

**COMPETENCY NEEDS OF ABUJA ELECTRICITY DISTRIBUTION COMPANY  
STAFF ON MANAGEMENT OF ELECTRICAL ENERGY DISTRIBUTION IN MINNA  
METROPOLIS**

**BY**

**YAKUBU NASIRUDEEN SAKAYEKENU**

**2015/3/57486TI**

**DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION, FEDERAL  
UNIVERSITY OF TECHNOLOGY MINNA**

**OCTOBER, 2018**

**COMPETENCY NEEDS OF ABUJA ELECTRICITY DISTRIBUTION COMPANY  
STAFF ON MANAGEMENT OF ELECTRICAL ENERGY DISTRIBUTION IN MINNA  
METROPOLIS**

**BY**

**YAKUBU NASIRUDEEN SAKAYEKENU**

**2015/3/57486TI**

**A RESEARCH PROJECT SUBMITTED TO THE  
DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION  
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION  
FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGER STATE.**

**IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE  
AWARD OF BACHELOR OF TECHNOLOGY DEGREE (B.TECH)  
IN INDUSTRIAL AND TECHNOLOGY EDUCATION**

**OCTOBER, 2018**

**DECLARATION**

I, YAKUBU Nasirudeen Sakayekenu with matriculation No. 2015/3/57486TI 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.

YAKUBU Nasirudeen S.

2015/3/57486TI

.....

Signature & Date

## CERTIFICATION

This research project has been read and approved as meeting the requirement of the Department of Industrial and Technology Education, School of Science and Technology Education, Federal University of Technology Minna, Niger State, for the Award of Bachelor of Technology (B. TECH) Degree in Industrial and Technology Education.

Dr. A.S. Owodunni

Supervisor

\_\_\_\_\_  
Signature and Date

Prof. R.O. Okwori

Head of Department

\_\_\_\_\_  
Signature and Date

\_\_\_\_\_  
External Examiner

\_\_\_\_\_  
Signature and Date

## **DEDICATION**

This research work is dedicated to God Almighty and to my loving parents Mallam Adam Yakubu and Mallama Mariam Yakubu for their untiring effort in watering the seedling that has now grown into a fruit-bearing tree, the size and taste of whose fruit awaits the testimony of time.

## **ACKNOWLEDGEMENT**

My profound gratitude goes to God, the supreme, the all-knowing unto him all praise is due. I acknowledge the leadership of my supervisor, Dr A.S. Owodunni who despite his tight schedule still created time to read, criticize, and gave useful which contribute to the successful completion of the project. You are not just a lecturer but a great teacher worthy of emulation. May God Almighty reward, bless and make you great in all ramifications. Amen.

I hereby wish to express my sincere gratitude to my H.O.D Prof. R.O. Okwori and to all lecturers in the Department of Industrial Technology Education of Federal University of Technology, Minna, for all the knowledge they impacted in me both academically and morally throughout my academic period.

To my family members, my Daddy Mallam Adamu Yakubu Sakayekenu, my mother Mallama Mariam Yakubu, my brothers Kazeem, Muhammed, Abdulkreem, Kabir, my sisters, Hajia Zainab Papa, Shahadat, Jemilat, Jumeedat, Aulat, Zainab, Lateefat. My boss Mr Adamu Saidu and his wife Mrs Sadiat Saidu. Mr Baba Police and Mr Adam Yakub. My wife Mrs Aminat Nasirudeen and my friends, Bila, Nasiru, Usman, Musa, Halid, Ahmed, Baloow, KK Okuta, Sobiku, Agali, Fawasi, Dayo, Sheylon, and my lovely friend Abdulmumini (Olowo). I thank you for all efforts put together to see that my academic endeavours are completed. You people are so great, Thank you once again.

## **ABSTRACT**

The research was designed to determine the competency needs of Abuja Electricity Distribution in managing electrical energy distribution in Minna metropolis, Niger state. The study identified the competency management needs of AEDC staff in the distribution of electricity, identify the management challenges that militate against effective distribution of electricity by AEDC staffs and identify ways of reducing the management challenges that militate against effective distribution of electricity by AEDC staffs, The literature has been reviewed in line with three research questions and three null hypotheses were formulated to guide the study. The researcher designed a questionnaire which was formulated to solicit information from the respondents. The random sampling technique was used in selecting four AEDC offices in Minna metropolis, Niger state and a total of 70 respondents (Technicians and Engineers) were sampled from AEDC offices. The study adopted a survey research. Data obtained were analyzed using mean, standard deviation and t-test statistics. The findings of the study itemized a regular maintenance on distribution network, AEDC offices should be open to respond to emergency, AEDC should collaborate with other electrical company within and outside the country and modern equipment should be introduced for advanced installation. Based on the findings, it was recommended that strategies should be put in place by the company to nominate inspectors to inspect the electrical company to ensure that all obsolete equipment and machine is changed, electrical engineers should be sent to other field to learn how to operate different electrical machines, the company should provide good funds that can acquire new modern machine, qualify engineers should be employed to ensure competency and reliability in the use of electrical equipment and the electricity company should make compulsory safety precaution for some careless electrical engineers who don't regard for danger pose by electricity.

## TABLE OF CONTENTS

<b>Content</b>	<b>No</b>
Cover page	i
Title page	ii
Declaration	iii
Certification	iv
Dedication	v
Acknowledgements	vi
Abstract	vii
Table of contents	x
<b>CHAPTER ONE: INTRODUCTION</b>	
1.1 Background of the study	1
1.2 Statement of the problem	5
1.3 Purpose of the study	5
1.4 Significance of the study	6
1.5 Scope of the Study	7
1.6 Research Question	7
1.7 Hypothesis	



## **CHAPTER TWO: REVIEW OF RELATED LITERATURE**

2.1 History of Electrical Energy in Nigeria	9
2.2 Electrical Energy Management in Nigeria	11
2.3 Competence Need of Electricity Distribution Staff in Nigeria	13
2.4 Challenges Faced in the Training of AEDC staffs for Electricity Management	14
2.5 Strategies in Improving the Competence of AEDC staffs	18
2.6 Review of Related Empirical Studies	21
2.7 Summary of Related Literature	23

## **CHAPTER THREE: RESEARCH METHODOLOGY**

3.1 Research Design	25
3.2 Area of the study	25
3.3 Population	25
3.4 Sample and sampling technique	26
3.5 Instrument for data collection	26
3.6 Validation of the instrument	26
3.7 Reliability of the Instrument	27
3.8 Administration of the instrument	27
3.9 Method of data analysis	27

## **CHAPTER FOUR: RESULTS AND DISCUSSIONS**

4.1 Research Question 1	28
4.2 Research Question 2	30
4.3 Research Question 3	31
4.4 Hypothesis 1	32

4.5 Hypothesis 2	34
4.6 Hypothesis 3	36
4.7 Findings of the Study	38
4.8 Discussion of the Findings	40

## **CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS**

5.1 Summary of the Study	42
5.2 Implications of the Study	43
5.3 Contribution to Knowledge	44
5.4 Conclusion	44
5.5 Recommendations	44
5.6 Suggestions for further studies	45

## **REFERENCES**

## **APPENDICES**

## CHAPTER ONE

### INTRODUCTION

#### 1.0 Background to the Study

Abuja Electricity Distribution Company (AEDC) has a role it played since from the time of creation of the industry, the AEDC contribution in the power sector has a great importance to Nigeria and takes a pivotal role in the economic transformation process. In the industrial world electricity is already widely available at prices that are typically lower in real terms than they were twenty years ago (Joskow 2015). The need for electricity is paramount for the growth of a country, access to electricity as the basic form of energy supply to the masses is vital for the development of a nation's economy, and this have been the major reason why the industries was created to succeed those ones before it. The major source of electricity in Nigeria comes from water called Hydroelectric energy. Hydroelectric energy is produced when water falls from a high place to a low place. A hydroelectric power station contains a turbine driven by falling water from a dam. The turbine drives the generator. This form of energy produces little pollution; in addition, it does not ruin the water. The water still can be used for other purposes. After all this process, the energy will then be sent to the grid station located at Kaduna state, whereby the energy is later distributed to the AEDC. AEDC need to provide the standard required to properly equip its staffs to provide all the management of electric power supply to the consumer units. A particular quantity of electrical energy is being supply to AEDC, thereafter, they need to figure out on how to equally distribute the energy to the necessary consumers available to them.

