ASSESSMENT OF FACILITY MANAGEMENT IN EKEDC DISTRIBUTION COMPANY

BY

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DECLARATION

I ANSELEM FRANSISCO IGWEM Matric No: 2016/1/61783TI

an undergraduate student of the Department of Industrial and Technology Education certify that the work embodied in this project is original and has not been submitted in part or full for any other diploma or degree of this or any other university

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2016/1/61783ti signatures and Date

CERTIFICATION

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

_____	_____
DR G.A USMAN	Sign & Date
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DR T.M SABA	Sign & Date
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Prof. Hassan Bello	Sign & Date

DEDICATION

This research project is dedicated to God almighty for his grace, favour, guidance and protection throughout the period this research was conducted and to my lovely parent for the support and their advice

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I appreciate the almighty God for his grace, help, guidance and protection also thanking him for granting me knowledge, good health and wisdom to carry out these projects. I thank the King of kings The Lord of lords for all he has done throughout my studies.

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ABSTRACT

The research was designed to study the assessment of facility management in EKO Electricity distribution company in Lagos state. Three research question were answered and three hypotheses tested at 0.05 level of significance were formulated for the study. The major uses of the study is to determine the planning strategies adopted in the management of EKEDC in Lagos state, the control measures used in facility management of EKEDC in Lagos state, the organizing process involve in facility management of EKEDC in Lagos state, the directing procedure processes involve in facility management of EKEDC in Lagos state. The literature was reviewed in line with the two research question, and the null hypothesis were formulated to guide the study, in which several sub-heading wee discussed as regard to the purpose of the study. The research design used for this study is survey research design in which questionnaire was formulated to solicit information from the respondents. The target population of the study comprised of EKEDC staff Electricity Consumers. The total population of the study is 460 which is consisted of 80 EKEDC staffs and 380 electricity consumers in Lagos state. Data obtained was analyzed using mean, standard deviation and t-test statistics. The finding also revealed that employing a competent staff to be responsible for the effective management of tools and equipment. Guiding staff in the proper handling of tools and equipment's to prevent misuse of tools and equipment's, supplying the right quality and quantity of materials to EKEDC organization, regular inspection of transmitting cables in order to replace bad once and enhance power, ensuring all safety provisions are in place for the various activities. The study concluded and recommended the following: The management should train and retrain staffs on the installation, maintenance and operation of new equipment with the help of some expert, The management should provide safety device and to improve safety of the staffs and the consumers, The EKEDC staff should maintain a cordial relationship between staff and the electricity consumers in the society to work together for the realization of EKEDC goals and objectives.

CHAPTER ONE

INTRODUCTION

1. BACKGROUND OF STUDY

According to Obadote (2009) the generation of electricity in Nigeria began more than a century ago; precisely in 1896 when it was first generated in Lagos, which is fifteen years after its introduction in England. In order to increase its production, various bodies at various times have been set up to manage and/or regulate the activities of power generation. In 1950, Electricity Corporation of Nigeria (ECN) was established by an Act of Parliament to serve as a central body in charge of electricity supply and development. There were some other bodies like Native Authorities and Nigeria Electricity Supply Company (NESCO) which were only licensed to produce electricity in certain parts of the country (Okoro and Chikuni, 2007). In 1962, by an Act of Parliament, another body known as Niger Dam Authority (NDA) was established. The Authority had the responsibility to generate electricity using the water resource of River Niger and any other River by construction and maintenance of dams (Sambo, 2008). Also included in the Authority's responsibilities was to promote navigation and fish brine and irrigation. Electricity Corporation of Nigeria bought electricity produced by Niger Dam Authority for distribution and sales at utility voltage. For the effective use of available resource for supply of electricity in the country and also to put the production and distribution of electricity in one body ECN and NDA were merged in April 1972 and known as National Electric Power Authority (NEPA). As at inception in 1896, Nigeria was generating 60KW of electricity which was more than the peak load then. As at 1999, NEPA had an installed capacity of 5600MW of which only 1750MW was available out of the installed capacity, as against the required peak demand of 6000MW. This was as a result of poor investment in power sector infrastructure (Okoro and Chikuni, 2007). Even though the required peak load could not be installed, the installed capacity was not available as a result of lack of maintenance; in fact many of the generating units went off completely. With the aim of meeting the needs and yearnings of the populace, the Nigerian government embarked on power sector reform. The reform programme led to unbundling of NEPA into seven generating stations, eleven distribution firms and one transmission company (Obadote, 2009). This led to the renaming of NEPA as Power Holding Company of Nigeria (PHCN). All these attempts aimed at encouraging private sector participation. The reform process which started in 2000 has since taken effect in 2004. In order to checkmate the services of Power Holding Company of Nigeria (PHCN), the Nigerian Electricity Regulatory

Commission (NERC) was established in 2005 (Sambo, 2008). NERC also has the responsibility of issuing license and regulating the tariffs of expected private investors. Since then, many private investors have indicated interest in taking part in Nigeria Electricity Supply and some have gotten the license but full privatization is yet to commence.

The Nigerian power sector is controlled by state-owned Power Holding Company of Nigeria (PHCN), formerly known as the National Electric Power Authority (NEPA). In March 2005, President Olusegun Obasanjo signed the Power Sector Reform Bill into law, enabling private companies to participate in electricity generation, transmission, and distribution. The government has separated PHCN into eleven distribution firms, six generating companies, and a transmission company, Several problems, including union opposition, have delayed the privatization, which was later rescheduled for 2006. In February 2005, the World Bank agreed to provide PHCN with $100 million to assist in its privatization efforts. By 2010, electricity supply in Nigeria had improved to an average of about 3,825 MW. With this and other incentives in place, the Federal Government set up the power sector reform committee to direct a strategic plan for the privatisation process. Active steps were taken to guarantee real improvements in the power sector while also planning on future investments. Setting the wheels in motion, the Presidential Action Committee on Power (PACP) and the Presidential Task Force on Power (PTFP) were both established. PACP was expected to eliminate excessive bureaucracy in government rules and formalities; PTFP were the developers, enforcers and overseers of the roadmap. November 2013 witnessed the closure of the privatisation transaction and formal conferral to private investors. All the successor generation and distribution companies were sold. TCN was retained by the government to protect national security, and avoid creating a natural monopoly for the buyers.

The Eko Electricity distribution company was establish in 2013 after the power holding company was sold out formally known as PHCN which have a number of over 1835 employees, the EKEDC cover a license area of southern part of Lagos state and A+gbara in Ogun state the license area of EKEDC is segmented into 3 circle and 10 district namely: West circle which has 3 district Agbara, Ojo and festac also we have the central circle which has four district Ijora, Mushin, oriel and Apapa. Lastly the east circle which has 3 district Lekki, Ibeju and Island the EKEDC receives a bulk power supply from the following transmission sources Akangba (330/132 KV) and Ajah (330/132 KV) there after 10nos of 132/33 KV transmission source.

The term management brings to mind some terms like people, resources, goals, objective, organization and business these this is evident in some of the definitions like the one by Kotter Cohen (2002) that define management as the function that coordinate peoples effort in using available resources effectively and efficiently to accomplish the organization' s goals and objective through others. Jonkar (2008) also captures a similar definition of management as a process that enables an organization to reach it goals by working through it employees and other organizational resources. (Thomas, 1996), point out that, the term management may be used as a way of getting things done through people. These definitions are in line with an older definition of management by one of the management pioneers Harold Koontz (1909-1984) who define management as the art of getting things done through other people within formally organized groups (Gautam, 2013). the three aspect of these definitions can be seen; "organization", 'goals'. 'objectives' and 'through people". In the context of this study, an evaluation will be made on the management of people, facilities, resources. goals and objectives of EKEDC in Lagos state. Therefore, an organization cannot be effective without the function the management which include; planning, organizing, directing, and controlling.

Facilities management (FM) is based on the premise that any organizational efficiency is related to the physical environment in which it operates and that the environment in which it operates can be improved to increase efficiency (Kurdi et.al, 2011). FM involves several aspects such as communication, emergency preparedness, and business continuity, environmental stewardship and sustainability, finance and business, human factor, leadership and strategy, operation and maintenance, project management, quality, real estate, and property management and technology. The key to facilities management aspects is to ensure the longevity of asset lifespan in providing a better return on investment through reduced budget and resources.

Assessment management is a careful examination of those things in the process of work or in the workplace that can cause ineffectiveness of people. It also covers finding out whether enough measure have been taken or more should be done to prevent ineffectiveness and in efficiency. It is against this background that assessment and pursuit should be geared towards the assessment of facilities management, determination of their significance, evaluation of the available corrective measures and the selection of the optimal remedies. This action is to ensure effectiveness and efficiency of electricity functionalism of EKEDC.

Kenneth and Keith (2002) viewed assessment as the process of examining as carefully, thoroughly and objectively as possible, an organization, facilities, individual or group of

products or programmed in order to ascertain strength and weakness. From the foregoing therefore, assessment can be seen as the systematic process of judging the worth, desirability, effectiveness, or adequacy of an organization according to a given criteria. With the problem militating against EKEDC, consumer complaining about poor service and even staging demonstration could it be that the authorities are not performing the management of facilities function properly.

1.2 Statement of the Problem

Electric power distribution in Lagos State has become more competitive due to the rapid increase in demand by customers in addition to fierce rivalry between utilities to provide satisfactory level of power continuity (Abu-Elanien & Salama, 2010). Therefore, utilities are required to assure the optimum utilization of the distribution equipment available. Knowledge about the equipment of the Electric Distribution Company is necessary to make strategic distribution decisions to meet consumers' satisfaction in terms of effective electric power distribution. This implies that, to take decisions vital to the operations, growth and maintenance of electric power distribution equipment, information must be collected and analyzed to its full extent. Such information contributes not only to efficient services, but also to the operation of equipment. If the equipment is not adequately utilized, it might lead to total breakdown of the distribution system and the objective of effective electric power distribution will be defeated. It is against this background that this study sought to assess the utilization of tools and equipment for effective electric power distribution by Eko Electricity Distribution Company in Lagos state. The government have made huge effort in other to resolve the electricity crisis in Nigeria, yet these effort have failed to yield positive result cause of complains of over billing of electricity consumers, poor and epileptic electronic electricity supply the government then took a step in the privatization of electricity in other to solve the present electricity challenge in country but it seems the problem even became worst then it is so could the mangers of of these distribution companies be lacking some aspect in the management of electricity (electrical facilities). So these study is to ascertain whether the management of Eko Electricity Distribution company have a well and equipped facilities and how well the are able to manage their facilities.

