

**ASSESSMENT OF MAINTENANCE PRACTICES ADOPTED BY
ELECTRICAL/ELECTRONIC TECHNICIANS IN NIGERIAN TELEVISION
AUTHORITY MINNA, NIGER STATE.**

BY

AJIBOYE, Precious Olushola

2016/1/64074TI

**DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION,
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGER STATE.**

April, 2023.

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**A RESEARCH PROJECT SUBMITTED TO THE
DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION FEDERAL
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AND TECHNOLOGY EDUCATION**

April, 2023

DECLARATION

I, **AJIBOYE, Precious Olushola**, with matriculation number **2016/1/64074TI**, 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.

.....

.....

Sign and Date

Ajiboye, Precious Olushola

2014/1/64074TI

CERTIFICATION

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

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Signature and Date

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Head of Department

Signature and Date

External Examiner

Signature and Date

DEDICATION

With profound joy and gratitude in my heart, I dedicate this project to God Almighty for His Unshakable and Unbreakable Faithfulness. His Divine and constant guidance in my life has made this project a reality today. Thank God.

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ABSTRACT

This study assess the maintenance practices adopted by electrical/electronic technicians in Nigerian television authority (N.T.A.) Minna, Niger state. Three research questions were developed to guide the study and one null hypotheses were tested at 0.05 level of significance. The study employed a survey research design. The study used a four-point scale questionnaire, which contains a total of 72-items, as instrument. The total population of the study was 0 respondents comprising 5 NTA directors and 45 electrical technicians. The findings of the study reveal the Consistently adhering to position of synthesizer, Earthling appropriately the transmitter equipment, Effect the metal contact part of the equipment. The study recommended among other things, Value engineers should be employed and positioned at all existing television transmission station who will carry out the costs, consistent with specify performance maintainability, consistent with specify performance maintainability, aesthelics, safety and security criteria.

TABLE OF CONTENTS

	Pages
Cover Page	i
Title Page	ii
Certification	iii
Approval Page	iv
Dedication	v
Acknowledgement	vi
Abstracts	vii
Table of Contents	viii
List of Tables	xi
CHAPTER ONE: INTRODUCTION	
Background to the Study	1
Statement of the Problem	4
Purpose of the Study	5
Significance of the Study	5
Scope of the Study	6
Research Questions	6
Hypotheses	6
CHAPTER TWO: LITERATURE REVIEW	
2.1.0 Conceptual Framework	8
2.1.1 The Concept of Maintenance	9

2.1.2	Maintenance practice	12
2.1.3	Total Quality Maintenance (TQM)	13
2.1.4	The Concept of Performance	15
2.1.5	Total Productive Maintenance (TPM)	16
2.2	Review of Related Empirical Studies	17
2.3	Summary of Review of Related Literature	21

CHAPTER THREE: RESEARCH METHODOLOGY

3.1	Research Design	22
3.2	Area of Study	22
3.3	Population of the Study	22
3.4	Sample and Sampling Technique	22
3.5	Instruments for Data Collection	22
3.6	Validation of Instrument	23
3.7	Administration of Instrument	23
3.8	Method of Data Analysis	23
3.9	Decision Rule	24

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1	Research Question 1	25
4.2	Research Question 2	26
4.3	Research Question 3	28

4.4	Hypotheses I	30
4.5	Findings of the Study	30
4.6	Discussion of Findings	31
CHAPTER FIVE: CONCLUSION AND RECOMMEDATIONS		
5.0	Summary of the Study	34
5.1	Implications of the Study	35
5.2	conclusion	35
5.3	Recommendations	35
5.4	Suggestions for Further Research	35
REFERENCES		36
APPENDICES		39
Appendix A: Request for Validation of Research Instrument		39
Appendix B: Research Instrument		40