Energy is the ability to do work. Energy is defined as the ability of matter to perform work due to its motion as a result of its position relative to forces acting on it. Energy plays the most vital role in the economic growth, progress, and development of a Nation. Electric energy distribution is the final stage in the delivery of electric power; it carries electricity from the transmission system to individual consumers. Distribution substations connect to the transmission system and lower the transmission voltage to medium voltage ranging between 2 kV and 35 kV with the use of transformers. According to Fringe (2016) primary distribution lines carry this medium voltage power to distribution transformers located near the customer's premises. Distribution transformers again lower the voltage to the utilization voltage used by lighting, industrial equipment or household appliances. Often several customers are supplied from one transformer through secondary distribution lines. Commercial and residential customers are connected to the secondary distribution lines through service drops line. Customers demanding a much larger amount of power may be connected directly to the primary distribution level or the sub-transmission level (Peter, 2014). In Nigeria, the entire electricity grid consists of hundreds of thousands of miles of high-voltage power lines and thousands of miles of low-voltage power lines with distribution transformers that connect thousands of power plants to hundreds of millions of electricity customers all across the country. The AEDC were able to distribute electrical energy to consumers in Niger state, and this was able to sustain the consumers for a little while. For this power supply to be improved upon, there is need for good management of the facilities and equipment use for work.

Management is simply defined as “planning, directing, controlling and coordinating of individual, group or organizational goal and objectives with the ultimate aim of achieving maximum benefit”. The need to implement management function is seen to be management

practice which can in a long way improve productivity in the distribution of electricity to consumer (Cristian, 2016). Management is an important function in order to improve productivity of power supply within the reach of consumers in the state or beyond. The concept of management is to ensure efforts to achieve the required level of quality for a product which is well planned and organized. From the perspective of electrical company, management in AEDC should mean maintaining the quality of equipment and energy supply at the required standard so as to obtain customers' satisfaction that would bring long term competitiveness and business survival for the companies. Harris and Cyprus, (2015) opined that management include all the means employed by managers in an effort to implement their quality policies. This made it clear to say that competency of staffs in AEDC will improve the standard of power supply more efficiently to the consumers in Niger state.

In this study, functional ability of staffs in AEDC to demonstrate knowledge, skills and attitudes required in electrical power station indicates competency. If on the other hand, one could not satisfactorily demonstrate knowledge, skills and attitudes required in this regard, then the individual has a gap which shows lack of competence. In electrical work, electrical engineer should be skilled in the area of tooling and facilities use (Andrews, 2017). Consumers requesting a substantially bigger measure of energy might be associated specifically to the essential conveyance level by the AEDC, to guarantee they are given the important supply. Albeit standard power supply techniques are ordinarily adequate for dealing with most business or modern applications, electrical unsettling influences can once in a while hurt the execution of delicate gear or hinder fundamental tasks. Obstructions in power supply can be especially unsafe in mechanized frameworks if the staffs in charge of this department of distribution are not skilled enough in management of the energy. Lack of competency in the other hand is the absence of

proper management of electrical staffs like the AEDC staffs in electrical production in Niger state. Smart (2014) said that if this management require isn't implied, there won't be great supply in electrical circulation. Understanding the different sorts of electrical management and their impacts on supply frameworks by AEDC can be useful in creating techniques to appropriately give a competency improvement of their staffs.

After the conclusion of the privatisation process, AEDC are faced with huge operational challenges, which are clearly visible in their operations and service delivery. Some of the challenges include a lack of sufficient energy supply from grid; old, obsolete networks; lack of maintenance of network equipment; poorly trained manpower; poor customer data; low meter penetration; health, safety and environmental issues; and a near absence of investments due to poor revenues, inadequate tariffs and external funding constraints (Rimo, 2016). While these challenges may have severely constrained the operations of AEDC and thus, the non-realisation of the supposed gains of the privatisation of the power sector, it is important to state that these challenges were precisely the reason why the privatisation of the power sector was done in the first place. The broad objective of the privatisation was for the private sector to address these challenges that had plagued successor AEDC while under government ownership. According to Femi (2017) the challenges faced by electrical industries are teething challenges that core investors are faced with, and would eventually overcome with the right investment and reasonable time. The research when conducted will help to improve the electrical industries to properly give her staffs the proper skills that will improve their competency in distribution line to meet customer needs in Niger state.

## **1.1 Statement of the Problem**

Competency is mostly seen as an ability and skills to do something well. AEDC as a matter of fact needed competency skills to carry out the task of meeting the need of their customers. Some of the staffs employed into AEDC need to be well trained and equipped with the best tools for distribution line. Since the past years after electrical energy was given to private company, there have being incompetence display among staffs and the organization in general. Poor funding on the use of equipment and poor salary welfare had affected the supply of electrical energy, most staffs take money from consumers that find it hard to pay their bills when is due. If the competency problem is not well looked into, it will go a long way to restrain and stagnate the current state of electrical energy in Nigeria. This study in very became important because of its ability to deal with the challenges faced in AEDC. This study looks to create a way forward in electrical energy distributions in Niger state.

## **1.2 Purpose of the Study**

The purpose of the study is to determine the competency needs of AEDC in managing electrical energy distribution in Minna metropolis, Niger state. Specifically, the study will: -

1. Identify the competency management needs of AEDC staff in the distribution of electricity in Minna metropolis Niger state.
2. Identify the management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis.
3. Identify ways of reducing the management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis.

### **1.3 Significance of the Study**

It will be of great benefit to the following, AEDC staffs, consumer of electricity, electrical engineers, artisans, craftsmen, technician technologist the government and researchers.

AEDC staffs will benefit from the research when completed; it will give them the need to adequately manage the tools and materials given during distribution work, it will help the field workers to be competent in given a proper training exercise to the AEDC staffs in management process. It will also help the AEDC staffs to overcome any outstanding problem during distribution of electricity to the consumer units.

The consumer of electricity will be a beneficiary of the research when completed; the consumer of electricity will be positively affected if the AEDC staffs are properly trained in the management of electrical transformers, proper reading of meter and proper installation of overhead cables.

Electrical engineers will be a beneficiary of this research when completed; it will help to improve their competency in the management of electricity, this could reduce fire outbreak in construction work. Electrical engineers should also follow safety precaution guide properly when performing distribution work after the research work.

Artisans will also benefit from the research when completed; it will help to improve them on the need to manage their professional duties when given a job to work in distribution line.

Craftsmen will also benefit from the study; it will help them to get themselves in attending seminars that will boost their competency skills in the management of electrical installation.



Technicians will be a beneficiary of the study when completed; it will make them to be technically skilled in the management of equipment given to them to carry out their task in distribution line.

Technologist will also gain from the study when completed; they will get improved in carry out task that required competent skills in the use of equipment and tools so as to properly manage electrical installation work to avoid any future hazard.

This research work will help the government to know the area where competent management of electricity is needed by AEDC staff in distribution line in Minna metropolis Niger State.

#### **1.4 Scope of the Study**

This research is on competency needs of AEDC in management of electrical energy distribution in Minna metropolis. This research will be delimited to the skills required to make AEDC workers competent in performance electrical connection and distribution.

#### **1.5 Research Questions**

The following research questions will be formulated to guide the study:

1. What are the competency management needs of AEDC staff in the distribution of electricity in Minna metropolis Niger state?
2. What are management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis?
3. What are the ways of reducing the management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis?

## 1.6 Hypotheses

The following null hypotheses was formulated and be tested at 0.05 level of significance.

**H<sub>01</sub>:** There is no significance difference between Technicians and Engineers in the competency management needs of AEDC in the distribution of electricity in Minna metropolis.

**H<sub>02</sub>:** There is no significance difference between Technicians and Engineers in the management challenges that militate against effective distribution of electricity by AEDC in Minna metropolis.

**H<sub>03</sub>:** There is no significance difference between Electricians and Engineers in the ways of reducing management challenges that militate against effective distribution of electricity by AEDC in Minna metropolis.

## **CHAPTER TWO**

### **REVIEWED OF RELATED LITERATURE**

Review of related literature is done under the following sub-headings:

- History of Electrical Energy in Nigeria.
- Electrical Energy Management in Nigeria.
- Competence Need of Electricity Distribution Staff in Nigeria.
- Challenges Faced in the Training of AEDC staffs for Electricity Management.
- Strategies for Improving the Competence of AEDC staffs for Electricity Management
- Review of Related Empirical Studies
- Summary of Related Literature.

#### **2.1 History of Electrical Energy in Nigeria**

The Federal Government of Nigeria (FGN) has been responsible for the formulation of energy policy development and regulation, including operation and investing the Nigerian energy sector before 2005, after which the FGN established the Electricity Power Sector Reform Act (Federal Government of Nigeria, 2005). The Federal Ministry of Power (FMP) conducted regulation of the power sector, while the National Electric Power Authority (NEPA) handled operation in the sector. Part of the responsibility of NEPA was power generation, transmission, and distribution. NEPA, however, ran a monopoly system from its inception in 1972 to its defunct in 2005, with control of power generation capacity of about 94 %, while transmission, system operators, distribution, and their marketing sector was 100 % owned by them (Nigeria Bureau of Public Enterprise, 2015).