1.3 Purpose of the Study The main purpose of this study was to assess the utilization of tools and equipment for effective electric power distribution by Eko Electricity Distribution Company in Lagos State. Specifically, the study sought to determine:

1. The level of tools utilization in the distribution of electric power by Eko Electricity Distribution Company.

2. The level of equipment utilization in the distribution of electric power by Eko Electricity Distribution Company.

3. The control measures used in the management of EKEDC in Lagos state.

4. The organizing process involved in the management of facilities in EKEDCv in Lagos state.

4. The directing processes in the management of facilities of EKEDC Lagos state.

1.4 Significance of the study

The finding of this study will be of great benefit to the electricity distribution company of Nigeria especially to EKEDC in Lagos state as it will enlighten them on the planning strategies that should be adopted, control measures used, organizing process involves and directing procedure processes in the management of electricity for effectiveness and efficiency of EKEDC in Lagos state. It is hoped the these finding from the study will assist the management of Eko Electricity Distribution company to identify the major areas in which management of facilities should be improved.

The outcome of these study will help the EKEDC engineers and supervisors in handling their various responsibilities through effective personnel management, the finding will motivate the participants in EKEDC. It will enhance and improve the skills of professionals in the electrical sector in terms knowing the planning strategies in the industry and how it can be executed. The study will also help the management of job-related hazards in terms of hazard evaluation and hazard identification. The outcome of the study will also benefits workers in various operational unit especially the operation and maintenance department in terms of the management of facilities in EKEDC in Lagos state so as to help them manage the facilities for a longer period of time. Workers in EKEDC will have the opportunity to acquire knowledge, skills and application to know the various hazard and their prevention. It is considered that the result of the study will be of great importance to our government, policy makers and maintain safety in the work place. If the finding is properly implemented in EKEDC, it will help to minimize electrical accidents in electrical workshop and EKEDC Company and also help in maintaining the facilities of EKEDC.

1.5 Scope of the study

The scope of the study is limited to the facilities management of the generating station, transmission and distribution station. control measures used in the management of EKEDC, organizing process involve in the management of EKEDC, to determine the

state of facilities management in terms of management principles and maintenance of facilities management and effective management techniques to improve power.

1.6 Research Questions

The following research question guided the study:

1. what are the planning strategies adopted in the management of facility by Eko electricity Distribution Company?
2. What is the level of facility management in the distribution of electric power by Eko Electricity Distribution Company?
3. What are the directing process in the management of facility of in EKEDC in Lagos state.

1.7 Hypotheses

The following null hypothesis were formulated and would be tested at 0.05 level of significance.

HO1: There is no significant difference between the mean responses of technicians and supervisors on the level of tools utilization in the distribution of electric power by Eko Electricity Distribution Company.

HO2: There is no significant difference between the mean responses of technicians and supervisors on the level of equipment utilization in the distribution of electric power by Eko Electricity Distribution Company.

HO3: there is no significant difference between the mean response EKEDC staff and the electricity consumers on the organizing process involved in the management of facilities in EKEDC in Lagos state.

CHAPTER TWO

LITRATURE REVIEW

2.1 Theoretical Framework

The theoretical framework is the "blueprint" for the entire dissertation inquiry. It serves as the guide on which to build and support your study, and also provides the structure to define how you will philosophically, epistemologically, methodologically, and analytically approach the dissertation as a whole. Eisenhart defined a theoretical framework as "a structure that guides research by relying on a formal theory…constructed by using an established, coherent explanation of certain phenomena and relationships" (1991, p. 205). Thus, the theoretical framework consists of the selected theory (or theories) that undergirds your thinking with regards to how you understand and plan to research your topic, as well as the concepts and definitions from that theory that are relevant to your topic. Lovitts (2005) empirically defines criteria for applying or developing theory to the dissertation that must be appropriate, logically interpreted, well understood, and align with the question at hand. We assert that students must select and clarify a theoretical framework from the time the dissertation topic is initially conceptualized. Philosophers such as Dooyeweerd (as cited in Sire, 2004, p. 35) have even gone so far as to call for "pretheoretical commitments" by the researcher to specifically identify one's "worldview of the heart rather than the mind." We profess that the researcher's choice of theory must be clearly stated and explicitly mentioned early in the writing of the dissertation. Mertens acknowledged that the theoretical framework "has implications for every decision made in the research process" (1998, p. 3), which supports our belief that the theoretical framework for a study must be identified at the inception of dissertation work. We also believe that all research is theoretical. The importance of theory-driven thinking and acting should be emphasized in relation to the selection of a topic, development of research questions, focus of the literature review, the design approach, and analysis plan for the dissertation study. Anderson, Day, and McLaughlin (2006) capture the necessity of including a sound theoretical underpinning in a dissertation study with a quote from a dissertation supervisor who stated, "I don't see how you can do a good piece of work that's a theoretical" (p. 154). Similarly, Sarter (2005, p. 494) addressed the "limited usefulness of findings and conclusions" when a study is not justified by a theoretical framework. Evidence across disciplines is clear that the explicit identification and inclusion of a theoretical framework is a necessity of sound research.

2.2 Klynveld Peat Marwick Goerdeler theory on Electricity

The concise Merriam webster dictionary defines electricity as a fundamental form of energy observable in positive and negative forms that occurs naturally (as in lightning) or is produced (as in a generator) and that is expressed in terms of the movement and interaction of electrons. Similarly, with reference to electrons, (Hydro Quebec, 2004, 2011) defines electricity as an invisible phenomenon created by the movement of electrons in a conductor. It is important to note that getting one definition of electricity is quite challenging. To these effects, (Hydro Quebec, 2004, 2011) notes that, the challenge In getting one acceptable definition of electrical energy is a reflection of the world which is filled with too many possibilities and unknowns. However various authors who have made attempt at defining electrical energy (which is the focus on these paper) stick to put across an understanding of its various properties; how it is generated, transmitted and distributed from one point to another. A typical of these kinds of definition is made by (KPMG,2013) which defines electricity as a type of energy fueled by the transfer of electrons from positive and negative point within a conductor. These authors go further to indicate that electricity is widely used for providing poor to buildings, electrical devices and even automobiles.

The concept of electricity as it is been used today was developed by banjamin franklin in 1759 following a discovery he made about the similarity between electricity and lightening as two phenomena that created light, made loud sounds when they exploded, were attracted to metal and had a particular smell (Hirram, 2013:5).

Today the movement of electricity from its sources to a final consumer involves three (3) main process which include Generation, Transmission and Distribution (IEC,2007). Thus it is important to note here that, making discussions on electricity distribution in isolation of generation and transmission will be presenting and incomplete discussion. These notes thus will be making reference to electricity generation and electricity transmission in Nigeria were necessary. Nigeria's Power Holding Company is made up of three types of subsidiaries which include: generation companies (GENCO), transmission and systems operation companies (TRANSYCO), and distribution companies (DISCO) (Bloomberg,2016).

Generation - Electric generating plants convert mechanical, chemical, and/or fission energy into electric energy. Within this population of electric generating plants, there are different types of processes employed to produce electricity (e.g., coal-fired power plants, wind turbines). Further information on the environmental performance characteristics of this industry are included in the previously published Advanced Notice of Potential Rulemaking4.

Waste from electricity generation arises at each step of the fuel cycle: mining, fuel fabrication or preparation, power production operations, and decommissioning. This characterization review concerns only the operations and decommissioning steps of direct relevance to the Electrical Power Generation, Transmission and Distribution Industry. Operation of any power plant requires use of a variety of nonhazardous materials, including paper, cardboard, wood, aluminum, containers, packaging materials, office waste, municipal trash etc. Potentially hazardous materials are also frequently used. These materials can include sandblast media, fuels, paints, spent vehicle and equipment fluids (e.g., lubricating oils, hydraulic fluids, battery electrolytes, glycol coolants) among others. Hazardous materials may include, but are not limited to, asbestos or mercury containing materials, compressed gases used for welding and cutting, dielectric fluids, boiler bottom ash, and oils. Process fluids can be either hazardous or non-hazardous, and can include oily water, spent solvents, chemical cleaning rinses, cooling water, wash and makeup water, sump and floor discharges, oily water separator fluids, boiler blowdown, and water from surface impoundments. Other materials beyond those listed here may be used in the operation of power plants. As an example, show the primary waste streams generated during Morrow Bay facility operations, including a description of each waste, its origin and composition, estimated amount, frequency of generation, and waste management methods. The amount of electricity manufactured in each country is measured in megawatts and differs depending on the country demand of electricity. It is however important to note here that, there has been a global increase in the demand for electricity putting increase pressure on electricity manufacturers and distributors (world Bank, 2013). In an attempt to meet increase demand and to cope with the global scarcity of water due to climate variability.

Electricity power transmission is the bulk transfer of electrical energy between the point of generation and multiple substations near a populated area or load centre. Transmission substations bring together energy generated by different points in the plant and use large transformers to increase voltage to reduce line losses during transmission. The transmission substation also has switches and circuits to control the electricity, and converters or inverters to convert the current to alternating current. A power transmission network is referred to as a "grid." Multiple redundant lines between points on the grid are provided so that there are a variety of routes from any power plant to any load centre (Dieter betz et al, 2009). A distribution substation performs multiple functions, such as stepping down and stabilizing voltage going into distribution lines, splitting and routing distribution power in multiple directions, and disconnecting the transmission grid from the substation when necessary. A general overview of electric power transmission was

produced in 2014 by the Western Governor's Association. As detailed by EPA33, most significant environmental impacts of electricity relate to how it is generated. Electricity delivery can also affect the environment in several ways. High voltage power switches, inverters, converters, controller devices and other power electronics contain lead, brominated fire retardants, and cadmium in their printed circuit boards. These circuit boards must be managed properly to avoid posing risk to human health or the environment. Electrical substations and urban manhole facilities require periodic cleaning, which may yield hazardous waste. Additionally, insulating materials such as asbestos and polychlorinated biphenyls (PCBs) must also be managed properly.

Many high-voltage circuit breakers, switches, and other pieces of equipment used in the transmission and distribution system are insulated with sulfur hexafluoride (SF6), which is a potent greenhouse gas. This gas can leak into the atmosphere from aging equipment or during maintenance and servicing. In collaboration with the industry Partners and stakeholders, EPA compiled a report34 on SF6 emission sources. The most common domestic use for SF6 is as an electrical insulator in high voltage equipment that transmits and distributes electricity. Since the 1950's, the U.S. electric power industry has used SF6 in circuit breakers, gas-insulated substations and other switchgear used in the transmission system to manage the high voltages carried between generating stations and customer load centres. Several factors affect SF6 emissions from electric power systems, such as the type and age of the SF6-containing equipment (e.g., old circuit breakers can contain up to 2,000 pounds of SF6, while modern breakers usually contain less than 100 pounds) and the handling and maintenance procedures practiced by electric utilities. The power lines are protected from the weather, which can cause the line to break (Brown et al, 2004).