Tables	LIST OF TABLES	Pages
4.1	Mean responses of the NTA Director and electrical technicians on the preventive maintenance carried out on transmission equipment and machine in the television station.	25
4.2	Mean response of the NTA Director and electrical technicians on the corrective maintenance carried out on transmission equipment and machine in the television station.	27
4.3	Mean responses of the NTA Director and electrical technicians on the strategies that can enhance maintenance of transmission equipment, machine and facilities to satisfy the society.	29
4.4	T-test on predictive maintenance carried out on transmission equipment and machine in the television station.	30

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Maintenance is the activities carried out in the workshop to prevent damage of tools and equipment, wastage of materials and death or injury of the personnel. Maintenance involves all the activities taken in order to prolong the service life of the item (Ohanu *et al.*, 2020). Maintenance can represent a significant portion of the cost in asset intensive organizations, as breakdowns have an impact on the capacity, quality and cost of operation. Maintenance of resources is crucial for preventing wastages and attaining maximum utilization through availability and longevity of the resources. According to Ren *et al.* (2021), the aim of maintenance is to guarantee the safe, reliable and cost-effective production, which includes preventive maintenance, planned outages and repairs. Maintenance is also defined in British Standard (B.S) 3811 1984 as the combination of all technical and associated administrative action intended to retain an item in or restore it to a state in which it can perform its required function. To retain, implies that defects are allowed to occur before they are corrected Osei-Mensah *et al.* (2022) the objectives of all the types of maintenance are to keep system going at an acceptable level. Maintenance in engineering is the function that should be carried out at scheduled time in order to keep the plant or engineering equipment in good operating condition. It is an important aspect of every establishment be it manufacturing or production industry. A breakdown is the result of inadequate maintenance of machine and equipment in all workplaces which will definitely lead to delay in the performance of the establishment or frustration in the production sector (Körner *et al.*, 2019).

For any equipment, machine or appliance to function properly and to last long, it is important that one acquires reasonable knowledge of how it works and, most importantly follow the guidelines provided for its maintenance. The knowledge of the working mechanism of the equipment will give one a sense of appreciation of the importance of every item of maintenance so that one will know the actual time to carry out the maintenance exercise especially in transmission in television station (Zhang *et al.*, 2016).

Transmission involves the radiation of waves into space from the point of generation and their reception at another point, this principle makes use of communication or broadcasting in transmitting messages, speeches or music from one place to another by radio, or television. The radio wave must first be generated before they can be transmitted and received in radio and television set which may be located at several kilometres away from the source of generation (Bamiro, Nurudeen & Akuru 2004). For a transmission station to function at all. It will consist of these principal elements

- A microphone which is used to control the radio waves in accordance with the information to be transmitted.
- A radio signal transmitter that will generate the radio frequency.
- A transmitting aerial to send out the waves into space.

An aerial must be fed with radio frequency (r.f) power to emit radio waves effectively Cheah *et al.* (2019) but speech and music produce audio frequency (a.f) voltage and current. The transmission in broadcast television occurs when the video signal is transmitted by amplitude modulation of a carrier in the ultra-high frequency u.h.f band. Maintenance practice is very essential in maintaining any electrical equipment.

Maintenance practices in an organisation are to schedule work efficiently, control costs and ensure regulatory compliance of the equipment/machines. Maintenance is any work that is done regularly to keep a machine or building or piece of equipment in good condition and working order. It is the continuation or preservation of something unchanged or unimpaired. According to Igwe and Utebor (2021) the types of maintenance practice includes: preventive (planned) maintenance, corrective maintenance, adaptive maintenance, perfective maintenance, predictive maintenance and periodic maintenance practices. But for the purpose of the study, the study will consider preventive maintenance and corrective maintenance practice.

Predictive maintenance is the method of using modern devices to predict, or foresee an impending breakdown in a machine (Su & Huang, 2018). By this prediction, an immediate intervention to arrest the situation should be adopted to prevent the breakdown of the machine, equipment and the facilities. While preventive maintenance is any activity carried out on any equipment or machinery even before the need arises. It forestalls the possibility of a major or total breakdown of the equipment or machinery, such activities involve checking equipment or machinery before time envisaged, servicing and overhaul of the equipment. Adequate lubrication, painting of buildings and cleaning of equipment before it is overdue. The most important part about preventive maintenance is that it must be planned and be consistent (Selcuk, 2017).