Inefficiencies in operations and financial performance in NEPA led the amendment of the Electricity and NEPA Acts by the FGN in 1998 to remove the monopoly held by NEPA and

encouraged the participation of the private sector .A reform agenda was specified in the National Electric Power Policy in 2001, while the legal basis for the unbundling of NEPA and formulation of successor companies (including privatization) was provided in the EPSRA (National Mirror 2014). NEPA was restructured to form the Power Holding Company of Nigeria (PHCN) in 2007 which stopped existing after September 30th 2013.The FGN sorted various means to sell off its stake in the electricity services industry(i.e. privatization), but retained the transmission grid as a public entity (Aladejare, 2014). The generation companies are now called the GENCOs, while the distribution companies are called the DISCOs, and the FGN operates the Transmission Company of Nigeria(TCN) (KPMG, 2013). The generators and transmission lines are interconnected in the national grid system which is controlled at the National Control Center, Oshogbo.

The FGN took the next step in setting up the Nigerian Electricity Regulatory Commission (NERC) and the Nigerian Bulk Electricity Trading Plc (NBET).The Operators of the Nigerian Electricity Market(ONEM) was established with the responsibility of the wholesale market and settlement operator. After the establishment of the agencies, the FGN then placed the new NIPP power plants for sale. Although most of the GENCOs companies were bound to suffer a loss, the FGN allocated N50 billion to them so as to reduce the impact of the loss (KPMG,2013). The NBET buys electric energy generated from the GENCOs and sells it to the DISCOs for sale to the final electricity consumers.The steps discussed above were taken to unbundle the PHCN and this is classified as the pre-transition electricity market (pre-TEM) development.However, until the TEM becomes fully functional, some rules govern the electricity marketing which the GENCOs charge the ONEM (Detail Commercial Solicitors,2014). The aim was to develop a framework which can oversee the arrangement of electricity trading during the pre-TEM period

and is still in effect. The TEM will be functional when the electricity market becomes fully privatized and private sector oriented.

## **2.2 Electrical Energy Management in Nigeria**

Generally, organizations exist to attain a specific goal or goals with some available resources at its disposal. The efficient and effective utilization of its resources to produce goods and services goes a long way to demonstrate the management's ability to accomplish organizational goals (Johnson, 2014). However, the inability of an organization to judiciously manage its resources effectively means it has failed as an entity and cannot meet the challenge of providing goods and services to its consumers. In recent years, electricity supply has become very significant owing to the seeming indispensable role played by electricity in every facet of our daily lives. Absence of electricity for long periods causes discomfort and hampers productivity. It is also a known fact that electricity consumption has become a parameter by which the standard of living as well as the level of industrialization of nations is measured (Putin, 2015). The federal government of Nigeria in 1998 mandated the Power Holding Company of Nigeria (PHCN) to generate transmit and distribution power to Nigerians. The question now, is has the organization been effective in carrying out its mandate of generating power for the consumers? If not, what are the problems militating against its inability to successfully carry out this mandate and how can these problems be addressed? This is the task this study hopes to investigate. To achieve this objective, the paper has therefore been sectionalized into five parts which include the introduction which has already been discussed.

The first electric power plant built in Nigeria was located in Lagos. It was built in 1898 and was managed by Public Works Department (PWD). NEPA, otherwise known as Power Holding Company of Nigeria (PHCN) in its present form came into being in 1972, with a mandate to

develop and maintain an efficient, co — ordinate and reliable power supply in the country. In 1973 only eight (8) of the present 36 States in Nigeria were directly connected to the National Grid system. Today all states but one is fed from the National (Hamza, 2014). PHCN'S system consist of ten (10) power stations (7 Thermal and 3 Hydro), with a total installed capacity of about 6000 Megawatts (6000MW) interconnected by network of 500 kilometers (KM) of 330 Kilovolt (330KV) and 6000 KM of 132KV 174 transmission lines. Transmission of bulk power to major load centers is by means of 24 numbers 330KV and 92 numbers 132KV substations from which the voltage is further transformed to 33KV, 11 KV, 6.6KV 3.3KV for distribution at 240 volts and 415 volts. (Hamza, 2015).In March 2000, the president of the federal Republic of Nigeria took charge of affairs of PHCN and set up a nine (9) Man Technical Board with full Executive powers. The mandate of the Board is to ensure uninterrupted power supply by December 31, 2001. The board reports directly to the President and also has additional mandate to generate 4000MW by December 31, 2001. Part of the Board's mandate is to restructure PHCN to meet present day realities and to encourage private sector participation in the industry. In line with this mandate, the Board has proposed the breakup of the utility into its functional partsof Generation, Transmission and Distribution and the eventual introduction of separate single buyer to perform centralized bulk power trading. By this process, all elements will be subject to competition, while maintaining the same ownership. The operation of each of these elements will be put into the hands of separate management structures. These desegregated entities while being managed independently may not be legally separated companies. This structural model is transitory and loosely patterned after expected privatization model (Linfa, 2013).

### **2.3 Competence Need of Electricity Distribution Staff in Nigeria**

The Abuja electricity distribution company staffs traditionally focuses on systems and devices for the conversion, delivery, and use of electrical energy within most part of the country. Often, electric staffs are considered a concentration within the electrical engineering profession; this is when they are engage with maximum training in electrical field (Luke, 2014). Specific training areas include electro mechanics, which includes magnetic and electric energy conversion methods and devices; large-scale power systems, which includes the analysis, operations, economics and control of electrical energy networks; and power electronic techniques for energy control, which includes design and operating methods for power semiconductor circuits and systems. The electrical energy programs also include economics, business, and communications topics so staffs are knowledgeable about the business side of the power industry, as well as the technical side, for staffs to get insight knowledge about the distribution and qualitative means for appreciation among costumers.

Meanwhile, the fundamental principles of power engineering have been around for a long time, the application of these training principles, as well as the understanding of the electric system, continues to evolve. Communications and controls is one area that has changed dramatically over time (Okoye, 2016). The growth in electrical industries, along with the ability to monitor grid conditions in near real-time for better distribution, will help to better understand the intricate operation of the grid, and resulted in are-examination of the fundamental principles upon which the training of AEDC is built. In addition, new discoveries enable technology enhancements that significantly improve the capability, performance, and reliability of the entire electricity system, which is integral to the economic and national security of the Nigeria. In 2004, there were 5,280 electrical engineers working in the electric power generation, transmission and distribution

industry in Nigeria (Ikeme and Ebohon, 2015). Although there are power engineers working outside the electric utility industry, it is impossible to identify these individuals within the general electrical engineering category. Thus, all subsequent analysis on electrical staffs will only consider the industrial categories. Earnings for engineers vary significantly by specialty, industry, and education. For instance, according to surveys by the IEEE, shows salaries for staffs working in the power and energy markets are behind other fields that employ electrical engineers. Even so, as a group, engineers earn some of the highest average starting salaries among those holding bachelor's degrees, and this is as a result of the fundamental value he is possessing in such position. 2005 survey by the National Association of Colleges and Employers.

#### **2.4 Challenges Faced in the Training of AEDC staffs for Electricity Management**

The available generation capacity is far short of what is required, and less training skill is most available on ground to meet this need. Many of the AEDC power plants are old and some even have dilapidated generating units due to lack of proper maintenance, which as a result of not training enough expert that can comb this situation. For instance, in Kanji Hydro Power Plant, the information is that, two to three generating units have not been in operational state for a long time, while in Afam thermal power station all the generating units in the old Afam I-IV plants have been 'dead' for a long time and are now more or less scraps (Kufor, 2017). The long period between the mid 1980's and the beginning of this decade during which there was virtually no investment in the construction of new power plants contributed in no small measure to this lack of generation capacity. According to Wonner (2014) major challenge is the problem of inadequate training skills supply to the thermal stations, particularly to those in the western axis of the country. The domestic electrical supply infrastructure is very limited and also quite often



subject to vandalization, when not taken proper care of with the right experts. For a long time, there has been the reluctance for the government to massively invest in the construction of more generating station, this lead to ignorance in training manpower in handling all aspect of the company. It is only in the last 2 or 3 years that serious effort has been made by Government towards having a cost reflective in training electrical experts like AEDC and KEDCO for proper distribution of electricity to the consumers unit. The problem of using the right means to give the staffs' proper training is the challenges that have been causing the problem of much blackout in most part of the country (Wulfing, 2016).Other important challenges that is leading to poor distribution of energy is the poor payment of incentives among AEDC staffs, which has cause instability of the grid that causes tripping of generating units, which in turn results in higher frequency of maintenance due to induced Equivalent Operating Hours (EOH). Then other is constrained generation, as the available capacity cannot be fully utilized due to the in ability of the Grid to absorb the full capacity. In Afams for example, out of the 650MW available capacity, only a maximum of 480MW have ever been evacuated.