2.2 Conceptual framework

2.2.1 Facility Management /Maintenance

The term 'facilities management' (FM) has been the subject of much debate since its conception. Leaman (1992) suggests that ''facilities management brings together knowledge from design and knowledge from management in the context of buildings in everyday use''. He continues, remarking on the apparent differences between designers and modern-day facilities managers. ''The management (FM and Property Management) disciplines which are less well-defined as disciplines, but include maintenance, administration and financial management tend to be much more short term, often day-to-day, in outlook. They deal with shorter timescales, the project deadline, the end-of-year financial statement, the quarterly report, the immediate crisis opposition to this short-term

position, Thompson (1990) argued for a more strategic view of the discipline, arguing that ‘‘real facilities management is not about construction, real estate, building operations maintenance, or office services. It is about facility planning—where building design meets business objectives’’. A recent definition of FM places less emphasis on the built asset, focusing instead on the role of service provision in a support capacity. The European CEN definition of facility management is expressed as: ‘the integration of processes within an organization to maintain and develop the agreed services which support and improve the effectiveness of its primary activities’ (CEN EN 15221-1). This definition makes no explicit reference to building operation. In so doing, it appears to bypass the role of the built environment in determining service outcomes. Moreover, it does not attempt to acknowledge the requisite skills of the property professional in meeting these outcomes. Perhaps the definition that has had the greatest longevity is that of the international facilities management association (IFMA): ‘Facility management is a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process, and technology’ (International Facility Management Association 2009). Technology provides both an enabler and a challenge in this context. From a sociotechnical perspective, it is the combination of management skills and suitable technology that dictate building and end-user performance. In professional practice, it is often seen as sufficient to describe the role of FM in terms of the scope of FM services provided. This can encompass an expansive range of services, including security, cleaning, maintenance, catering, landscaping, hygiene, health, and safety, all of which have a bearing on the sustainability agenda. However, a definition that is framed in terms of work packages provides no clarity as to the value adding proposition of FM. In contrast, the emphasis on the ‘integrating’ role of FM identified in the IFMA definition captures the essence of FM as a discipline. Innovations such as bundling of services, performance measurement, and multitasking are illustrative of integration approaches.

Facility manager: the role of a facility manager incorporates several different functions, from strategic planning and maintenance to managing third-party suppliers and supporting staff. But, despite the overwhelming amount of tasks required to keep a built environment operational, the importance of a facility manager is often overlooked. Whether this is because property owners are happy managing premises on their own, or they’re simply unaware of the benefits that a good manager can offer. However, having a facility manager at the helm of your property can have multiple benefits. Especially if they have access to tools such as Facilities Management Software. Typically, they’re expected to lead the management of services such as:

- Scheduling and planning maintenance and building repairs
- Handling legal or contractual matters (with occupants and third-party suppliers)
- Providing occupants with the right equipment and amenities
- Being compliant with health and safety regulations
- Making sure occupants are happy and safe through space management
- Ensuring the property and its surroundings are kept secure

A major role of a facility manager is to ensure occupants are happy and getting the most from their built environment – after all, the main objective is to keep a building in the best possible working order to help generate more revenue. The responsibility of facility manger This can be achieved through effective space management such as the design of office layouts, ensuring shared spaces are clean, and providing the right furniture and equipment. 73% of workers claimed well-managed office spaces were the driving force that helped them perform better at work. As head of a building's entire operations, a facility manager will work across a range of disciplines. These can be broken down into two categories; hard and soft facility management services. Knowing the difference between hard and soft FM tasks is essential to help identify the roles expected of a manager. FM adds value to all goods and service supplied by maximizing resource utilization, controlling costs and providing services to standards required by its customers. (Esan, 2002).

Maintenance, repair and operation Electrical systems need regular maintenance to ensure optimum performance, such maintenance will prevent system and equipment failures and ensure maximum safety and efficiency in the utilization of the facilities. At each installation, establish a program for proper maintenance and effectively follow it. Include in this program the scope of work, intervals of performance, and methods of application including safety requirements, practices and procedures, and operations and maintenance (O&M) of electrical power and distribution systems. The information provided applies to the plans and procedures to operate and maintain installation electrical distribution systems. Specific installation conditions may dictate the need for procedures that exceed these minimum requirements. These systems include substations, overhead and underground electrical distribution systems, exterior lighting systems, and electrical apparatus and components. The importance of discussed topic comes from the fact that electricity companies must handle a large number of electrical equipment (circuit breakers, transformers, cables etc.). Most of them have been in exploitation for years and are close to the end of their useful lifetime and then, they are more likely to fail, being

necessary an assistance in making an appropriate and timely decisions about their assets. Based on the information acquired from asset management activities (monitoring and diagnosis, maintenance strategies and risk management), the decision-making process is designed to maintain electrical equipment in operating state, in safe condition and economical efficiency for electricity companies. In the context of energy market deregulation for any company in the electricity field either generation, transmission and distribution, its overall objective is to reduce costs while increasing equipment reliability, extending equipment lifetime and ensuring high levels of health and safety for operation and maintenance personnel, for the public, and for the environment. Due to this fact, proper operation and maintenance of major electrical equipment (transformer, circuit breakers, and overhead lines) becomes significant because:

- ❖ they belong to the expensive equipment category;
- ❖ the costs for maintenance of these equipment represent a large percentage of maintenance budgets;
- ❖ failure adversely affect the system reliability and the existing monitoring technologies within the power station.

Overall objective of the electricity companies is now, more than ever, to minimize operational costs of the electrical equipment and also to ensure that the system is working more economically. An important operational cost is the maintenance cost. Maintenance optimization is one possible technique to reduce life cycle costs while improving reliability. The electricity company needs to implement new strategies for more effective maintenance techniques. Thus, making decisions about the equipment maintenance activities must have a clear idea about what the maintenance can perform, what maintenance strategies are available, what assets to perform maintenance on, what level of maintenance to perform, what specific maintenance steps to perform, and when to perform the selected maintenance.

The aim of maintenance is to carry out a protective and repair measures designed to determined effort of the natural or imposed processes, thereby prolonging the useful life of the plants, equipment or machinery. Apart from safety, maintenance is needed **to keep** plant in an acceptable condition. Maintenance of this kind must be reviewed on an economic and energy efficiency basis. While it is appreciated that breakdown of plant may result in costly interruption of normal building operation, it must also be borne in mind that stopping plant for maintenance can also cause a loss in production**.**

Equipment on continuous and arduous duty, e.g. switchboards, motor control centers (MCCs), air-handling units, chiller plant etc., require more attention than that which is lightly loaded and rarely used.

Types of maintenance

according to Olaitan (2000) he pointed out the three (3) important and related concepts readily associated with the maintenance include.

Preventive maintenance

Preventative maintenance is the practice of taking proactive measures to avoid equipment problems before they happen. Preventative maintenance frequently entails regular inspections, improvements, upgrades, appropriate lubrication (as needed), modifications, and replacement of worn-out parts or equipment. Any preventive action, such as changing water filters, routinely cleaning necessary equipment (such as refrigerator condenser coils), inspecting company vehicles (such as delivery vans), and checking grout and caulking to guard a property against water damage, can be implemented in many areas of your business. Naturally, the preventative maintenance you carry out will be unique to your company and should always include a thorough examination of your most important assets or your most expensive equipment used in regular operations. An illustration of preventive upkeep When a restaurant's refrigerator breaks down unexpectedly, it can cause significant food loss, the need to close for the remainder of the day (or for as long it takes to arrange and perform repairs), and expensive repair work. Regularly checking and cleaning the condenser coils will help prevent such an expensive catastrophe from happening and, in the long run, reduce the risk to your company.

Predictive maintenance

Predictive maintenance monitors a machine's or appliance's typical performance to find potential flaws before they become an issue. With this type of maintenance, equipment performance is measured using condition-monitoring technology, generally using IoT. (the Internet of Things). IoT is essentially a system that connects digital and mechanical machinery to electrical devices. It has the capacity to identify and send data without the need for human intervention or interference. This implies that predictive maintenance will notify you of potential machine flaws without your intervention. Sensors for energy usage, oil analysis, and equipment monitoring are a few instances of predictive maintenance in general. An illustration of preventive maintenance Predictive maintenance may be used by a food production facility to maintain its expensive industrial ovens, which may be used around-the-clock to remain competitive. The oven would have a sensor placed that would analyze and generate temperature and vibration data, alerting employees to poor-performing machinery in real-time and preventing the need to totally stop production.

Corrective maintenance

The best way to define corrective maintenance is as any action that identifies and corrects a system flaw so that the machinery may be put back in working condition. It is not a plan, as opposed to reactive maintenance, but rather an action that is directed towards a particular piece of equipment. Also, the flaw might be found or discovered before it results in a serious issue or complete device failure. Corrective repair example It can become expensive for a restaurant if frost or ice accumulates in a walk-in freezer. Ice buildup can prevent refrigeration from working as it should, which makes compressors use more energy and operate less effectively. In order to defrost ice that has accumulated in a commercial freezer, the unit should either be turned off or by using a tool such as a hair dryer to expedite the process. This is one illustration of a completely economical corrective maintenance measure.

The attitude of maintenance is sadly absent from electrical enterprises and distribution facilities. Everybody has a part to play in fostering a maintenance culture, especially in educational institutions. Olaitan (2000) (2000) Moreover, a lack of maintenance culture is a sign of illiteracy and disorganization, both of which foster corruption and impede economic growth.

2.2.2 Management of electrical facilities

The cost of maintenance

In today's competitive market scenario, all types of industries are under tremendous pressure **to cut down their maintenance costs**, as they form a significant portion of the operation costs.

The industries are forced to look for different types of maintenance of the electrical equipment rather than usual preventive maintenance being carried out at a fixed interval of time.

Over the past twenty years or so, the concept of maintenance has been assuming different dimensions and changing a lot, perhaps more so than any other management discipline. The changes are due to a huge increase in the number and variety of plant equipment in the industries, which must be properly maintained.

The electrical equipment with much more complex designs require new maintenance techniques and changing views on maintenance organization and responsibilities.