Corrective Maintenance is the repair work carried out when equipment has broken down. It is an activity designed to restore a machine, equipment or facility to its initial standard. It involves minor and major repairs necessary through troubleshooting and replacement of bad element or worn-out parts of the machine, equipment or facility (Sahal *et al.*, 2020). The goals of reliability, condition base, predictive and preventive maintenance are all the same which is to keep assets working in

optimal condition for the longest period of time at the lowest overall cost to an organisation. In order to properly maintain equipment and machines there must be adequate assessment.

Assessment is the process of ascertaining the value of work of a performance of certain facility over a period of time (Ogunniyi 1999). Therefore, to sustain the functionality of equipment, machine and other facilities in the television transmission station their operations and performance must be evaluated periodically. Federal Government of Nigeria has enjoyed a boost by the establishment of a number of television transmission station in towns and cities in the country across the state (Dyikuk & Chinda, 2017). To bring the activities of the federal government to the grassroots and to disseminate valuable information and quick-orientation of masses. Nigeria Television Authority (NTA) established a local television transmission station in Minna Niger state of Nigeria. It is transmitting at 10Vhf. Frequency by virtue of its duty in disseminating information to the grass root. It is imperative to assess the maintenance practices adopted by electrical/electronic technicians in Nigerian television authority (N.T.A.) Minna, Niger state.

1.2 Statement of the Problem

Maintenance is an essential of any organization, which is another basis for the successful competitive edge. Inconsistencies in equipment's lead to variability in product characteristics and result in defective parts that fail to meet the established specifications. Effective maintenance is critical for the success of an organisation as poor maintenance leads to more frequent failures, poor utilization of equipment and delayed schedules (Djerdjouri, 2005). Breakdown maintenance postpones repairs and allows damage to accumulate, compounding an organization's problems. The television transmission station is a rare communication facility, which almost disappoint the viewers and the subscribers that patronize the stations. So many educative, culture and religious

programmes scheduled for viewing get failed due to the poor maintenance of the television station, on so many occasions, the transmitting station do go on air and offer series of apology for failure to appear on the air. The consequence of poor maintenance policy is the disruption of this fundamental aim. This failure of facilities and breaking in transmission was due to poor maintenance of facilities. It is against the problem this study seeks to assess the maintenance practices adopted by electrical/electronic technicians in Nigerian television authority (N.T.A.) Minna, Niger state

1.3 Purpose of the Study

The main purpose of this study is to assess the maintenance practices adopted by electrical/electronic technicians in Nigerian television authority (N.T.A.) Minna, Niger state. Specifically, the study seeks to:

1. Find out the preventive maintenance carried out on transmission equipment and machine in the television station.
2. Determine the corrective maintenance carried out on transmission equipment and machine in the television station.
3. Find out the strategies that can enhance maintenance of transmission equipment, machine and facilities to satisfy the society

1.4 Significance of the Study

The findings of this study will be beneficial to electrical technicians, television station director and Ministry of information.

The findings of the study will be of benefit to the electrical technicians as it will be an eye opener for them on the proper ways of maintaining equipment for lasting usage. The findings of the study will enable the help the electrical technicians to improve on the way they maintain equipment through the preventive and corrective maintenance strategies identified from the study.

The television station director will benefit from the findings of the study as it will enable them to inculcate the habit of supervising the electrical technicians and other staffs on the maintenance of equipment that are been used in the station.

The findings of the study will be of benefit to the government as it will enable the set of supervising teams to monitor the equipment in the government owned television station and make policies to guide the usage of equipment in the television stations.

1.5 Scope of the Study

This study will be carried out to assess the maintenance practices adopted by electrical/electronic technicians in Nigerian television authority (N.T.A.) Minna, Niger state. This study will cover only maintenance practices as well as the strategies that can enhance maintenance of transmission equipment, machine and facilities to satisfy the society. Due to the constraints, extent and adequacy of maintenance practices will not be covered.