The less skill management, the higher are the losses on the line. Currently, there is also the inability to ensure the continued delivery of power in case of problems in a link between two substations. For now, the Grid network largely consists of 'radial or single circuit' connections, with very little or no redundancy and lack of alternative power wheeling route in case of link failure (Okoye, 2016).The issue of Way leaves or Rights- of-Way (ROW) acquisition for the construction of new transmission lines is also a major problem faced by the Nigeria government. Many transmission line projects of AEDC have taken much longer to be completed or still not completed because of the issue of poor management. One of the major challenges in the area of Distribution management is the issue of very high commercial loses. Some studies have put these

losses as high as 30 to 40% for some of the distribution units. Various reasons have been given for this problem; power theft due to bypassing of meters/out-right illegal connection, reluctance of consumers to pay bills based on estimated consumption, sharp practices by some meter readers, and so on. According to Johnson (2014) the problem is that of unplanned and ill-maintained network. In many places, the connection from the distribution poles to consumers follows no rules or logic, with wire meshes all over “the famed spaghetti connections”. The issue of overloaded injection and distribution transformers is another challenge in distribution. This is coupled with exposed and unprotected distribution and feeder pillars that lead to easy theft of earth cables and vandalization of these facilities (Akinbami, 2016). Another major issue and perhaps the most important one for distribution is that of cost reflective consumer tariff. The present average consumer tariff is about N11/KWh i.e. roughly, 6.4 US cents/KWh, at N155 to \$1. This translates to \$64/MWh. This level of tariff is not all cost reflective, bearing in mind that this is what goes to paying (taking into consideration current EPC prices indicate an average cost in generation of around \$70/MWh in sub-Saharan Africa. In the electricity industry, the general standard is that the generation part (inclusive of fuel) of the Electricity value chain is responsible for about 45% of the consumer tariff, with corresponding percentages for transmission and distribution being 25% and 30% respectively. Therefore, working on the basis of 45% and \$70/MWh for Generation, the tariff for Transmission will be about \$39/MWh (corresponding to 25%) and \$47/MWh (corresponding to 30%) for Distribution. This implies that the average cost of generating, transmitting and distributing 1MWh of electrical energy to the consumer is about \$156 or N24,000 (at \$1 = N155).

This translates to a tariff of about N24/KWh for the consumer. While this price is still far less than the cost associated with self-help generations already mentioned above, it remains to be

seen whether or not the consumer(i.e. the Nigerian public) will accept this level of tariff with the current electricity supply situation (Nigeria Bureau of Public Enterprise, 2015). On the other hand, without increase in consumer tariff, there will be reluctance by the private sector to bring in the needed investment in order to repair/upgrade existing infrastructure and build new facilities. One of the problems cutting across the entire value chain of the energy company in Nigeria is how-to get the needed investment towards improving the situation. Huge capital investment is required to revamp existing facilities and to build new ones to bring the capacity of the company like AEDC to meet the country's power needs. Again, according to Road Map Document, "To reach the target of 40,000 MW in 2020 will require investments in power generating capacity alone of at least USD\$ 3.5 billion per annum for the next 10 years (Nigeria Bureau of Public Enterprise, 2015). Correspondingly large investments will also have to be made in the other parts of the supply chain (i.e. the fuel-to-power infrastructure and the power transmission and distribution networks). That is, a total of USD\$10 billion per annum would represent a conservative estimate of the sums that will need to be spent on the whole supply chain over the next 10 years in order to reach the modest target of 40,000 MW by 2020". Inadequate human capital is also an issue of concern for the AEDC Company, more so in the areas of generation and transmission. The problem will even become more acute as new facilities are built and brought into operation, but the need to train this staffs well should be an issue of concern at all level of generation and distribution.

As stated in the Roadmap Document, investments in human capital development in the sector have been inadequate and as there has been no significant investment in focused training in the last 15 years, while many of the people trained earlier have retired and/or nearing retirement (Akinbami, 2016). But, a well-trained and properly motivated workforce an absolute necessity to

achieving the desired goal of providing Nigerians with adequate and reliable electricity supply. Lastly, but also very important is the lack or limited availability of local (in country) manufacturing of equipment, materials and spare parts. Almost everything has to be imported with its attendant delays in repair and consequently long downtime of machines/equipment, aside from the high cost associated with importation. For instance, a major overhaul of gas turbine system involving refurbishing of turbine blades in a local facility will take at least 2 to 4 months off the repair time compared to a situation where such a turbine system has to be shipped abroad for such repairs.

## **2.5 Strategies for Improving the Competence of AEDC Staffs for Electricity**

### **Management**

The Electric Power Industry must also take responsibility for addressing any current or future Skills shortage. It is likely that continuous training with strong industry support will be required to promote the skills of AEDC staffs. A cooperative effort by Industry and Universities on a state or national level could be an efficient way of directing resources to this end, and this should be graduated students trained in electrical field (Okoye, 2016). For the electrical industry survey sample 54% of respondents indicated that they are currently having difficulty recruiting electrical power engineering staff, and a further 27% of the industry respondents were not currently trying to recruit new staff but rather having less equipment to properly train their already available staffs. Thus of the respondents currently recruiting new staff 73% are having difficulties. Indications were that the difficulties are in finding a suitable candidate rather than not receiving sufficient numbers of training skill (Wulfing, 2016). Most AEDC staffs need to be sent to a training workshop for like six months, if possible, they should be sent outside for good training to be able to withstand the challenges in distribution of electricity. Many electrical industries in

Nigeria donor have the full array of skills in needed to be competent in their work, and that, where required; most staffs were not willing to upgrade their academic knowledge.

The workshop also highlighted the situation that if an experienced engineer was required they would most probably have to come from within the industry rather than being able to transfer across from a non-power industry and receive further training. This was largely due to time constraints of suitable engineers to act as mentors. The perception of 73% of respondents to the industry survey was that there would be a shortage of power engineers in the immediate future, with 93% concerned that there would be a shortage within the next 2-6 years. The main reasons cited included a reduction in the number of electrical engineering graduates from universities, retirements, and the promotion of engineering staff into non-engineering managerial roles. To combat such a shortage in the medium to long term the industry respondents indicated that they preferred a group approach between industry, government, professional associations and tertiary institutions. The approach should include a strong emphasis on increasing the number of electrical power engineering graduates from universities and providing postgraduate education for their staff, both with a focus on specialist power engineering skills. Some organizations have been proactive in strategies to recruit new engineers, predominantly by head hunting engineers from other organizations but also, in a few cases, by employing new graduate engineers. It was noted by participants at the workshop that while head hunting satisfied the individual organization requirements, the global shortage of power engineers would remain and perhaps, if not effectively addressed, would eventually lead to problems for the individual organizations even though their immediate requirements were satisfied.

Industry survey respondents suggested that one of the major problems in recruitment of new power engineers was that the profession of power engineering, and indeed engineering as a

whole, is seen as being less attractive than other careers. In respect of power engineering reasons include a perception that it is a mature technology, and that remuneration packages do not provide equivalent compensation to that of other careers in electrical engineering. Only 41% of the industry respondents thought that the existing education of a newly qualified electrical power engineering staff member was adequate. The perception from survey respondents was that the material covered at university only scraped the surface of the knowledge required, little or no practical experience was offered during the undergraduate degree, and that universities were offering fewer power engineering specialization subjects. Some survey respondents commented that graduates seem to be no longer receiving the technical background required for power engineering due, in part, to the introduction of nontechnical course content, including project management and general management courses. For after graduation education 85% of respondents stated that their organizations currently provide support for staff to complete various courses. Short courses were the most predominantly utilized with 78% of the sample survey already providing support for staff to attend, and 90% stating that they would use (or continue to use) short courses if more were available. 51% of organizations provide support for in-house training and a similar figure support part time postgraduate university education, but only 15% stated that they would support full time study. Approximately half the respondents to the industry survey indicated that they would use after graduation distance education if it were available. There is a decline in the number of expert power engineering academics. With a number of these experts approaching retirement or departure from teaching it is essential that their knowledge be captured and passed on to younger power engineering academics.

