.....
- Department/ Section.....
- Please indicate your status: Technician Supervisor/ Engineer

PART B: INTRODUCTION

This part is divided into four sections (I-IV), with each sections containing number questions. Section (I) uses the checklist of YES or NO while the remaining sections uses the key below. Please tick(√) the appropriate answers from the options given in section(I-IV).

- | | | | | | |
|-----------|---|--------------------|------------|---|------------------|
| SA | - | Strongly Agreed | VHE | - | Very high Extent |
| A | - | Agreed | HE | - | High Extent |
| D | - | Disagreed | LE | - | Low Extent |
| SD | - | Strongly Disagreed | VLE | - | Very low Extent |

SECTION I

Research Question 1

What are the available Personal Protective Equipment and Facilities in PHCN?

S/NO	ITEMS	YES	NO
1	Eye protector/ goggles		
2	Fault alarms		
3	Fire extinguishers		
4	First Aid kits		
5	Fuse pullers		
6	Grounding devices		
7	Hand gloves		
8	Helmets		
9	Leg guards		
10	Operating rods		
11	Potential test indicators (voltmeter, ammeter and ohm's meter)		
12	Respirators		
13	Safety belts		
14	Safety boots		

SECTION II

Research Question 2

What is the extent of compliance with Occupational Health and Safety (OHS) standards in PHCN work environment?

S/NO	ITEMS	VHE	HE	LE	VLE
1	Compartments such as the control rooms, servicing and testing rooms are adequately lighted				
2	There are functional fire extinguishers where fire outbreak can evolved				
3	There are proper emergency exit in the workshop				
4	Cautions signs and safety posters are well displayed in the appropriate positions and locations where high voltage is involved				
5	Caution / prohibition tags are displayed on equipments that must not be operated				
6	Every workers is provided with protective wears such as hand gloves, safety boots, goggles etc.				
7	Adequate working space and means of access, free from danger, is provided for all apparatus that has to be worked or attended to by any person.				
8	Approved protective wears are always worn by all workmen in an environment prone to hazards				
9	Distribution substations are properly fenced and floored with gravels				
10	Distribution substations are kept clean and not allowed to be overgrown with weeds				
11	There are proper emergency exits in compartments housing equipments				
12	The workmen ladders are in good working conditions				
13	The workmen vans are in good condition				
14	The servicing and testing rooms are well ventilated				

SECTION III

Research Question 3

To what extent is safety enlightenment activities carried out in PHCN?

S/NO	ITEMS	VHE	HE	LE	VLE
1	Seminars/workshop on health and safety are organized and attended by PHCN staff on regular basis				
2	Every staffs undergo safety induction courses upon their employment				
3	Eliminating physical hazards				
4	Training and re-training of all workers is mandatory				
5	Every technical staff is provided with the company's safety manual				
6	All the workers can operate at least a portable fire extinguisher				
7	All the workers are trained on how to administer first aid treatment				

SECTION IV

Research Question 4

What are the possible ways of improving occupational safety and environment in PHCN?

S/NO	ITEMS	SA	A	D	SD
1	All accidents, irrespective of the degree should be reported and documented				
2	Seminars and Workshops on safety should be organized on regular basis				
3	Indoctrinating new employees into proper safety culture				
4	Workers should be train on how to improve their practical skills				

5	Workers should use correctly, the personal protection clothing and devices provided for it uses				
6	Encouraging maintenance culture for equipments and machineries				
7	Training of workers in potential hazard identification				
8	Every substations should be adequately fenced and free from weeds				
9	Provision of protective equipments such as hand gloves, helmets, goggles etc.				
10	De-energizing power equipments and apparatus which are capable of storing charges while testing/working on them				
11	Supervisors enforce strict compliance with safety rules and regulations.				
12	Ensure that safety signs and cautions are always mounted at strategic positions				
13	Establishment of Occupational Health and Safety Department in every Business units.				
14	Legislation of appropriate laws on safety at work by government				
15	Encouraging good house keeping				

APPENDIX III

DESCRIPTIVE RESULTS AND FORMULARS.