1.6 Research Questions

- 1** What are the preventive maintenance carried out on transmission equipment and machine in the television station?
- 2** What are the corrective maintenance carried out on transmission equipment and machine in the television station?

3 What are the strategies that can enhance maintenance of transmission equipment, machine and facilities to satisfy the society?

3.6 Hypotheses

The following null hypotheses will be tested in the study:

H₀₁: There is no significant difference in the mean response of NTA Director and electrical technicians on the predictive maintenance carried out on transmission equipment and machine in the television station.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

The review of related literature to this study is organized under the following subheadings:

2.1 Conceptual Framework

2.1.1 The Concept of Maintenance

2. 1.2 Maintenance practice

2. 1.3 Total Quality Maintenance (TQM).

2. 1.4 The Concept of Performance

2. 1.5 Total Productive Maintenance (TPM)

2.2 Related Empirical Studies

2.3 Summary of Review of Related Literature

2.1 Conceptual Framework

2.1.1 The Concept of Maintenance

There are many definitions of maintenance. Yisa (2021) define maintenance as “the combination of all technical and related administrative actions including supervision, with an aim to retain an item in, or restore it to a state in which it can perform a required function”. This definition clearly identifies two distinct activities in maintenance; the technical and the administrative. The technical activities are grouped under maintenance engineering and deal with the actual tasks carried out on equipment while the administrative activities are grouped under maintenance management and basically deal with the management aspects of maintenance. Chiekezie *et al.* (2017), observes that maintenance is a means to maintain and improve the quality of the elements involved in a production process, continuously and cost-effectively through detecting and controlling the deviations in the condition of a production process.

Maintenance can be summarized as the repair and upkeep of existing equipment, buildings and facilities to keep them in a safe, effective and desired condition so that they can meet their intended purpose (Wilson, 2022).

Maintenance strategies are generally categorized as corrective (reactive) and preventive (proactive). The corrective maintenance is an unscheduled maintenance attempting to restore a system after a failure occurs. The preventive maintenance on the other hand is to schedule proactive maintenance routinely by designed inspection, detection, and repair/replacement (Madureira *et al.*, 2017).

Needs for Maintenance

A thorough adherence to a well-defined and developed maintenance strategy will take care of facility breakdown or malfunction thereby allowing facility managers to concentrate on capitalisation (Abiodun *et al.*, 2016). In the absence of this, measurable time will be required to develop and define a maintenance strategy, communicate it, and last focusing on the tactical choice, for how to achieve it. Tactics are the actual activation needed to implement the strategy, which concerns the management of processes, people, and physical asset infrastructure (Nogueira *et al.*, 2020). The management's objectives must be realized in accordance with safety, environmental regulations and also in a cost effective way. The integration of machines, men, methods and means into a well-designed strategy requires indispensable managerial capacity (Malik *et al.*, 2022).

Below are some of the accruable benefits if maintenance culture is embraced in our society:

Keeping assets in utmost working condition in order to minimize downtime and disruption to services

- Keeping facilities in a state of good repair for the owner's health and safety
- Keeping assets from deteriorating in appearance and aesthetics
- Keeping facilities so as to optimally achieve their full potential service life
- Leveraging efficiencies that can be reflected on the owner's statement of financial position
- Satisfying a legislated duty that is owed to owners, occupants and guests on the property
- Preventing unnecessary damage to assets or facilitation that may result in their performance failure

Types of maintenance

Planned maintenance: The maintenance organized and carried out with fore thought, control and the use of records to a predetermined plan.

Unplanned maintenance: The maintenance carried out to no predetermined plan. This is the restoration of sudden defective facility to its functional state.