## **2.6 Review of Related Empirical Studies**

In this section of the study, relevant works carried out by various researchers through survey design to identify training needs of Abuja electricity distribution company staff on management of electrical energy in minna metropolis, The Abuja electricity distribution company staff traditionally focuses on system and devices for the conversion, delivery, and use of electrical energy within most part of the country, Often, electric staff are considered a concentration within the electrical engineering profession; this is when they are engage with maximum training in electrical field (makoju,2007). The main purpose of the study was to identify the training need of Abuja electricity distribution company staff on distribution of electrical energy in minna metropolis. Survey research design was employed for the study. A total sample size of 70, (35 Technician, and 35 Engineers) respondents were randomly selected and used for the study. A structured questionnaire was used for data collection. The mean and t-test were used for data analysis. Findings from the study indicated that the following trianing were needed for improving the performance of distribution of electricity in minna niger state. Thus: the training need include proper use of electrical tools, to be more tactical in installation work, developing work objectives in measurable terms, to understand how to read meter. This work is related to the present study competence need of (AEDC) staff on management of electrical energy distribution in minna metropolis. the present study focused on competence need of Abuja Electricity Distribution Company staff on management of electrical energy distribution in minna metropolis. to participate in the study. A questionnaire was used as an instrument for gathering data for the study. The following findings were made: the study revealed that the AECD staff need training in the following areas; eg, proper use of electrical tools, to be safety precaution, knowing how to reloads and load a transformer substation. This work is related to the

present study as both studies focus on company management aimed at effective distribution, that

A study was carried out by Suleiman (2016) on identification of training needs on Abuja electricity distribution company staff on management of electrical energy distribution in Minna metropolis, Niger State. His purpose for the study was to: identify the training needs of (AEDC) staff in the distribution of electricity in Minna metropolis. Identify the challenges that limit against effective distribution and the ways of reducing challenges that limit against effective distribution. A structured questionnaire was adopted to obtain data from 70 (AEDC) staff: 35 technicians and 35 engineers; it differs in the sense that Suleiman's work was only concerned with training needs of the company staff, while the present study deals with competence need of the company staff in management of electrical energy distribution; since its inception. The population comprised all lecturers, instructors, technologists and technicians in all the civil, electrical/Electronic Engineering departments in the company. There were all together 70 participants, with no sample taken. Mean, and standard deviation were used to answer the research questions, while t-test used to test the hypotheses at 0.05 level of probability; The population of the study consisted 70 (AEDC) staff, Through random sampling technique, all subjects were selected and used for the study. Questionnaire was used for data collection, while frequency distributions, mean, analysis of variance, and t-test were used for data analysis. Results showed that staff need skills, attitude and technical knowledge in order to be able to operate any tools, perceived roles included carrying out preventive maintenance services, maintenance management equipment. This work is related to the present study because both studies focus on company management for effective distribution. However, they differ in the sense that the past study was concerned with training needs, while the present study is concerned



with the competence needs of AEDC staff on management of electrical energy distribution in minna metropolis niger state.

## **2.7 Summary of Related Literature**

The federal government of Nigeria in 1998 mandated the Power Holding Company of Nigeria (PHCN) to generate transmit and distribution power to Nigerians. The question now, is has the organization been effective in carrying out its mandate of generating power for the consumers? If not, what are the problems militating against its inability to successfully carry out this mandate and how can these problems be addressed? This is the task this study hopes to investigate

Specific training areas include electro mechanics, which includes magnetic and electric energy conversion methods and devices; large-scale power systems, which includes the analysis, operations, economics and control of electrical energy networks; and power electronic techniques for energy control, which includes design and operating methods for power semiconductor circuits and systems. The electrical energy programs also include economics, business, and communications topics so staff are knowledgeable about the business side of the power industry, as well as the technical side, for staffs to get insight knowledge about the distribution and qualitative means for appreciation among costumers.

For a long time, there has been the reluctance for the government to massively invest in the construction of more generating station, this lead to ignorance in training manpower in handling all aspect of the company. It is only in the last 2 or 3 years that serious effort has been made by Government towards having a cost reflective in training electrical experts like AEDC and KEDCO for proper distribution of electricity to the consumer's unit. For the electrical industry survey sample 54% of respondents indicated that they are currently having difficulty recruiting

electrical power engineering staff, and a further 27% of the industry respondents were not currently trying to recruit new staff but rather having less equipment to properly train their already available staffs. Thus of the respondents currently recruiting new staff 73% are having difficulties. It was noted by participants at the workshop that while head hunting satisfied the individual organization requirements, the global shortage of power engineers would remain and perhaps, if not effectively addressed, would eventually lead to problems for the individual organizations even though their immediate requirements were satisfied. Many transmission line projects of AEDC have taken much longer to be completed or still not completed because of the issue of poor management. One of the major challenges in the area of Distribution management is the issue of very high commercial losses. Some studies have put these losses as high as 30 to 40% for some of the distribution units.

## **CHAPTER THREE**

### **3.0 RESEARCH METHODOLOGY**

#### **3.1 Research Design**

The research design used in carrying out this study is survey research design where questionnaires was use to sought for opinions of respondents on competency needs of Abuja Electricity Distribution Company on management of electrical energy distribution in Minna metropolis. The survey research design is appropriate method for the research as it seeks the views of people about a particular issue that concerns them, give room for researcher to study the group of people and items to source for information from the respondents

#### **3.2 Area of the Study**

The study was conducted in Minna metropolis; and cover four AEDC offices in Minna. The offices located in Tunga Paiko road, Chanchaga, opposite UK Bello art theatre, Bosso at Dutsen Kura Gwari junction

#### **3.3 Population**

The Population of the study was 193 respondents which are Technician and Engineers in Minna metropolis, Niger state. It consists of 71 staff in opposite UK Bello art theatre, 40 staff in Chanchaga office, 45 staff in Bosso office, Dutsen Kura Gwari junction and 37 staff in Tunga Paiko road office.

#### **1.4 Sample and Sampling Techniques**

Sample random sampling technique was used in selecting 70 staff of the AEDC staff that served as respondents from the four AEDC offices in Minna metropolis Niger state.

#### **3.5 Instrument for Data Collection**

The structured questionnaire was used for the data collection. The questionnaire is structured under two sections (A and B). Section A consist of respondents personal data, while Section B consists of respondents view on items of questionnaire which are numbered from 1 to 30, the items are grouped into I,II and III based on the research questions.

Research question I: - this section contains 10 items which dealt with the management competency needs of AEDC staff in the distribution of electricity in Minna metropolis.

Research question II: - this section contains 10 items which dealt with management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis.

Research question III: - this section contains 10 items which dealt with the ways of reducing the management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis.

#### **3.6 Validation of the Instrument**

The instrument was validated by three Electrical/Electronics lecturers from the Department of Industrial and Technology Education, Federal University of Technology Minna. The suggestions were incorporated in the final draft of the instrument, to ensure that the instrument is capable of eliciting necessary information that is needed for the study and guide the researchers during the study.

### **3.7 Reliability of the Instrument**

Cronbach alpha reliability method was used to determine the internal consistency of the instrument for data collection. 193 instrument were administered to AEDC offices covered technicians and engineers. The responses of the AEDC staff analyzed using Statistical Package for Social Science (SPSS) software and micro excel.

### **3.8 Administration of the Instrument**

The questionnaire was personally administered by the researcher to the respondents (AEDC staffs and resource persons) with the assistance of the officers in charge of the offices, the completed questionnaires was also collected by the researcher immediately after completion.

### **3.9 Method of Data Analysis**

Mean and standard deviation was used to answer the research question, while the t-test was used to test the hypotheses at 0.05 level of significance. The analysis was carried out using statistical package for social sciences (SPSS) software and Micro excel. In order to take decision, a mean score of 2.50 is use. Therefore any item with a mean of 2.50 and above was regarded as needed and any item with a mean of 2.49 and below was regarded as not needed. Also to the test of hypotheses where the calculated t-value of the item was not significantly greater or less than the critical or table value, the null hypotheses was accepted and if otherwise was rejected.

## **CHAPTER FOUR**

### **4.0 RESULTS AND DISCUSSIONS**

This chapter presents the analysis of the data collected as well as the results of the statistical test done through the use of tables for clarity and easy comprehension. The tables are presented in accordance with the research questions and hypotheses that guided the study.

#### **4.1 Research Questions I**

What are the competency management needs of AEDC staff in the distribution of electricity in Minna metropolis Niger state?

**Table 1**

**Mean response of the respondents on the competency management needs of AEDC staff in the distribution of electricity in Minna metropolis Niger state.**

		N <sub>1</sub> =40		N <sub>2</sub> =30	
S/NO	Items	$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_t$	Remarks
1.	Staffs need to acquire the necessary skills in electric distribution	2.56	2.12	2.37	Not Needed
2.	AEDC staffs should be up to the available task	3.20	2.34	2.85	Needed
3.	Staffs need to use the right tools for work	2.67	2.78	2.71	Needed
4.	Staffs are to be available to handle faults at all time	2.55	2.45	2.50	Needed
5.	Staffs are to learn to manage available materials given to them	3.22	2.87	3.06	Needed
6.	Providing all the necessary feedback during installation work	1.87	2.78	2.26	Not Needed
7.	Using the best material for the right work	2.83	1.76	2.38	Not Needed
8.	To have basic knowledge of how transformers work	2.33	2.90	2.57	Needed
9.	Knowing how to reload and load a transformer substation	2.65	1.91	2.33	Not Needed
10.	Knowing how to share loads within a particular district or street	3.11	2.36	2.78	Needed

**Key:** N<sub>1</sub> = Technicians, N<sub>2</sub> = Engineers, X<sub>1</sub> = Mean response of Technicians, X<sub>2</sub> = Mean response of Engineers, X<sub>t</sub> = Mean average. The analysis of mean responses of the two groups of respondents in table 1 revealed that the item 2, 3, 4, 5, 8 and 10 were needed as the competency management needs of AEDC staff in the distribution of electricity in Minna metropolis Niger

state, since their average mean value is above the cutoff point of 2.50 while the items 1, 6,7and 9 were not needed because their average mean values is below the cutoff of 2.50.