Maintenance activities are also responding to changing expectations as follows:

- Rapidly growing awareness of the extent to which electrical equipment failure affects safety of plant and personnel and the environment.
- Growing awareness of the connection between maintenance and product quality.

- ❖ Increasing pressure to achieve high plant availability remaining cost-effective.

The changes are testing attitudes and skills in all branches of industry to the limit. Maintenance people are required to adopt completely new ways of thinking and acting, as the plant engineers and as the plant managers. At the same time, the limitations of maintenance systems are becoming increasingly apparent, no matter how much they are computerized.

2.2.3 UPKEEP OF THE ELECTRICAL INFRASTRUCTURE AT EKEDC

Electrical equipment that has not been properly maintained can impact worker safety through undocumented or unknown conditions. With aging infrastructure and modifications to electrical systems over time, the previously calculated short circuit capacity, arc flash hazards, and device coordination may not reflect the installed system. Performing preventive maintenance on electrical systems at industrial facilities, especially the low voltage systems, can be more difficult during economic downtimes due to the hidden nature of challenges from daily operation. Justifying cost associated with maintaining and/or upgrading systems can be challenging. However development and execution of electrical preventive maintenance (EPM) programs can greatly assist in outlining requirements for electrical equipment and prevent unnecessary damage and/or replacement due to neglect. EPM programs can assist with future expansion planning, improve reliability of equipment in the field, and decrease risk posed to workers and the overall operation. Numerous industrial facilities across Canada and North America have legacy electrical systems installed that have been in operation for decades. Over time, these systems have been modified and upgraded to ensure operation and production continues with minimal interruption. From site wide distribution of medium voltage to localized low voltage systems, modifications have left many systems virtually unrecognizable from the initial installation. With emerging technologies and legacy systems intertwined, adequate electrical preventive maintenance (EPM) programs have never been more important than now. EPM programs outline the electrical installation on site and provide a roadmap for proper inspection, testing, maintenance, and replacement of electrical equipment. These programs allow sites to transition from a reactionary approach, where electrical equipment is maintained and replaced on a corrective basis, to a preventive maintenance approach, where electrical equipment is maintained and replaced on a corrective basis, to a preventive maintenance approach, where electrical equipment is serviced and/or replaced on a time in service and use basis D. Morte, 2016. When these programs are undeveloped or inadequate, electrical equipment and component failures are more likely to occur and can impact the overall system, thus compromising the safety of personnel. Maintenance and testing The deterioration of

electrical equipment is normal, and this process begins as soon as the equipment is installed. If deterioration is not checked, it can cause electrical failures and malfunctions. In addition, load changes or circuit alterations may be made without overall design coordination, which can result in improper selection of equipment, or settings of protective devices, or wrong trip devices installed in the circuits. The purpose of an electrical preventive maintenance (EPM) and testing program should be to recognize these factors and provide means for correcting them. With an EPM and testing program, potential hazards that can cause failure of equipment or interruption of electrical service can be discovered and corrected. Also, the EPM program will minimize the hazards to life and equipment that can result from failure of equipment when it is not properly maintained. Properly maintained equipment reduces downtime by minimizing catastrophic failures. To carry out the successful operation of electrical equipment and apparatus, it is essential to set up an effective maintenance and testing program. This program can be implemented by setting up a maintenance department or by contracting the work to a private company engaged in this practice. The EPM program should consist of conducting routine inspections, tests, repairs, and service of electrical power system apparatus such as transformers, cables, circuit breakers, switchgear assemblies, and the like, along with associated equipment comprised of control wiring, protective devices and relays, supervisory equipment, and indicating and metering instruments. Why we maintain and test A well-organized and implemented program minimizes accidents, reduces unplanned shutdowns, and lengthens the mean time between failures (MTBF) of electrical equipment. Benefits of EPM can be categorized as direct and indirect. Direct benefits are derived from reduced cost of repairs, reduced downtime of equipment, and improved safety of personnel and property. Indirect benefits can be related to improved morale of employees, better workmanship, increased productivity, and the discovery of deficiencies in the system that were either designed into the original system or caused by later changes made in the system.

Primary testing and maintenance for a distribution substation Thinking in cost and failure effect, the most critical pieces are power transformers and circuit breakers; many old transformers and breakers are in use with many aging problems that requires periodic maintenance. One of the best practices in electrical substation maintenance is the circuit breaker testing. Periodically analyzing their physical and electrical parameters helps to predict an abnormal operation before it happens. Open/close timing, poles synchronism, contact resistance and coils condition are the most commonly checked parameters, as well as DC batteries status and motion analysis. The small and friendly SMC PME-500-TR

includes all mentioned functions that can be required in the electrical substation maintenance plans, and reduces the testing time to evaluate the condition of the breaker.

Measuring breakers contact resistance and other interconnections integrity is common practice in the electrical substation maintenance routines. Our new PRIME micro-ohmmeter results best-suited for this application, performing both static and dynamic resistance measurements, as it is essential for assessing the actual condition of the contacts in inaccessible SF or vacuum chambers.

Powers transformers are also critical during the electrical substation maintenance. In fact, its failing can produce large economic losses. They are exposed to several electrical and thermal stresses during its lifetime, and therefore many routine tests can be included in the electrical substation maintenance.

Apart from testing each device separately, it is essential to test the entire protection circuit on a periodic basis – or after any system modification – , to ensure integrity of the total circuit. The protection system can be tested as a whole by injecting primary test currents. The combination of mobility, digital regulation and versatility makes the RAPTOR the ideal system for all primary injection testing required in the electrical substation maintenance routines. Current transformer testing is also an important part of electrical substation maintenance. Protective relays can only operate adequately if they receive the correct secondary current from the CTs. The Raptor includes in one unit current, voltage and power transformer testing, and other functionalities (circuit breaker and switchgear testing, ground grid and step & touch measurements, etc)

Secondary testing and maintenance for a distribution substation Periodic testing is necessary to ensure that a protection scheme provides satisfactory performance for many years after being installed, and secondary injection tests may be carried out at suitable intervals to check relays, protection panel, wiring and all secondary equipment performance, during the electrical substation maintenance planning, or after any modification. The type of testing required and frequency will depend on the type and technology of protection installed. Secondary injection may involve testing of overcurrent, distance, differential, voltage and frequency protections, reclose schemes, IEC 61850 compliance, etc, apart from the checking of all secondary control and protection circuits, wiring, polarity, burden, etc.

SMC offers the widest range of secondary injection test sets, single and 3-phase, to accomplish any secondary testing work during the electrical substation maintenance

(PTE-100-C series, PTE Range, MENTOR 12, etc), along with a full range of accessories and must-have tools for every need (PME-20-PH, PTE-30-CH, etc). As usual with SMC test equipment, simplicity and ease-of-use are common to all secondary testing solutions for electrical substation maintenance.

2.2.4 Factors Affecting EKEDC's Ability To Manage Electrical Facilities Effectively

Magnus found out that benchmarks based on cost frontiers had become increasingly popular as a way to regulate electricity distribution utilities. He noted that there had been an extensive research focus on how to estimate the level of inefficiency, but only limited investigation of which factors influence inefficiency. He mentioned that if the sources of inefficiency were known, then the reliability of benchmarks would increase and regulators would be able to act as active catalysts for welfare improvements. In his research Magnus found that inefficiency was sensitive to outages, transformer capacity and share of overhead lines whereas utility ownership does not affect inefficiency. Magnus quoted Jamasb & Pollitt, (2001) who found that many regulatory agencies in many countries were already using, or plan to use, benchmarks. Developments of methods used to calculate/estimate efficiency and a realization that benchmarks reduce the negative consequences of asymmetrically distributed information, have contributed to this development. How ‘ever, in their review of benchmark studies in electricity distribution published from 1989 to 2000, Jamasb and Pollitt (ibid.) noted that on the whole there was inconclusive evidence as which factors and to what extent those factors influence inefficiency in electricity distribution. As a consequence, it was claimed that the usefulness of benchmarks was significantly reduced since unexplained data variation would either be fully attributed to inefficiency or arbitrarily divided between data noise 26 and inefficiency. Magnus further quotes (Irastorza 2003; Shuttleworth 2003). Shuttleworth who argued that there could be several legitimate reasons for why utility cost varied and hence, benchmarks were only valid if the sources of inefficiency could be plausibly explained. In addition, if regulators could inform utilities on how to best increase cost efficiency, they would be able to act as active catalysts to welfare improvements. This view was in line with the suggestion presented by Bartle & Vass, 2007. They encouraged regulators to take a wider societal responsibility by engaging in advice and debate in the public domain, scenario planning to assist government policy development, and public communication and education. Based on this, it seemed odd that relatively few studies had attempted to more fully explain the causes of inefficiency. It was plausible that the apparent lack of scientific contribution would be attributed to the

particular challenges involved in identifying all factors having an influence on cost inefficiency in electricity distribution, and obtaining a sufficiently large data set representing the factors identified. The purpose of Magnus Soderberg study was to contribute to a deeper understanding of which factors influenced cost inefficiency in electricity distribution. Magnus quoted from different studies as follows. Jamasb & Pollitt, (2001) noted in their review of efficiency studies published from 1989 to 2000 that utility size and ownership together with regulatory arrangement were related to efficiency. The direction of each influence was however unclear as conclusions were contradictory. Bagdadioglu et al. (1996) and Kumbhakar & Hjalmarsson, (1998) argued that privately owned utilities were more efficient in Turkey and Sweden respectively. Pollitt (1995), on the other hand, found no significant benefit of privatisation from his international comparisons, and Cote (1989) suggested that publicly and cooperatively owned utilities were more efficient. The appropriateness of transferring publicly owned utilities to private investors had also been wildly debated outside electricity distribution with no consensus reached. Economies of scale had also been reported to influence inefficiency (Filippini 1998; Kumbhakar & Hjalmarsson 1998), but the conclusions were not robust enough to serve as general policy recommendations. Pombo & Taborda, (2006) found out that ownership had no effect on efficiency whereas Kwoka (2005a, b) claimed that publicly owned utilities were more efficient. Some contributions also claimed that market liberalization and loss reductions increased efficiency (Pombo & Taborda, 2006; Pacudan & Guzman, 2002). In his conclusion. Magnus found out that many of the hypothesized variables affecting cost inefficiency were found to be significant. Different econometric models do however produce strikingly different estimates. In his study it was argued that a random parameter specification was more realistic compared to conventional specifications since it allowed inefficiency variance to vary both over time and firms and compensates for excluded non-linear effects. The regulator should be aware that cost and quality efficiency are contradictory. Utilities were advised to reduce their share of overhead lines and increase their transforming capacity in order to reduce cost inefficiency. This study contributed to the debate on privatization of public utilities by concluding that private utilities were not found to be more cost efficient than publicly/cooperatively owned utilities. Given the varying conclusions presented on the relationship between ownership and cost efficiency in electricity distribution by earlier studies, it was tempting to suggest that ownership does not have a significant impact per se, but that the interaction between ownership and other factors (e.g. dynamic market conditions) produce apparently random outcomes. (Magnus, 2008)

Several factors also have been persistently affected effective management of facilities in electrical industries (Olaitan and Abdullahi 2000)

I. Establishment that the emphasize training re-training and continue education can hardly posses an effective maintenance program.