Preventive maintenance: Preventive maintenance (PM) is the care and servicing by personnel for the purpose of maintaining equipment and facilities in satisfactory operating condition by providing for systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects; that is, maintenance of equipment or systems before fault occurs. These maintenances include tests, measurements, adjustments, and parts replacement, performed specifically to prevent faults from occurring. Comprehensive preventive maintenance programs schedule repairs, adjustments machine rebuilds for all critical equipment while more limited programs only consist of minor adjustments and lubrication. The scheduling guideline for these programs is the common denomination due to the fact that, all preventive maintenance management programs assume that equipment will degrade within a certain period of time (Kim *et al.*, 2017). The strategy is cost effective, energy saving as well as increased component life cycle and reduced equipment or process failure.

Corrective maintenance: Corrective maintenance can be defined as a maintenance task performed to identify, isolate, and rectify a fault so that the failed equipment, machine, or system can be restored to an operational condition within the tolerances or limits established for in service operations (Saboori *et al.*, 2019). Corrective maintenance is the most commonly used maintenance approach, but it is easy to see its limitations. It covers all activities, including replacement or repair

of an element that has failed to a point at which it cannot perform its required function. Corrective maintenance is sometimes referred to as failure-based or unplanned maintenance. Corrective maintenance tasks often take place in an ad hoc manner in response to breakdowns or user requests (Ibe and Oyim, 2019).

Emergency maintenance: The maintenance which is necessary to put in hand immediately failure occurred to avoid serious consequences, Higgs *et al.*, (2018). This is sometimes referred to as day-to-day maintenance, resulting from such incidences as gas leaks and damage.

Schedule maintenance: The preventive maintenance carried out to a predetermined, say, interval of time, number of operations or mileage.

Condition-based maintenance: Condition-based maintenance (CBM), shortly described, is maintenance when need arises. This maintenance is performed after one or more indicators show that equipment is going to fail or that equipment performance is deteriorating. As systems get costlier, instrumentation and information systems tend to become cheaper and more reliable, CBM becomes an important tool for running an organization in an optimal manner. Better operations lead to lower production cost and lower use of resources. And lower use of resources is one of the most important differentiators in a future where environmental issues become more important by the day (Shrivastava & Kumar, 2015).

2. 1.2 Maintenance practice

Practice is difficult to define because it has multitude concept, each with its own slight variation depending on the focus of study. It is a way of life which consist language, arts and thought, spiritually, social activity and interaction. Generally, practice is acknowledged as encompassing inherited ideas, beliefs, values and knowledge that contribute the shared bases of social actions

(Six *et al.*, 2015). Practice is the key that influences behaviour of getting things done the right way without which would hinder the goals from being achieved (Gilbert *et al.*, 2018). Practice is shaped by the interaction between individual and groups shared the value, perception and goal they have learned previous generation continues to generation. The context of practice has been used in organisation when practice is created in the organisation of social relationship among members through way thinking, behaviour and belief. In general, practice is defined as the overall activity of human behaviour, the arts, belief, values, attitudes, practices, and all human works and ideas that influences each member in the organisation. Practice in an organisation is a pattern of shared basic assumptions that the group learned as it solves its problems of external adaptation and internal integration that has worked well enough to be considered valid and therefore, to be taught to new members as a correct way to perceive, think and feel in relation to those problems (Tankard & Paluck, 2016). Hepp *et al.* (2015), maintains that the significance of cultural approach to maintenance activities is that it allows a general view of the social dynamics in a complex and diverse domain.

Maintenance practice focuses on the design and implementation of a technical procedure that supports the prevention or correction of premature failure of engineering systems with least cost and time without compromising the system performance and safety parameters (Alcaraz & Zeadally, 2015). Developing good maintenance practice in industries requires a human resources organisational framework. The strategies would be based on definite corporate focus and objectives while the functionality of the human element depends on factors like qualification, motivation, inter-personal relationships, training and retraining. It has been found that a good production system is usually backed up by an effective maintenance system; therefore, evaluating

maintenance practice is an important ingredient in the effort to enhance productivity in the manufacturing industries (Chiekezie, Nzewi and Odekina, 2017).

2. 1.3 Total Quality Maintenance (TQM).