## 4.2 Research Questions II

What are the management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis?

**Table 2**

**Mean response of the respondents on the management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis.**

N <sub>1</sub> =40    N <sub>2</sub> =30					
S/NO	Items	$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_t$	Remarks
1.	Poor use of electrical tools	2.87	2.34	2.64	Needed
2.	Lack of the right materials for the job	2.34	2.88	2.57	Needed
3.	Lack of incentives for staffs	2.27	2.76	2.48	Needed
4.	Poor use of safety measures	2.44	2.54	2.48	Not Needed
5.	Delay of materials during distribution work	2.69	2.37	2.55	Needed
6.	Lack of seminars	3.11	2.66	2.91	Needed
7.	Corruption among staffs in AEDC	3.10	2.92	3.02	Needed
8.	Lack of collaboration with other electrical industries abroad	2.76	2.34	2.58	Needed
9.	Incompetent staffs flooding the system	2.33	2.45	2.38	Not Needed
10.	Lack of adequate training	2.77	2.88	2.81	Needed

**Key:** N<sub>1</sub> = Technicians, N<sub>2</sub> = Engineers, X<sub>1</sub> = Mean response of Technicians, X<sub>2</sub> = Mean response of Engineers, X<sub>t</sub> = Mean average. The analysis of mean responses of the two groups of respondents in table 2 revealed that the item 1, 2, 3, 5, 6, 7, 8 and 10 were needed as the



management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis, since their average mean value is above the cutoff point of 2.50 while the items 4 and 9 were not needed because their average mean values is below the cutoff of 2.50.

### 4.3 Research Questions III

What are the ways of reducing the management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis?

**Table 3**

**Mean response of the respondents on the ways of reducing the management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis.**

		N <sub>1</sub> =40    N <sub>2</sub> =30				
S/NO	Items	$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_t$	Remarks	
1.	Government should provide the resources Needed for distribution work	2.88	2.34	2.64	Needed	
2.	AEDC staffs are to be paid when needed	2.65	3.00	2.80	Needed	
3.	Proper training should be given to AEDC staffs	2.33	2.51	2.40	Not Needed	
4.	Staffs should be sent for seminars	2.17	2.77	2.42	Not Needed	
5.	Incompetent staffs should be properly checked before employing them	1.77	2.98	2.29	Not Needed	
6.	Carrying out regular maintenance on distribution network	2.71	2.43	2.59	Needed	
7.	More offices should be open to respond to emergency	2.55	1.87	2.25	Not Needed	
8.	AEDC should collaborate with other electrical Industries within and outside the country	2.29	2.87	2.53	Needed	
9.	New tools should be introduced for advanced installation	3.21	1.69	2.55	Not Needed	
10.	Checking of distribution lines to ensure					

---

**Key:** N1 = Tehnicians, N2 = Engineers,  $X_1$  = Mean response of Technicians,  $X_2$  = Mean response of Engineers,  $X_t$  = Mean average. The analysis of mean responses of the two groups of respondents in table 3 revealed that the item 1, 2, 6, 8 and 10 were needed as the ways of reducing the management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis, since their average mean value is above the cutoff point of 2.50 while the items 3, 4, 5, 7 and 9 were not needed because their average mean values is below the cutoff of 2.50.

**Testing Hypotheses:** Three hypotheses were tested as part of the study at 0.05 level of significance.

#### 4.4 Hypotheses I

$H_{01}$ : There is no significance difference between Technicians and Engineers in the competency management needs of AEDC in the distribution of electricity in Minna metropolis.

The result of the test of significance difference in mean responses of respondents on competency management needs of AEDC in the distribution of electricity in Minna metropolis is presented in Table 4.

**Table 4: T- test Analysis of the competency management needs of AEDC in the distribution of electricity in Minna metropolis.**

N<sub>1</sub>=40 N<sub>2</sub>=30

S/NO	Items			t-cal	Remarks		
		$\bar{X}_1$	$\bar{X}_2$				
		SD <sub>1</sub>	SD <sub>2</sub>				
1.	Staffs need acquire the necessary skills in distribution	2.56	0.67	2.12	0.81	0.83	NS
2.	AEDC staffs should be up to the available task	3.20	0.65	2.34	0.59	0.55	NS
3.	Staffs need to use the right tools for work	2.67	0.79	2.78	0.86	0.48	NS
4.	Staffs are to be available to handle faults at all-time	2.55	0.72	2.45	0.77	0.88	NS
5.	Staffs are to learn to manage available materials given	3.22	0.58	2.87	0.63	0.12	NS
6.	Providing all the necessary feedback during installation	1.87	0.59	2.78	0.75	0.17	NS
7.	Using the best material for the right work	2.83	0.58	1.76	0.65	0.24	NS
8.	To have basic knowledge of how transformers work	2.33	0.81	2.90	0.59	0.98	NS
9.	Knowing to reload and load a transformer substation	2.65	0.50	1.91	0.76	0.34	NS
10.	Knowing how to share loads within a particular district	3.11	0.59	2.36	0.75	0.30	NS

**Key:** SD<sub>1</sub> = Standard deviation for Technicians SD<sub>2</sub> = Standard deviation for Engineers Df = 68, t=t-test value of the Technicians= 1.69 t=t-test value of the Engineers=1.68 S = Significant, NS = Not Significant.

Data presented in Table 4 revealed that each item had their calculated t-values ranged from 0.12 to 0.98 which were less than t-table value of 1.66 at 0.05 level of significance and at 68 degree of freedom (df).

This implies that there is no statistical significance difference between the mean responses of Technicians and Engineers on the above items while null hypothesis rejected for item that has significance difference in the mean responses of Technicians and Engineers in the competency management needs of AEDC in the distribution of electricity in Minna metropolis.

#### **4.5 Hypotheses II**

Ho<sub>2</sub>: There is no significance difference between Technicians and Engineers in the management challenges that militate against effective distribution of electricity by AEDC in Minna metropolis.

The result of the test of significance difference in mean responses of respondents on management challenges that militate against effective distribution of electricity by AEDC in Minna metropolis is presented in Table 5.

**Table 5: T- test Analysis of the management challenges that militate against effective distribution of electricity by AEDC in Minna metropolis.**

N<sub>1</sub>=40    N<sub>2</sub>=30

S/NO	Items	$\bar{X}_1$	$\bar{X}_2$		t-cal	Remarks	
		SD <sub>1</sub>	SD <sub>2</sub>				
1.	Poor use of electrical tools.	2.87	0.72	2.34	0.65	0.93	NS
2.	Lack of the right materials for the job.	2.34	0.78	2.88	0.59	0.60	NS
3.	Lack of incentives for staffs	2.27	0.58	2.76	0.70	0.10	NS
4.	Poor use of safety measures.	2.44	0.47	2.54	0.75	0.08	NS
5.	Delay of materials during distribution work.	2.69	0.66	2.37	0.50	0.91	NS
6.	Lack of seminars.	3.11	0.95	2.66	0.50	0.14	NS
7.	Corruption among staffs in AEDC	3.10	0.75	2.92	0.51	0.06	NS
8.	Lack of collaboration with other electrical industries	2.76	0.66	2.34	0.72	0.84	NS
9.	Incompetent staffs flooding the system	2.33	0.67	2.45	0.66	0.36	NS
10.	Lack of adequate training	2.77	0.65	2.88	0.51	0.45	NS

**Key:** SD<sub>1</sub> = Standard deviation for Technicians SD<sub>2</sub> = Standard deviation for Engineers Df = 68, t=t-test value of the Technicians= 1.69 t=t-test value of the Engineers=1.68 S = Significant, NS = Not Significant..

Data presented in Table 5 revealed that each item had their calculated t-values ranged from 0.08 to 0.93 which were less than t-table value of 1.66 at 0.05 level of significance and at 68 degree of freedom (df).

This implies that there is no statistical significance difference between the mean responses of Technicians and Engineers on the above items while null hypothesis rejected for item that has significance difference in the mean responses of Technicians and Engineers in the management challenges that militate against effective distribution of electricity by AEDC in Minna metropolis.

#### **4.6 Hypotheses III**

Ho<sub>3</sub>: There is no significance difference between Technicians and Engineers in the ways of reducing management challenges that militate against effective distribution of electricity by AEDC in Minna metropolis.

The result of the test of significance difference in mean responses of respondents on ways of reducing management challenges that militate against effective distribution of electricity by AEDC in Minna metropolis is presented in Table 6.