II. Indiscipline and ignorance on the part of users of equipment often lead to persistent equipment breakdown. In such situation maintenance become problematic.

III. Lack of data and poor information processing is a handicap to effective maintenance.

IV. Inadequate incentive in terms of salaries, allowance and mobility of the maintenance staff.

2.2.5 The EKEDC Distribution Company's Facilities Management Techniques.

Benchmarking of Reclamation facilities against similar facilities, both public and private, allows Power Managers to gauge the performance of the facilities. Open and honest communication about performance with staff is essential to reinforce the importance of performance. The following performance standards are included in the management component of Reclamation's Power Review of Operation and Maintenance (PRO&M) Program and are used to determine the overall performance of the facility.

A. Production Costs Production costs of the facility ($/megawatt [MW]) should be reviewed annually and compared to the appropriate capacity class facility of the hydropower industry. The annual production cost of the facility is determined by dividing the total cost that was accrued (expensed) against all Federal Energy Regulatory Commission Power O&M cost authority structures (5100-535 through 5100-545) by the total powerplant MW nameplate generating capacity.

B. Forced Outages A forced outage rate is an excellent indicator of the effectiveness of the facility maintenance program. Reclamation’s goal is to maintain a forced outage rate not greater than 3 percent annually. The annual forced outage rate of a facility is determined by dividing the total number of forced outage hours for all units by the total number of hours available in a year for all units.

C. Power Delivery Project power is one of the deliverable products of Reclamation power facilities. The project should provide 100 percent of the project power.
D. Unit Availability Unit availability is a standard used throughout the power industry. The capability of providing unit availability is an excellent measure of facility performance and should be maintained to at least 90 percent.

Reclamation conducts a continuous review program of its hydroelectric facilities and equipment. Directive and Standard FAC 04- 01, Power Review of Operation and Maintenance Program, implements the PRO&M Review Program. The purpose of these reviews is to assess the effectiveness of Reclamation's power O&M activities to support its hydroelectric assets. These assessments are conducted under the Reclamation PRO&M Program. Details about the review program can be found in the PRO&M Program Guidebook. In accordance with Directive and Standard FAC 04-01, Power O&M reviews are to be conducted annually. The Power Review of O&M Program consists of an annual review, a periodic review, and a comprehensive review. Listed below is a brief description of each review.

A. Annual Reviews
Each year that does not include a periodic or comprehensive power review, reviews are to be conducted and documented by local staff. A cornerstone of the review program is the annual review during which staff from the local office performs a self-evaluation of the local power program by completing the Power O&M Review check sheets developed for the Power O&M Review Program. Early identification and self-correction of individual and systemic problems is considered essential to a well-managed O&M program.

B. Periodic Reviews are to be conducted and documented by the regional office once every 6 years (every 3 years following comprehensive power reviews).

C. Comprehensive Reviews are to be conducted and documented by the Power Resources Office once every 6 years (every 3 years following periodic power reviews).

D. Power Resources Information System Database Category 1 and category 2 recommendations from the periodic and comprehensive reviews are entered and tracked using the Power Resources Information System (PRIS), which is a separate database

found in the Dam Safety Information System. It is the responsibility of the area and regional offices to enter recommendations from the reviews into PRIS. It is also highly recommended that all category 3 recommendations resulting from a Power O&M Review be entered into the PRIS database.

E. Review Check Sheets It is important that completed, site-specific check sheets and other requested data be furnished in a timely manner to the Periodic and Comprehensive Power O&M Review Teams so that adequate review can take place before the site visit. Failure to deliver the needed data in the time requested may result in the review being postponed, potentially causing scheduling and budgeting problems. Review check sheets are the most important review tool and form the foundation of the Power Review Program. The check sheets are key to maintaining thorough and accurate documentation of review findings and recommendations. Check sheets are used during the annual, periodic, and comprehensive reviews.

F. Variances A variance from the standards is permitted provided that it can be justified, is officially documented, and properly approved by management. A variance form is required to be completed and kept on file at the facility.

From one industry to the next, facilities management best practices are shared and implemented every day by facility managers worldwide. While not all organizations operate the same way, facility leaders still share a common goal when it comes to facilities management: to work efficiently and effectively, improve their organization's operating costs, and boost employee productivity.

Facility management is an ever-evolving process because, as facility leaders know, every day is different, and procedures grow and change to match daily demands. That is why it is so crucial for facility managers to continue to utilize and stay up-to-date with facilities management best practices. It's the only way to realize cost savings and maintain their facilities and building systems as efficiently as possible.

Here are 7 common facilities management best practices that can help you cut costs, improve maintenance management efficiency, and achieve operational success in electrical distribution station

1. Automate and streamline facilities maintenance and operations

An essential best practice of good facilities management is creating a streamlined workflow that can be modified as needed. An automated and streamlined workflow will help to increase visibility, maintain consistency, and improve facility efficiency.

Many facility managers have found that automating processes like facility lighting and/or HVAC systems has led to increased efficiency in their facilities operations. HVAC schedules connected directly into your building automation system will allow you to control heating and cooling settings based on facility occupancy leading to better energy usage. Similarly, lighting controlled on an as-needed basis can help improve facility energy efficiency, saving organizations money in the long run.

Facility managers are also streamlining facility and maintenance operations by submitting electronic work orders generated by facility management software or other avenues. Eliminating paperwork orders enhances visibility for all facility and maintenance activities, helping to improve team productivity and efficiency.

Learn how FMX can help your organization automate work order process with its work order capabilities.

2. Customize your facilities management operations to fit your organization’s needs

When it comes to facility management, every organization operates differently. Whether your top priority is preventive maintenance, special projects, asset management, event scheduling, etc., your workflows must be flexible and customized to fit your organization’s unique facility maintenance needs.

One size doesn’t fit all when it comes to facility management practices. Customized facility management workflows help facility managers capture, track, and report on all crucial details surrounding their facility’s processes, providing them the tools they need for operational success, and ensuring that all facility decisions support the best interest of their organization.

3. Communicate with your team, across departments, and with outside vendors

Communication is key to success, and a key facility management best practice is to have clear and effective communication amongst team members, across departments, and outside vendors. Be sure to include keeping everyone up-to-date on any changes that are

taking place within your facilities or with your facility processes, any emergency repairs that took place, and always be open to listening to your team members' concerns by answering any questions they may have.

With the proper communication tools in place, you will be able to:

- Improve your team's productivity and accountability by informing them of all facility activities and their current assignments.
- Maintain contractor and vendor relationships by communicating planned maintenance and current projects, service requests, invoicing, training programs, equipment, etc.
- Eliminate any unnecessary tasks, allowing you and your team to dedicate more time to the work that matters most to you, your organization, your technicians, maintenance schedule, and facilities.

4. Implement a preventive maintenance plan

As a facility manager, you strive for optimum efficiency for all of your assets to cut maintenance costs at the same time. By implementing a preventive maintenance (PM) plan for your facilities, you will be able to extend the life of your equipment, reduce downtime and reactive maintenance, keep an organized calendar for all PM tasks, track metrics and maintenance schedule KPI analytics that help you achieve data-driven decisions for your facilities, and cut down on reactive maintenance costs. Organizations that put a preventive maintenance plan in place have saved anywhere between 12%-18% on their annual maintenance expenses. To some facility managers, the idea of tracking and maintaining the necessary details for a PM plan may seem overwhelming; however, with the right tools in place, routine maintenance is simple. Click here to learn more about how you can benefit from implementing preventive maintenance software.

5. Use data trends to track and measure facility management processes and performance

A recommended facilities management best practice is to collect and track as much information as possible. The list includes storing details such as manufacturer, serial number, emergency repairs, and warranty information for all of your equipment and assets, tracking worker labor rates and hours, inventory levels, equipment downtime, and much more.

With access to this data, you will have complete visibility into all aspects of your facility operations, helping you to set and reach facility and maintenance goals for your organization. For example, with access to all of your assets' logs and data, you will be able to establish operational benchmarks or key performance indicators (KPI) that allow you to predict and prevent asset breakdowns, prolong the lifespan of your assets, maintain asset warranties, prepare for future operation costs, and lower your maintenance costs as a whole. In addition, through reporting and analytics, you will gain better insight into your facilities' operations and performance on a daily, weekly, monthly, or even yearly occurrence. The intelligence will help you analyze trends and make data-driven decisions regarding your facility and maintenance processes, asset enhancements, productivity, additional staffing needs, and future budgeting plans. Decision-making on this level will give you an increase in profitability, a strong return on investment (ROI), and lead to operational success—ultimately improving your overall bottom line.

6. Embrace and utilize the capabilities of IoT

Facilities management best practices are continuously evolving and improving in terms of technology, which is why it's important that facility managers embrace the use of technology to help them with their everyday facility management processes. In fact, the Internet of Things or IoT, is changing the way facility leaders operate.

With so many cloud-based facilities managements software options, facility managers are no longer sifting through paperwork orders, tracking down lost request details, or spending unnecessary time organizing schedules for their maintenance team. Instead, they are communicating and accessing all of their facility activities and schedules directly from their smartphone or tablet, giving them their maintenance team the ability to work from anywhere, at any time, and even in multiple facilities. Throw in the ability to control your facilities' HVAC and lighting settings directly from your mobile device, and you've got it covered.

From saving time, cutting costs, aligning your team, maintaining a safe work environment, and improving productivity, the IoT offers you just the right tools so you can focus on the things that matter most to your organization.