TQM is an integrative philosophy of management for continuously improving the quality of products and processes. TQM functions on the premise that the quality of products and processes is the responsibility of everyone who is involved with the creation or consumption of the products or services offered by an organization (AK, 2017). TQM model was developed by Al-Najjar (1996), which includes the development from life-cycle cost (LCC) to life-cycle profit (LCP). It is soundly based on the Deming cycle (plan-do-check-act-plan) which is the foundation of TQM.

Al Mannai *et al.* (2017) identified the nine common TQM practices as cross-functional product design, process management, supplier quality management, customer involvement, information and feedback, committed leadership, strategic planning, cross-functional training, and employee involvement. TQM approach seeks to improve quality and performance to meet or exceed customer expectations and achieved by integrating all quality-related functions and processes throughout the company. TQM looks at the overall quality measures used by a company including managing quality design and development, quality control and maintenance, quality improvement, and quality assurance.

Sahoo and Yadav, (2018) pointed out that total quality maintenance management is a business function of which is the considerable operational and tactical importance that favors the continuous operation of the institutions. As problems and opportunities are needed to be anticipated in time in order to make the necessary adjustments which will lead to sound performance reporting that is indispensable.

Another principal strand of TQM is that maintenance should be integrated with production and scheduled with it. This argument is also compelling. It involves a two way traffic. The preventive maintenance, whether age or on-condition, should be scheduled to avoid busy production periods, but on the other hand, production schedules should incorporate time for the maintenance calculated to be essential to sustain quality and minimize total down time. It is recognized in TQM Main that integration of maintenance and production schedules will require an integrated data system based upon the Deming P-D-C-A cycle, and sufficiently discriminatory to choose and optimize a policy for maintenance. It does not prescribe how exactly this should be achieved.

2. 1.4 The Concept of Performance

The concept of performance lends itself to an almost infinite variety of definitions, many of which relate to specific contexts or functional perspectives. Sahoo and Yadav (2018) gave a general definition and well-crafted definition of performance, sharing the concept of two primary components, efficacy and effectiveness. Efficiency refers to performance in terms of inputs and outputs so that the resulting higher volume for a given amount of inputs, means greater efficiency. Effectiveness refers to the performance by the degree to which planned outcomes are achieved (for example: objective to avoid interruptions of supply over a period of time can be regarded as an efficient outcome).

Many previous definitions of performance tended to focus on the size of efficiency, showing financial results as a primary measure of performance. Subsequently, this concept's definitions have evolved, especially with the emergence of the Balanced Score card Cooper *et al.* (2017) which includes not only the financial perspective, but also the internal perspective, customer perspective and innovation and learning perspective. Performance can be expressed through a balanced set of parameters describing the results and processes to achieve these results.

Construction business performance is achieved by balancing and interrelation of at least four forces (Wang *et al.*, 2020):

- Efficiency of production processes;
- Shareholders' meeting requirements;
- Customer satisfaction;
- Capacity of the growth and development - staff skills (training, satisfaction), the degree of innovation, use of opportunities.

Performance is the execution or accomplishment of work, tasks or goals to a certain level of desired satisfaction. In this study, however, organisational performance is defined in terms of the ability of an organisation to satisfy the desired expectations of three main stakeholders comprising of owners, employees and customers (Wang *et al.*, 2020). This is measured in terms of the following parameters:

- Owners' satisfaction with costs reduction and financial returns or profits from organisational operations.
- Employees' satisfaction with the conditions of work, such as wages and remuneration, style of supervision, rapid promotion and the ability of the organisation to guarantee job security.
- Employees' expressed a desire to stay with the organisation, i.e., the ability of the organisation to retain its workforce.

Customers' expressed satisfaction with the quality of the products of the organisation.

2.1.5 Total Productive Maintenance (TPM)

TPM is a maintenance model that ensures the maximum use of the existing equipment and performs the increased production within regular working hour to achieving the cost reduction

without sacrificing the product quality. The goal of TPM program is to markedly increase production while at the same time increasing employee morale and job satisfaction. TPM brings maintenance into focus as a necessary and vitally important part of the business. It is no longer regarded as a non-profit activity (Singh & Ahuja, 2015).