**Table 6: T- test Analysis of the ways of reducing management challenges that militate against effective distribution of electricity by AEDC in Minna metropolis.**

N<sub>1</sub>=40 N<sub>2</sub>=30

S/NO	Items	$\bar{X}_1$	SD <sub>1</sub>	$\bar{X}_2$	SD <sub>2</sub>	t-cal	Remarks
1.	Government should provide the resources needed for distribution work	2.88	0.67	2.34	0.33	0.87	NS
2.	AEDC staffs are to be paid when needed	2.65	0.76	3.00	0.47	0.69	NS
3.	Proper training should be given to AEDC staffs	2.33	0.53	2.51	0.44	0.88	NS
4.	Staffs should be sent for seminars	2.17	0.34	2.77	0.29	1.07	NS
5.	Incompetent staffs should be properly checked before employing them	1.77	0.77	2.98	0.32	0.91	NS
6.	Carrying out regular maintenance on distribution network	2.71	0.19	2.43	0.61	0.74	NS
7.	More offices should be open to respond to emergency	2.55	0.50	1.87	0.31	0.81	NS
8.	AEDC should collaborate other electrical industries within and outside the country	2.29	0.49	2.87	0.22	0.65	NS
9.	New tools should be introduced for installation	3.21	0.58	1.69	0.45	1.26	NS
10.	Checking of distribution lines to ensure no wire twist, wire cut etc	2.33	0.37	2.67	0.65	0.99	NS

**Key:** SD<sub>1</sub> = Standard deviation for Technicians SD<sub>2</sub> = Standard deviation for Engineers Df = 68, t=t-test value of the Technicians= 1.69 t=t-test value of the Engineers=1.68 S = Significant, NS = Not Significant.

Data presented in Table 4 revealed that each item had their calculated t-values ranged from 0.07 to 0.99 which were less than t-table value of 1.66 at 0.05 level of significance and at 68 degree of freedom (df).

This implies that there is no statistical significance difference between the mean responses of Technicians and Engineers on the above items while null hypothesis would be rejected for item that has significance difference in the mean responses of Technicians and Engineers in the ways of reducing management challenges that militate against effective distribution of electricity by AEDC in Minna metropolis.

#### **4.7 Findings of the Study**

The following findings emerged from the study based on the research questions formulated and hypotheses tested:

##### **The finding related to the competency management needs of AEDC staff in the distribution of electricity in Minna metropolis Niger state:**

1. Staffs need to acquire the necessary skills in electric distribution.
2. AEDC staffs should be up to the available task.
3. Staffs need to use the right tools for work.
4. Staffs are to be available to handle faults at all time.
5. Staffs are to learn to manage available materials given to them.
6. Providing all the necessary feedback during installation work.
7. Using the best material for the right work.
8. To have basic knowledge of how transformers work.
9. Knowing how to reload and load a transformer substation.
10. Knowing how to share loads within a particular district or street.

##### **The finding related to the management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis:**

1. Poor use of electrical tools.
2. Lack of the right materials for the job.



3. Lack of incentives for staffs.
4. Poor use of safety measures.
5. Delay of materials during distribution work.
6. Lack of seminars.
7. Corruption among staffs in AEDC.
8. Lack of collaboration with other electrical industries abroad.
9. Incompetent staffs flooding the system.
10. Lack of adequate training.

**The finding related to the management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis:**

1. Government should provide the resources needed for distribution work.
2. AEDC staffs are to be paid when needed.
3. Proper training should be given to AEDC staffs.
4. Staffs should be sent for seminars.
5. Incompetent staffs should be properly checked before employing them.
6. Carrying out regular maintenance on distribution network.
7. More offices should be open to respond to emergency.
8. AEDC should collaborate with other electrical industries within and outside the country.
9. New tools should be introduced for advanced installation.
10. Checking of distribution lines to ensure no wire twist, wire cut etc.

#### **4.8 Discussion of the Findings**

The discussions of finding are based on the research questions posed for the study and the hypothesis.

The study revealed that Abuja Electricity Distribution Company staff should be up to the available task, staff need to use the right tools for work, staff should be punctual at work so as to handle immediate faults at all time, staff are to learn how to manage available materials given to them, they have to acquire basic skills, knowledge on how transformers works and knowing how to distribute loads within a particular district or street. Staff need to use best material for the right work, staff should provide all the necessary feedback during installation work. This is accordance to John (2014) who carried out similar study on vast knowledge of transformers in distribution work.

The study revealed that poor use of electrical tools or equipment, lack of right materials for the job, lack of incentives for staff, delay of materials during distribution work, lack of seminars, corruption among staff in AEDC, lack of collaboration with other electrical industries abroad and lack of adequate training. This is in line with Louis (2013) in his book on how to manage available resources.

The study revealed that the Abuja Electricity Distribution Company should provide the needs and resources needed for the distribution works, staffs' salaries and allowances should be paid adequately, carrying out regular maintenance on distribution network, AEDC should collaborate with other electrical industries within and outside the country, and checking of distribution lines to ensure that no wire twist, wire cut etc. New tools or equipment should be introduced for advanced installation; incompetent staff should be properly screened before employing in order

to avoid them flooding the system, the company should provide the adequate resources for distribution work, more offices should be open to respond to emergency, Providing the necessary equipment both (financially and material) to achieve effective management in the company and making the righ connection that will last longer. This is also among the researches of Woods (2016) on the maintenance of available equipment during installation work.

## **CHAPTER FIVE**

### **5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Summary of the Study**

The study identifies the competency needs of Abuja Electricity Distribution Company in managing electrical energy distribution in Minna metropolis, Niger state. The chapter one of this study discussed a lot of issues concerning management of electrical distribution among AEDC staff in the background of the study, the statement of the problem was formulated, which as to do with poor training among electrical engineers, lack of advanced techniques in handling new equipment and lack of seminars or training among some AEDC engineers. This study also identifies how the company should be managing, planning, directing, controlling and coordinating individual, group or organizational goals and objectives with the ultimate aims of achieving maximum benefit. The purpose of the study, significance of the study, the research questions and hypotheses were all formulated to guide this study.

The literature review looked at the history of electrical energy in Nigeria, electrical energy management in Nigeria, competence need of electricity distribution staff in Nigeria, challenges faced in the training of AEDC staff for electricity management, strategies for improving the competence of AEDC staff for electricity management. Those are the sub-headings that were discussed, and different views concerning the topic which was harmonized in a comprehensive literature review.

A survey research design was used, whereby a questionnaire was used as source for opinions from respondents on competency needs of AEDC in managing electrical energy distribution. The targeted Population for this study was 193 respondents which are Electrical Technicians and Electrical Engineers in AEDC in Niger state. The instrument was validated by three Electrical /Electronics lecturers from the department of industrial and Technology Education, Federal University of Technology Minna. The data collected was analyzed using mean standard deviation and t-test. A mean response of 2.50 was used as cut-off point. t-test however was employed to test the null hypotheses at 0.05 level of significance.

## **5.2 Implication of the study**

The findings of the study have implications on AEDC staffs, electrical engineers and technicians. The implication of the findings discovered that AEDC staffs can improve well in management of electrical distribution if only they are given the best training skills required from, them to carry out their duty, it further implication in on the need for them to be sent to other distribution company for them to go and learn something new so as to become more skilled in their job.

The implication of the findings on el electrical engineers, if the electrical engineers are taken for training and also placed on their own department, they will surely give out the best they have, more implication revealed that they should be available to handle faults at all time because they are meant to carry out such task.

The implication of the findings is on electrical technicians in Niger state, the implication will make them to seek for funds from the organization to acquire modern equipment, it further implication is on the use of obsolete electrical equipment for management operation, the electrical equipment will disappoint when still in use, so it need to be replaced on time. The

implication on the organization is that, the organization will fund the procurement of new electrical machine that will improve the training and operation of those modern machining for distribution process in electrical industries in Nigeria.

### **5.3 Contribution to Knowledge**

The study has been able to shed light on the competency need of Abuja Electricity Distribution Company Staff on management of electrical energy distribution in minna metropolis. In the company, there is various staff on different occupation and the needed occupational competency in order to perform good and effective operations in their work, and ensure their optimal productivity as well as full life span. The study has also suggested means by which the message can also reach those with little or no knowledge of what to do in order to ensure their safety in the workshop.

### **5.4 Conclusions**

On the analysis of the findings and implication, the need for training and strict creation of department will make competency to be an issue of concern in Abuja Electricity Distribution Company, and also the study area of the use of equipment can be improve when taken care properly. Also the AEDC are to be more committed to their jobs to avoid poor distribution work for the sake of the consumers in the environment. The findings of this study also revealed that staffs are to learn to manage available materials given to them and AEDC staffs are to know how to distribute load within a particular district or street.

### **5.5 Recommendations**

The following recommendations were made for implementation;

1. Strategies should be put in place by the government to nominate inspectors to go and checkmate the electrical industries to ensure all obsolete equipment is changed include electrical machine.
2. Electrical engineers should be sent to other field to learn how to operate different electrical machines.
3. The company should provide adequate funds that can acquire new modern machine.
4. Qualify engineers should be employed to ensure competency and reliability in the use of electrical equipment.
5. The Abuja electricity distribution company should make compulsory safety precaution for some careless electrical engineers who do not regard for danger pose by electricity.