7. Control your operations through maintenance management software

All of the above best practices will help you achieve facilities management success. However, facilities maintenance software can help you achieve better results faster. With

many options to choose from, it can tend to be a little overwhelming. To help you narrow it down, we highly recommend software that offers these key benefits:

- Asset and equipment management
- Open communication and idea exchange
- Workflow and routine process automation
- Time management improvements
- Reduction in maintenance costs and space
- Configurable reporting

A facilities management system helps facility leaders prioritize tasks and assign work orders to teams based on technician availability and the work order's level of importance. Storing information in the system regarding how something was fixed in the past also decreases time spent on work orders and provides an excellent means of reporting employee and asset productivity. This keeps teams on track, ensures that need-to-have request items are being worked on first, decreases overall work order resolution time, streamlines processes, and decreases costs.

Whether it's choosing the correct cost-saving maintenance management software or setting up the most efficient preventive maintenance plan, rather than reinventing the wheel, utilize the tools and facilities management best practices that have proven to work for facility managers time and time again.

2.3 Reviewed of Related Empirical Studies

These chapter contains the work related to the present study and will be reviewed under the following; two key concepts appear dominant in this review: electrical facilities, compliance to the effective working conditions and management of electrical facilities and ways of enforcing practice in Eko Electricity Distribution Company

Summary of Related Literature

Electricity has become an important entity to the existence of man, thus making the electrical industries/distribution station a very viable and important companies in Nigeria. From the history of Nigeria, the country has invested a lot both human and material resources, in the acquisition of facilities in the electrical distribution companies with the aim of providing efficient power supply in the country. From the above literature it is clear that the ability of electrical distribution company (EKEDC) to meet its obligation is hinged on effective maintenance or management of these electrical facilities. Factors such as lack of competent staffs, poor funding, poor attitude of individuals towards public properties, lack of spare parts etc. were itemized as some of the problem affecting effective maintenance of facilities in the substation. Effective methods in the use of

contractors to facilitate management of electrical facilities in EKEDC were also suggested in these literature review.

Lack of policy There must be a concerted and systematic approach to the management of facilities in order for desired objectives to be realized. This therefore necessitates a policy, which may either be documented or imbibed by all concerned and supported by management of facilities in order for desired objectives to be realized. This therefore necessitates a policy, which may either be documented or imbibed by all concerned and supported by management.

Lack of funding in most organizations, top management needs to be fully briefed in order to understand and appreciate the demands of facility management in the organization. Funds requested for preventive maintenance will usually need some explanation before release.

Misuse of facilities A change of use midstream of a facility without adequate precautions is an invitation to failure. Sometimes, ignorance is the cause of misuse but it doesn't change the fact that abuse of facilities is a potent cause of failures.

Abuse of facilities Many users of facilities fail to realize that specific constraints and values of loading on weight were employed in the design of these structures. Abuse occurs when a facility is subject to forces for which it was not designed or intended to resist

CHAPTER III
METHODOLOGY

This chapter discusses in detail the methodological decision and the study's research design procedure are covered in detail in this chapter. The research problem and the philosophical position have mostly been used to inform the methodological decision. It discusses why the explanatory sequential mixed methods research strategy is deemed suitable for the study in more detail. The chapter also established the processes for gathering, analyzing, and reporting data. The quantitative and qualitative approaches each served a different objective, hence different processes were utilized for each. Also, the methods used to improve the studies' validity and reliability are outlined in depth. The chapter concludes by defining research procedure issues, such as timing, weighting, and study integration decisions, and highlighting ethical implications issues.

3.1 Research Design

Research design emerged as a recognizable field of study in the 1960s, at first marked by a conference on Design Method at Imperial college, London in 1962. It led to the founding of the Design Research Society (DRS) in 1966. John Christopher Jones founded a postgraduate Design Research laboratory at the University Manchester Institute of Science and Technology (who initiated the 1962 conference) and L. Bruce Scher founded the postgraduate Department of Design Research at the Royal College of Art, London and became the first professor of Research Design. Dawson Catherine, (2002). Some of the origin of design methods and research design lay in the emergence after the and world management decision making technique the most fundamental challenge to conventional ideas on design has been the grouching advocacy of systematic methods of problem and the development of design solutions. Herbert Simon (1969) established the foundations for a science of design which would be a body of intellectually tough, analytic, partly formalizable, partly empirical, teachable doctrine about the design process Gupta Mukul and Gupta Deepa, (2011). A research design is the 'procedures for collecting, analyzing, interpreting and reporting data in research studies' (Creswell & Plano Clark 2007, p.58). It is the overall plan for connecting the conceptual research problems with the pertinent (and achievable) empirical research. In other words, the research design sets the procedure on the required data, the methods to be applied to collect and analyze this data, and how all of this is going to answer the research question (Grey, 2014). As explained by Robson (2002), there are three possible forms of research design: exploratory, descriptive and explanatory. His base of classification relies on the purpose of the research area as each design serves a different end purpose. For instance, the purpose of a descriptive study is to provide a picture of a situation, person or event or show how things are related to each other and as it naturally occurs (Blumberg, Cooper and Schindler, 2005). However, descriptive studies cannot explain why an event has occurred and is much suitable for a relatively new or unexplored research area (Punch, 2005). Therefore, in situation of abundant descriptive information, alternative research designs such as explanatory or exploratory approach is advisable.

3.2 Area of The Study

The study was carried out in EKEDC in lagos state. The EKEDC covers a license area of the southern part of Lagos state and Agbara a local government in Ogun state, the license area of EKEDC is segmented into three (3) circle and 10 district namely: the west circle has three (3) district which are AGBARA, OJO and FESTAC also the central circle which has four (4) district which are IJORA, MUSHIN, ORILE and APAPA. Lastly is the west circle which has three (3) district which are LEKKI, IBEJU and ISLAND the EKEDC receive there power supply from two transmission station which are AKANBA (330/132kv) and AJAH (330/132kv) the EKEDC headquarters is located in 24/25 MARINA Lagos state

3.3 Population of the Study

The target population for these study is drawn up for all the district office in EKEDC particularly the management/protection and testing department and maintenance department in EKEDC is shown below.

Table 1 distribution of the population of the study

S/N	District office	Protection and testing staff	Maintenance staff	Total
1	Agbara	14	80	94
2	Ojo	13	75	88
3	Festac	13	70	83
4	Ijora	12	65	77
5	Mushin	12	58	70
6	Orile	10	50	60
7	Apapa	10	45	55
8	Lekki	9	40	49
9	Ibeju	7	35	42
10	Island	6	30	36
	Total	106	548	654

3.4 Sample and Sampling Technique

The researcher has decided to obtain a small size from the population using a survey design. A survey design is one which involved the assessment of people opinion using the questionnaire the study adopts survey design because it suits people opinion

The table 3 shows the Breakdown of the Sample Under Study

S/N	District office	Protection and testing staff	Maintenance staff	Total
1	Agbara	5	60	65
2	Ojo	5	55	60
3	Festac	5	50	55
4	Ijora	5	45	50
5	Mushin	5	40	45
6	Orile	5	35	40
7	Apapa	5	30	35
8	Lekki	5	25	30
9	Ibeju	5	20	25
10	Island	5	15	20
	Total	50	420	425

3.5 Instrument for Data Collection

The instrument for data collection was A structured questionnaire created specifically for this study served as the instrument for gathering data. It is broken into two parts: part I, which is an introduction, and part II, which has fifty-four (54) objects organized into four sections: A, B, C, and D.

Personal information on the respondents is included in Part I of the questionnaires. The current situation of facilities management at Eko Electricity Distribution Company is covered in Section A, which has 19 components. There are 9 items in Section B that discuss the effects of facility management at Eko Electricity Distribution Company. 13 items make up Part C, which discusses the barriers to efficient facilities management at Eko Electricity Distribution Company. 14 items make up Part D, which is about potential facility management strategies that could support efficient maintenance at Eko Electricity Distribution Company.

3.6 Validation of the Instrument

The questionnaire constructed by the researcher's supervisor and three (3) additional lecturers from the department of Industrial and Technological Education received the questionnaire she had created. Federal University of Technology in Minna must make the necessary modifications in order to create the pertinent data necessary to support the research question. To gather information for this investigation, a validated questionnaire was used.

3.7 Administration of the instrument

With assistance from research assistants from each section, the researcher individually administered the surveys to the respondents. After completion, the administered questionnaire was collected. 90% or so was gathered.

3.8 Method of Data Collection

The respondent received the questionnaire directly (EKEDC Workers). Worth the assistance of the four copies that the researcher and assistant filled with study. The researcher also gathered the computed copies and kept the questionnaires in their possession for study.

3.9 Method of data Analysis

The statistical means score method, standard deviation, and t-test on an independent sample were utilized to examine the data used in this study. Each item must be answered on a 4-point scale, with the best response indicated.

Strong agree (SA)	=	4 point
Agree (A)	=	3 point
Disagree (D)	=	2 point
Strongly disagree (S.D)	=	1 point

Decision Rule

The mean of 2.50 was used as decision point for every questionnaire item. Consequently, any item with a mean response of 2.50 and above was considered to be agreed and any item with a mean of 2.49 and below was equally considered disagreed. for testing hypothesis 1.96 is the critical value of 178 degree of freedom so any item that has it calculated t- value equal or less than t- critical will be considered accepted and any item that has it calculated t- value above the -critical will be considered rejected.

CHAPTER IV

PRESENTATION AND DATA ANALYSIS

The results of the data analysis for the research questions were provided first, followed by those of the study's tested hypotheses. This chapter deals with the presentation and analysis of data with respect to the research questions and hypotheses developed for this study.

Research question 1

What is the state of facility management in electrical distribution company in Nigeria?