- ❖ The mean percentage of each item was obtained using this formular

$$P_1 = (Y_1/N_1) \times 100\%$$

Where Y_1 = number of engineers that agreed with the present of the equipment

N_1 = total number of engineers

E.g. for calculating the availability of hand gloves, where $Y_1 = 12$ & $N_1 = 15$

$$P_1 = (12/15) \times 100 = 80\%$$

$$P_2 = (Y_2/N_2) \times 100\%$$

Where Y_2 = number of technicians that agreed with the present of the equipment

N_2 = total number of technicians

E.g. for calculating the availability of hand gloves, where $Y_2 = 31$ & $N_2 = 35$

$$P_2 = (31/35) \times 100 = 89\%$$

∴ the average mean percentage is $\frac{(P_1+P_2)}{2} = \frac{(80+89)}{2} = 84.5\%$

Strongly agreed (SA)	= 4	Very high extent (VHE)	= 4
Agreed (A)	= 3	High extent (HE)	= 3
Strongly Disagreed (SD)	= 2	Low extent (LE)	= 2
Disagree(D)	= 1	Very low extent (VLE)	= 1

- ❖ The mean response of each item was obtained using the formular

$$\bar{X} = \frac{\Sigma FX}{N}$$

Where:

Σ = Summation of

X = Normal value of option

\bar{X} = Grand mean response to all item

N = Total number of response of an items

F = Frequency of response to each option

Variance

$$\sigma^2 = \frac{\Sigma f (X - \bar{X})^2}{\Sigma f}$$

Where:

Σ = Summation of

F = Frequency

X = Normal value of option

\bar{X} = Mean response of all item

σ^2 = Variance of the population.

$$\sigma^2_1 = \frac{\Sigma f (X_1 - \bar{X}_1)^2}{\Sigma f}$$

Distribution (x)	4	3	2	1
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Frequency (f)	4	9	2	-
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X	F	Fx	$x - \bar{x}$	$(x - \bar{x})^2$	$f(x - \bar{x})^2$
4	4	16	0.867	0.752	3
3	9	27	0.133	0.018	0.162
2	2	4	-1.183	1.28	2.56
1	0	0	0	0	0
Total	15	47			5.722

$$\bar{X}_1 = \frac{\sum FX}{\sum F} = \frac{47}{15} = 3.133$$

$$\sigma^2_1 = \frac{\sum f (X_1 - \bar{X}_1)^2}{\sum f} = \frac{5.722}{15} = 0.384$$

$$\sigma^2_2 = \frac{\sum f (X_2 - \bar{X}_2)^2}{\sum f}$$

Distribution (x)	4	3	2	1
Frequency (f)	9	23	3	-

X	F	Fx	$x - \bar{x}$	$(x - \bar{x})^2$	$f(x - \bar{x})^2$
4	9	36	0.8	0.64	5.76
3	23	69	0.2	0.04	0.92
2	3	6	-1.2	1.44	4.32
1	0	0	0	0	0

Total	35	112			11
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$$\bar{X}_2 = \frac{\Sigma FX}{\Sigma F} = \frac{112}{35} = 3.2$$

$$\sigma^2_2 = \frac{\Sigma f (X_2 - \bar{X}_2)^2}{\Sigma f} = \frac{11}{35} = 0.314$$

t-test

$$t\text{-cal} = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma^2_1 + \sigma^2_2}{N_1 + N_2}}}$$

Where:

t = Test of significant

\bar{X}_1 = Grand mean of Supervisors/engineers

\bar{X}_2 = Grand mean of Technicians

N_1 = Number of Supervisors/engineers

N_2 = Number of Technicians

σ^2_1 = Variance of supervisors/engineers

σ^2_2 = Variance of technicians

D.f = $N_1 + N_2 - 2$

$$15 + 35 - 2 = 48$$

Example :- t-call for the above tables using the same item is shown below

$$T\text{-cal.} = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma^2_1}{N_1} + \frac{\sigma^2_2}{N_2}}} = \frac{3.133 - 3.2}{\sqrt{\frac{0.384}{15} + \frac{0.56}{35}}} = \frac{-0.07}{0.187} = -0.37$$

t-test was used to compare the mean of the groups. For instance the mean response of supervisors/engineers and technicians was compared. Each t-value calculated that is less than the t – critical value (± 1.98) at 0.05 level of significance was accepted while t-value that is equal or exceed (± 1.98) was rejected.