#### **5.5 Suggestions for further Study**

The following were made for further study;

1. Strategies to improve the electrical energy supply in Niger state.
2. Competency of electrical engineers in electrical installation in AEDC.

## References

- Akinbani, S.O. (2016) Towards achieving energy for sustainable development in Nigeria. *Renew Sustain Energy Rev* 34:255–272
- Aladejare, SA (2014) Energy, growth and economic development: a case study of the Nigerian electricity sector. *Am J Bus Econ Manage* 2(2):41
- Andrew, V.B. (2017) Electric energy supply in Nigeria, decentralized energy approach. *Cogen Distrib Gen J* 24(4):34–50
- Cristian, M.N. (2016) Technology options for increasing electricity access in areas with low electricity access rate in Nigeri. *Socio-Econ PlannSci* 51:1–12
- Cyprus, E.B. (2013) Fuel wood consumption and desertification in Nigeria. *Int J Sci Technol* 3(1):1–5
- Detail Commercial Solicitors (2014) The declaration of transitional electricity market (TEM) and stakeholder expectations for the Nigerian electricity supply industry (NESI). [www.detailsolicitors.com/?section=news&cmd=details&newsid=49&printview=1](http://www.detailsolicitors.com/?section=news&cmd=details&newsid=49&printview=1). Accessed 30 Dec 2014.
- Femi, M. (2017) Domestic energy crisis and deforestation challenges in Nigeria. *Journal of Environmental Earth Science*, 4(2), 94–100
- Fringe, A.Z. (2016) Gas to power: the impact of natural gas pricing on electricity tariffs and Supplier benefits in Nigeria. M.Sc. thesis. University of Oklahoma
- Hamza, P.U. (2015) Towards sustainable universal electricity access in Nigeria. CPEEL. [www.cpeel.ui.edu.ng/sites/default/files/monograph-2.pdf](http://www.cpeel.ui.edu.ng/sites/default/files/monograph-2.pdf). Accessed 6 Aug 2015
- Ikeme, K.L. & Ebohon, S.A. (2015) Determinant of rural household poverty nexus fuel consumption among Fisherfolks in Kwara State, Nigeria. *J Sci Res Rep* 7(3):185–194
- Johnson, M.L. (2014) Domestic energy crisis and deforestation challenges in Nigeria. *Journal of Environmental Earth Science*
- Jokow, A.O. (2015) Patterns of energy consumption in Nigeria. *Energy Convers Manag* 30(2):69–73.
- KPMG, (2013) A guide to the Nigerian power sector. [www.kpmg.com/Africa/en/IssuesAndInsights/Articles-Publications/Documents/Guide%20to%20the%20Nigerian%20Power%20Sector.pdf](http://www.kpmg.com/Africa/en/IssuesAndInsights/Articles-Publications/Documents/Guide%20to%20the%20Nigerian%20Power%20Sector.pdf). Accessed 30 Dec 2014.
- Kufor, S.D. (2017) Integrating renewable energy and smart grid technology into the Nigeria electricity grid system. *Smart Grid Renew Energy*.
- Linfu, T.B. (2013) coal development in Nigeria: prospects and challenges. *Int J Eng* 4(1):8269



- National Mirror, (2014) Electricity: still in the dark hour. [www.nationalmirroronline.net/new/electricity-still-in-the-dark-hour](http://www.nationalmirroronline.net/new/electricity-still-in-the-dark-hour). Accessed 29 Dec 2014.
- Nigeria Bureau of Public Enterprise (NBPE) (2015) Overview of the power sector. [www.bpeng.org](http://www.bpeng.org). Accessed 11 Aug 2015.
- Okoye, C.N. (2016) Engineering economy studies of biogas as a renewable energy source at household level in Nigeria. Technology Planning and Development Unit, Faculty of Technology, Obafemi Awolowo University, Ile-Ife, Nigeria
- Peter, R.T. (2015) Revitalization of the Nigerian coal mining industry to expand the power generation needs of Nigeria. *Journal of Res Environmental Science Toxicol*, 2(8):175–178
- Putin, A.I. (2015) Solar energy development in the world of today. *J Eng Energy Res* 2(1)
- Rimo, T.G. (2016) On the wind energy resources of Nigeria. *Int J Energy Res* 18(5):493–508
- Smart, S.B. (2014) Prospects for small hydropower development for rural applications in Nigeria. *Nigerian J Renew Energy* 1(1):74–86
- Wonner, I.G. (2014) Wood fuel consumption in Nigeria and the energy ladder: a review of fuel wood use in Kaduna State. *J Pet Technol Altern Fuels* 4(5):85–89.
- Wulfing, U.D. (2016) Rural solar electrification in Nigeria: renewable energy potentials and distribution for rural development. SOLAR 2012\_0332.

## Appendix A

### Formula

$$\text{Mean } X = \frac{\sum fx}{\sum f}$$

X = mean

$\sum$  = the sum of

x = the score

F = the frequency of each point in the scale

Standard deviation

$$SD = \frac{\sqrt{\sum f(x-X)^2}}{\sum f}$$

X = mean

$\sum$  = the sum of

X = the score

F = the frequency

T - Test formula

$$T - \text{Test} = \frac{X_1 - X_2}{\sqrt{S_1^2 + S_2^2}}$$

X<sub>1</sub> = Mean Score of Technicians

X<sub>2</sub> = mean Score of Engineers

S<sub>1</sub><sup>2</sup> = Variance of Technicians

S<sub>2</sub><sup>2</sup> = Variance of Engineers

N<sub>1</sub> = Number of Technicians

N<sub>2</sub> = Number of Engineers

$$x_i = \frac{\sum fx}{\sum f}$$

$$S_1^2 = \frac{\sum fx(x-x)^2}{\sum f}$$

$$S^2 = \frac{\sum fx(x-x)^2}{\sum f}$$

**FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA**  
**SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION**  
**DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION**

**Questionnaire on**

**COMPETENCY NEEDS OF AEDC STAFF ON MANAGEMENT OF ELECTRICAL  
ENERGY DISTRIBUTION IN MINNA METROPOLIS**

**SECTION A**

**INTRODUCTION:** Please complete this questionnaire as faithfully as possible and sincerely by ticking [  ] in the column that best represents your perception about the above topic.

The questionnaire is for research purpose and your view will be treated confidentially.

**PERSONAL DATA**

**Respondent**

Technicians [  ]

Engineers [  ]

**INTRODUCTION:** A four point rating scale is used to indicate your opinion, tick the word which best describe your agreement as shown below.

**HIGHLY NEEDED** (HN) = 4 Points

**MODERATELY NEEDED** (MN) = 3 Points

**NEEDED** (N) = 2 Points

**NOT NEEDED** (NN) = 1 Points

## SECTION I

What are the competency management needs of AEDC staff in the distribution of electricity in Minna metropolis?

S/NO	ITEMS	SA	A	D	SD
1	Staffs need to acquire the necessary skills in electric distribution.				
2	AEDC staffs should be up to the available task.				
3	Staffs need to use the right tools for work				
4	Staffs are to be available to handle faults at all time.				
5	Staffs are to learn to manage available materials given to them.				
6	Providing all the necessary feedback during installation work.				
7	Using the best material for the right work.				
8	To have basic knowledge of how transformers work				
9	Knowing how to reload and load a transformer substation				
10	Knowing how to share loads within a particular district or street				

## SECTION II

What are the management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis?

<b>S/NO</b>	<b>ITEMS</b>	<b>SA</b>	<b>A</b>	<b>D</b>	<b>SD</b>
11	Poor use of electrical tools.				
12	Lack of the right materials for the job.				
13	Lack of incentives for staffs.				
14	Poor use of safety measures.				
15	Delay of materials during distribution work.				
16	Lack of seminars.				
17	Corruption among staffs in AEDC				
18	Lack of collaboration with other electrical industries abroad.				
19	Incompetent staffs flooding the system.				
20	Lack of adequate training.				

### SECTION III

What are the ways of reducing the management challenges that militate against effective distribution of electricity by AEDC staffs in Minna metropolis?

S/NO	ITEMS	SA	A	D	SD
21	Government should provide the resources needed for distribution work.				
22	AEDC staffs are to be paid when needed.				
23	Proper training should be given to AEDC staffs.				
24	Staffs should be sent for seminars.				
25	Incompetent staffs should be properly checked before employing them.				
26	Carrying out regular maintenance on distribution network.				
27	More offices should be open to respond to emergency.				
28	AEDC should collaborate with other electrical industries within and outside the country.				
29	New tools should be introduced for advanced installation.				
30	Checking of distribution lines to ensure no wire twist, wire cut etc				