Table 4: Mean Responses of Management/protection and testing and Maintenance Personnel on the Current State of Facility Management in Eko Electricity Distribution Company in Lagos State

(N1= 30, N2= 140)

S/NO	ITEMS	X_1	X_2	X_t	REMARK
1	Engineering are used during maintenance Work	3.60	3.60	3.60	Agree
2	Management used the appropriate instructional time schedule for maintenance	3.50	3.20	3.25	Agree
3	Routine maintenance is usually observed as schedule	3.50	3.60	3.55	Agree
4	maintenance personnel the used appropriate facilities (tools) for maintenance	3.70	3.70	3.70	Agree
5	Maintenance personnel are involved in purchasing spare parts	3.10	3.00	3.05	Agree
6	Funds are provided for effective maintenance works	3.30	3.00	3.15	Agree
7	Maintenance personnel are guided to respond to faulty machines for necessary Action	3.30	3.38	3.55	Agree

8	Proper inventory system is usually kept at all times	3.20	3.20	3.20	Agree
9	Constant training and re-training of maintenance personnel when need arises	3.10	3.10	3.10	Agree
10	Spare part of the facility are always in Stocked	3.20	2.55	2.88	Agree
11	Workshop are fully equipped with Modern equipment	3.40	2.75	3.08	Agree
12	Maintenance manual are available for use	3.30	2.45	2.88	Agree
13	Management provide the equipment when the need arises	3.40	2.95	3.18	Agree
14	Maintenance personnel are comfortable with maintenance procedures in the industry	3.60	3.05	3.33	Agree
15	Safety equipment are made available in the industry	3.30	2.80	3.05	Agree
16	Routine inspection of facilities is carried out in industry	2.80	3.05	2.93	Agree
17	Adequate security is provided	3.40	3.40	3.40	Agree
18	Staff observe standard safety practices measures when carrying out work	3.30	3.05	3.18	Agree
19	Broke down equipment are4 not left unattained for a long period of time	3.20	3.05	3.13	Agree

KEY:

X_1=Mean of management

$\mathbf{X_2}$=Mean of maintenance personnel

$\mathbf{X_t}$=Mean total

$\mathbf{N_1}$=Number of Management

$\mathbf{N_2}$=Number of maintenance personnel

The result presented in Table 4 above shows that the respondents agreed with all the items with an average mean score ranging from 2.88 to 3.70

Research question 2

What are the impacts of facilities management in Eko Electricity Distribution Company?

TABLE 5: Mean Responses of protection and testing and Maintenance Personnel on the Impact of Facilities Management in the Eko Electricity Distribution Company.

(N1 = 30, N2=140)

S/NO	ITEMS	X_1	X_2	X_3	REMARK
20	Effective maintenance will result in faster constant power supply	3.70	3.75	3.76	Agree
21	Reducing the cost of generating power	3.40	3.50	3.45	Agree
22	Improved safe working environment	3.50	3.35	3.43	Agree
23	Reducing risk of accident	3.50	3.20	3.35	Agree
24	Increase life span of equipment	3.30	3.40	3.35	Agree
25	Encourage economic development	3.50	2.85	3.18	Agree
26	Reduce cost of buying new equipment	3.40	3.25	3.33	Agree
27	Reduce the wastages of material and labour	3.50	3.10	3.30	Agree
28	It generates more profit	3.60	3.25	3.43	Agree

KEY:

X_1=Mean of management

X_2=Mean of maintenance personnel

X_T=Mean total

N_1=Number of management

N_2=Number of maintenance personnel

The result presented in Table 5 above shows that the respondents agree with all the items with a mean score ranging from 3.18 to 3.73

Research Question 3

What are the constraints of effective facility management in Eko Electricity Distribution company

Table 6: Mean Responses of Management and Maintenance Personnel on the Constraints of Effective Facilities Management in EKEDC

(N=30, N=140)

S/NO	ITEMS	X_1	X_2	X_t	REMARK
29	Inadequate supervision of maintenance programme	3.50	3.05	3.28	Agree
30	Poor training and re training of staff Lack of fund for effective maintenance	3.60	3.15	3.38	Agree
31	Maintenance personnel are not motivated	3.60	3.35	3.48	Agree
32	Inadequate information and communications	3.70	2.95	3.33	Agree
33	Non availability of spare parts	3.50	2.90	3.20	Agree
34	Lack of fund for effective maintenance	3.50	2.80	3.15	Agree
35	Workshop are not well equipped	3.40	2.90	3.15	Agree
36	Absence of efficient inventory system	3.20	3.20	3.20	Agree
37	Shortage of skilled man power	2.70	2.80	2.75	Agree
38	Indiscipline and ignorance on the part of users	3.00	2.80	2.90	Agree
39	Staff are not well remunerated	3.10	3.05	3.08	Agree
40	Low education background of maintenance Personnel	3.40	2.95	3.18	Agree
41	Maintenance works are carried out by technicians	3.20	3.50	3.35	Agree

KEY:

X-Mean of management

X2-Mean of maintenance personnel

X-Mean total

N-Number of management

N-Number of maintenance personnel

The result presented in Table 6 above shows that the respondents agreed with all the items with an average mean score ranging from 2.75 -3.73

Research question 4

What are the possible facility management techniques that will sustain effective maintenance of electric power infrastructures?

Table 7: Mean Responses of Management and Maintenance Personnel on the Possible Facility Management Techniques that will Sustain Effective Maintenance of **Electrical Distribution Company**

(N=30, N=140)

S/NO	ITEMS	X_1	X_2	X_t	REMARK
42	There should be adequate supervision of maintenance programmes	3.70	3.80	3.75	Agree
43	Provision efficient fire-fighting equipment	3.50	3.60	3.55	Agree
44	Warning signals should be promptly attended to	3.70	3.60	3.65	Agree
45	Adequate training and retraining of maintenance personnel	3.70	3.80	3.75	Agree
46	Maintenance personnel should be motivated	3.50	3.65	3.58	Agree
47	Adequate information and communication Technology	3.70	3.66	3.68	Agree
48	Provide adequate funds for the establishment of effective electrical industries programmes	3.50	3.55	3.53	Agree
49	Spare part should be available in workshop	3.87	3.70	3.79	Agree
50	Report any defective tools, equipment and machine to the supervisor	3.70	3.65	3.68	Agree
51	Safety devices should not be removed with permit	3.50	3.40	3.45	Agree
52	Experience workers should be put in charge of the new once	3.90	3.35	3.63	Agree

53	Fire extinguishers should be routinely serviced	3.90	3.60	3.75	Agree
54	Safety poster should be properly displayed in work places	3.87	3.65	3.76	Agree

KEY:

X-Mean of management

X2= Mean of maintenance personnel

X= Mean total

N=Number of management

N2= Number of maintenance personnel

The result presented in Table 7 above shows that the respondents agreed with all the items with an average mean score ranging from 3.45- 3.79

Hypothesis 1

HO1 There is no significant difference in the mean response of maintenance personnel and management staff regarding the current state of facility management in Eko Electricity Distribution Company

Table 8: t-test Analysis of Management and Maintenance Personnel on the Current State of Facility Management in Eko Electricity Distribution Company

(N-30, N2- 140)

S/NO	ITEMS	$S.D_1$	$S.D_2$	t-test	REMARK
1	Management used the appropriate instructional time schedule for maintenance	0.50	0.40	3.09	S
2	Proper inventory system is usually kept at all times	0.60	0.88	0.00	NS
3	Maintenance personnel are guided to respond to faulty machines for necessary action	0.50	0.49	-1.00	S
4	Funds are provided for effective maintenance works	0.46	0.46	0.00	S

5	Maintenance personnel are involved in purchasing spare parts	0.70	0.32	0.77	NS
6	maintenance personnel used the appropriate facilities(tools) for maintenance	0.65	0.64	2.31	NS
7	Routine maintenance is usually observed as Schedule	0.50	0.49	-1.00	NS
8	Engineering is used during maintenance work	0.49	0.74	0.00	S
9	Management provides the equipment when the need arises	0.49	0.50	5.56	S
10	Maintenance manual are available for use	0.49	0.81	4.00	S
11	Workshop are fully equipped with Modern Equipment	0.46	0.81	7.85	S
12	Spare part of the facility is always in stocked	0.49	0.70	6.07	S
13	Constant training and re-training of maintenance personnel when need arises	0.70	0.77	0.00	NS
14	Broke down equipment are not left unattained for a long period of time	0.40	0.81	6.50	S
15	Staff observe standard safety practices measures when carrying out work	0.60	0.74	1.19	NS
16	Safety equipment are made available in the industry	0.75	0.74	-1.67	NS
17	Routine inspection of facilities are carried out in the distribution company	0.80	0.49	0.00	NS
18	Adequate security is provided	0.65	0.81	1.83	NS
19	Maintenance personnel are comfortable with maintenance procedures in the industry	0.46	0.75	4.76	S

KEY:

$S.D_1$=Standard Deviation of management

$S.D_2$= Standard Deviation of maintenance

N_1=Number of managements

N2= Number of maintenance personnel

There is no significance differences between the mean responses of management and maintenance personnel regarding the current state of facility management in electrical industry in Niger state, from Table 8 above item 1,3,4,5,8,9,16,17,18,19 are accepted because they fall within t-test value of ± 1.96 while item 2,6,7,10,11,12,13,14,15 are rejected because they fall within the range which exceed the t- table value which indicate some short coming in the current state of facility management of electrical industry

Hypothesis 2

HO2 There is no significant difference in the mean response of maintenance personnel and management staff regarding impacts of facilities management in Eko electricity Distribution company.

Table 9: t- test Analysis of Management and Maintenance Personnel on the Impacts of Facilities Management of Eko Electricity Distribution Company

(N1 = 30, N2 =140)

S/NO	ITEMS	$S.D_1$	$S.D_2$	t-test	REMARK
20	It generates more profit	0.49	0.77	3.17	S
21	Reduce cost of buying new equipment	0.50	0.77	3.57	S
22	Reduce the wastages of material and labour	0.49	0.63	1.45	NS
23	Effective maintenance will result in faster constant power supply	0.46	0.44	-0.55	NS
24	Reducing the cost of generating power	0.49	0.60	-0.98	NS
25	Reducing risk of accident	0.50	0.80	1.33	NS
26	Improved safe working environment	0.50	0.51	2.98	S
27	Increase life span of equipment	0.46	0.74	-0.96	NS
28	Encourage economic development	0.50	0.86	5.58	S

KEY:

$S.D_1$ = Standard Deviation of management

$S.D_2$ = Standard Deviation of maintenance

N_1=Number of managements

N_2= Number of maintenance personnel

There is no significance difference between the mean response of management and maintenance personnel regarding the impact of facilities management in industries, from Table 9 above item 20,21,22,24 and 26 are accepted because they fall within t-test value of ± 1.96 while item 23, 25,27 and 28 are rejected because they fall within the range which exceed the t- table value which indicate some short coming in the impact of facilities management in industries.

FINDINGS

The following are the principle finding of this study. They are highlighted based on the research question.

Findings Related to Current state of Facility Management of EKEDC

Both respondents agreed with the following concerning the current state of facility management in Eko Electricity Distribution Company which include:

- Spare part of the facility are always in stocked
- Management provide the equipment when the need arises
- Maintenance personnel are comfortable with maintenance procedures in the industry
- Staff observe standard safety practices measures when carrying out work

Findings Related to the Impact of facilities Management in Electrical distribution company (Eko Electricity Distribution company) include:

Both respondents agreed with the following concerning the impact of facilities management in Eko Electricity Distribution Company

- Effective maintenance will result in faster constant power supply
- Reducing the cost of generating power
- Increase life span of equipment
- Encourage economic development
- Reduce the wastages of material and labour

Findings Related to the Constraints of Effective Facilities Management in Eko Electricity Distribution Company:

Both respondents agreed with the following concerning the constraints for effective facilities management in Eko Electricity Distribution Company

- Poor training and retraining of staff
- Lack of funds for effective maintenance
- Maintenance personnel are not motivated
- Inadequate information and communication
- Non availability of spare part
- Low education background of maintenance personnel
- Shortage of skilled man power

The possible facility management techniques that will sustain effective maintenance of Electrical Distribution Company.

Both respondents agreed with the following result on the possible facility management techniques that will sustain effective maintenance of Electrical Distribution Company

- Adequate information and communication technology
- Adequate training and retraining of maintenance staff
- Safety poster should be properly displayed the work place
- maintenance personal should be motivated
- adequate funds and equipment for maintenance personnel

electrical Distribution Companies we find quite a number of personnel without the correct knowledge and skill good maintenance practice. Where the right personnel can be fund, for good facility maintenance for mass transit, skill must be effectively managed by those who know what facility management is all about. Electrical engineers, technologists and technicians.

Also from table 4 the study identified safety equipment, standard safety practice. Olaleye, Ndu and Abdullah (2000). Observed that before any maintenance can be carried out, the individual concerned must be well equipped with his or her safety procedures. Employers and employees have the duty to ensure that the place in which maintenance work is to be carried out is free from dangers which are likely to affect the health and safety of themselves and others. Abdullah (2000) faulty electrical installation is a frequent cause of damage by fire in industry and houses. The industry is expected to put in place

appropriate accident reporting procedures and regularly train employees on fire prevention/protection/fighting and on first aid treatment especially for shocks, burns, cuts bleeding and suspected broken limb.

Findings from table 5 revealed that effective maintenance will result in faster constant power supply which will reduce the cost of generating power Ekpo (2005) the poor delivery of electricity has a negative impact on the economy, which is further made worse by very high cost of alternative supply for those who normally rely on public supply of electricity. The result further revealed that effective maintenance will reduce the wastages of material and labour Ugwu (2000) low supply of electrical power is manifestation from poor moving maintenance material and labour cost.

Finding from table 6 revealed that the constraints of effective facility management is as result of poor fund for effective maintenance programme Kareem (2000) for effective maintenance, adequate stocking of faster moving maintenance materials and spare part must be barked upon these parts should be replenished from time to time on regular basis as it will to hasten jobs thereby reducing congestion in the industry and economic development here phasis must, however be laid on adequate funding as very necessary if the industry is to function effectively. Also from table 6 the study identified poor training and re-training of maintenance staff, the right technical staff with the necessary tools must be used for the appropriate jobs. Abdullah (2000) where corruption is rampant, even if you have skilled workmen, maintenance is impossible. Good maintenance work can only be executed by qualified, disciplined and honest technicians, craftsmen and artisans. Training can be on the job. in the training institutions or in the manufacture industry.

Finding from table 7 of this study confirms the management techniques that will sustain effective maintenance of electrical infrastructures according to Abdullah (2000) the infrastructure must be maintained. To do this requires disciplined and skilled staff, availability of spare parts and tool and adequate allocation of funds. The maintenance system must be preventive so that the structure and infrastructure are not allowed to breakdown or constitute security risks.

CHAPTERV

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary of the study

Electricity is considered the life wire of modern system and operation such as computer, banking. In short modern civilization cannot survive without electricity. The need for electricity power supply has prompted the growth of electrical industries in Nigeria.

The study considers the continuous absent of available and reliable electricity supply in the country which arises from poor maintenance of electrical facilities and lack of management of those facilities.

The purpose of the study therefore emphasis the current state of facility management in Eko Electricity Distribution Company.

Related literature were reviewed in the study under the following sub heading. Historical development of Nigeria electrical Distribution company, facility management/maintenance of electrical facilities, factors affecting effective management of facilities in electrical distribution company, Method of improving facility management in Eko Electricity distribution company.

A survey approach was taken to develop the instrument of the study. The population for this study was the management staff and maintenance personnel in Eko Electricity Distribution Company.

The instrument was analyzed using frequency current count, mean, standard deviation and t test. The four research questions were answered.

The findings of the study are highlighted based on the research question.

Implications of the Study

The finding revealed that there should be adequate fund for effective maintenance works in electrical Distribution companies. This have a serious implication if there is adequate funding, Electrical facility will be in good condition and some materials need for maintenance will be available in the workshop.

The findings revealed that there should be adequate safety devices, this will have a serious implication. If adequate safety devices is properly provided it will promote the health of

the worker and good working environment thereby promoting the worker and reducing risk of accident.

The findings also revealed that there should be constant training and re- training of maintenance staff. This will have a serious implication if the maintenance staff will be well trained. The performance of the industry will increase and all facilities will be in good condition and operate at maximum level. The findings revealed that there should be constant maintenance of facilities in electrical Distribution companies, this will have a serious implication in that if the facilities are well maintained there will enhance their nature life span and last longer and also reduce the cost of purchase new equipment there by saving fund.

Another findings regarding to the information and communication technology for electrical distribution companies have an implication if adequate means of communication technology is been adopted. This line of information will be effective.

The findings revealed that there should be adequate tools and equipment in the workshop. This will have a serious implication if the available tool and equipment are adequate in the workshop. It will also facilitate the maintenance activities when the need arise thereby make the maintenance work reliable and effective.

Conclusions

There is a saying that if a thing is worth doing then it should be done well. The case for maintenance of electrical facilities in electrical distribution companies particularly the Eko Electricity Distribution company in Lagos state has been to improve the condition of electrical facilities to operate at maximum level.

The greatest problem has been the gap between the distribution companies and the consumer traceable to a number of factors. The major one is poor funding, for maintenance works in the industries and lack of power supply. To acquire the relevant tools and equipment and infrastructure needed to facilitate effective generation of electricity. Fund must be provided.

Nigeria is at a critical condition due to the problem of power sector if the meaningful and effective maintenance of electrical facilities will be properly implemented it will result in reducing the cost of power generation, reducing the risk of accident and reducing the wastage of materials and labour.

Recommendations

Based on the findings of the study, it is recommended that

- There should be constant maintenance of equipment in electrical Distribution Companies this will enable the equipment to function properly. There should be available of spare parts in the operation and maintenance department to keep maintenance work effective and improve performance of the facility at maximum. It should be purchase using the impress and revenue.
- Maintenance personnel should be well motivated to improve the standard of maintenance and improve standard of living of workers.
- All defective, tools, equipment, and machine should be reported to supervision to avoid suddenly breakdown thereby affect the generation of electrical power.
- Safety devices, posters warning signals should be properly put in place to increase the safety of their worker and the working environment

Suggestions for Further Study

- Evaluation of Electrical Distribution Companies
- Strategies of effective management of electrical Distribution company in Nigeria.
- Assessment of safety precautions in electrical Distribution Companies.

Appendix 1

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

SCHOOL OF SCIENCE AND SCIENCE EDUCATION

DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION

This is a research work on the role of Assessment of Facility Management in Electrical Industry in Niger State.

Please kindly respond to the items provided as objectively as possible. All information provided will be highly confidential and strictly use for the purpose this research.

Personal Data

Management Staff

PART A

Maintenance Staff

PART B

Please read the questionnaire items carefully and tick () the response that best suit your opinion on each item. The response categories are:

SA Strongly Agree

A Agree

D Disagree

SD Strongly disagree

Research question 1

What is the state of facility management in electrical industry in Nigeria state? S/NO ITEMS

S/N	ITEMS	SA	A	D	SD
1	Qualified Engineers are used during maintenance work				
2	Management used the appropriate instructional time schedule for maintenance				
3	Routine maintenance is usually observed as schedule				

4	maintenance personnel used the appropriate facilities(tools) for maintenance				
5	Maintenance personnel are involved in purchasing spare parts.				
6	Funds are provided for effective maintenance works				
7	Maintenance personnel are guided to respond to faulty machines for necessary action				
8	Proper inventory system is usually kept at all times				
9	Constant training and re-training of maintenance personnel when need arises				
10	Broke down equipment are not left unattained for along period of time				
11	Spare part of the facility are always in stocked				
12	Workshop are fully equipped with Modern equipment				
13	Maintenance manual are available for use				
14	Management provide the equipment when the need arises				
15	Safety equipment are made available in the industry				
16	Maintenance personnel are comfortable with maintenance procedures in the industry				
17	Routine inspection of facilities are carried out in industry				
18	Staff observe standard safety practices measures when carrying out work				
19	Adequate security is provided				

Research question 2

What are the impacts of facilities management in electrical industries?

S/NO	ITEMS	SA	A	D	SD
20	Reducing the cost of generating power				

21	Effective maintenance will result in faster constant power supply				
22	Increase life span of equipment				
23	Encourage economic developments				
24	Reduce the wastages of material and labour				
25	Improved safe working environment				
26	Reducing risk of accident				
27	Reduce cost of buying new equipment				
28	It generates more profit				

Research Question 3

What are the constraints of effective facility management in EKEDC Distribution company

S/NO	ITEMS	SA	A	D	SD
29	Inadequate information and communications				
30	Low education background of maintenance personnel				
31	Inadequate supervision of maintenance programmed				
32	Non availability of spare parts				
33	Workshop are not well equipment				
34	Staff are not well remunerated				
35	Indiscipline and ignorance on the part of users				
36	Shortage of skilled man power				
37	Maintenance works are carried out by technicians				
38	Absence of efficient inventory system				
39	Maintenance personnel are not motivated				
40	Poor training and re training of staff				
41	Lack of fund for effective maintenance				

Research question 4

What are the possible facility management techniques that will sustain effective maintenance of Distribution companies

S/NO	ITEMS	SA	A	D	SD
42	Adequate information and communication technology				
43	Provide adequate funds for the establishment of effective electrical distribution companies programmers				
44	There should be adequate supervision and well-funded maintenance personal				
45	Safety poster should be properly displayed in work places				
46	Fire extinguishers should be routinely serviced				
47	Experience workers should be put in charge of the installing new transformers				
48	Safety devices should be kept in good conditions				
49	Report any defective tools, equipment or drop outage to maintenance department				
50	Warning signals should be promptly attended to by the maintenance department				
51	Provision efficient fire-fighting equipment for the operation and maintenance department				
52	Maintenance personnel should be motivated				
53	Adequate training and retraining of maintenance personnel				
54	Spare part should always be available in sub-station of the distribution company				

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