Ahmad *et al.*, (2018) recognize full definition of TPM in five points: it aims at getting the most efficient use of equipment (i.e. overall efficiency); establishes a total (company-wide) PM system encompassing maintenance prevention, preventive maintenance, and improvement related maintenance; requires the participation of equipment designers, equipment operators, and maintenance department workers; involves every employee from top management down; and, promotes and implements PM based on autonomous, small group activities. Hooi and Leong (2017) suggests that TPM maintenance involves all employees in the organisation and accordingly includes everyone from top management to the line employees.

Raji *et al.* (2021) summarize an entire TPM philosophy in succinctly as: “productive maintenance involving total participation in addition to maximizing equipment effectiveness and establishing a thorough system of PM”, where PM is a comprehensive planned maintenance system. According to Nakajima, it relies upon the fact that the deterioration of machines is accelerated by abusive operation and lack of primary care, such as greasing, tightening and cleaning, all of which can be alleviated by the operator. The problems come later, the efforts of the operator can postpone the need for PM, but unnecessary, costly failures will still occur if it is never done.

2.3 Related Empirical Studies

Michaelina (2011) carried out a study on the effectiveness of strategic approaches adopted by university of Nairobi ICT units in maintenance of information communication technology

equipment. Maintenance is an imperative activity in an organization. Breakdown in poor equipment health lead to inconsistencies in output as well as deviance from established work specifications/quality. Poor maintenance leads to more frequent failures, poor utilization of equipment and delayed schedules. Regularly scheduled equipment maintenance not only prevents sudden and unexpected equipment failure, but also reduces the overall life-cycle costs of the equipment thus gives an organization a competitive edge. In learning institutions, where generation of knowledge through research is emphasized, good and consistent performance of ICT equipment is extremely vital. Thud, there is need to become more conscious on the role of ICT maintenance management in improving the quality of their services. This study sought to establish how effective the current strategic management practices adopted by the University of Nairobi on its ICT equipments and the extent to which ICT maintenance practices are applied. The study used descriptive survey research design approach on a target population of the 11 ICT units within the University and officers in charge (OIC) sampled purposively. The study used semi-structured questionnaires. Descriptive analysis technique through the use of frequencies, percentage, mean and standard deviation was applied. Based on the findings, the study concludes that the University recognizes the important role of the Maintenance in providing quality services to its users, by ensuring that their equipments are well maintained and repaired in good time. From the findings it can be concluded that there is a centralized maintenance policy which guide the maintenance personnel at the ICT Central Facility as well as those at the various campuses. However slow response time to failure/corrective action on failed ICT equipment needs to be addressed.

Toyin (2013) carried out a study on the assessment of the maintenance of equipment facilities in television transmission station in Oyo town of Oyo state. Maintenance is a highly skilled craft combining art and science. It requires technical knowledge as well as real understanding of

engineering and critical performance of transmission equipment and machine for adequate performance of the required output. The population for the study was made of up of 52 engineering staff in the television transmission station, due to the small number all the engineering staff was adopted as the sample for the study. Questionnaire was used to elicit responses from the respondents, the arithmetic mean was used as a statistical tool to obtain the results. The findings showed that eleven out of thirty-five preventive maintenance activities were inadequate while twenty-one activities of corrective maintenance were found not suitable, while two out of managerial strategies was found to be disagreed on the maintenance of television transmission station in Oyo town. It was hereby recommended that installers and repairers of Nigerian Television Authority (NTA) should have good eyesight and colour perception to work with the intricate component used in television transmission station for effective performance.

Tambari (2021) conducted a study on Availability, utilization and maintenance of facilities have been recognized as the hub for which teaching and learning in technical colleges revolved. The study assesses the level of availability, utilization and maintenance of facilities for teaching electrical installation and maintenance works (EIMWs) in Technical Colleges in Rivers State. Three research questions were answered while two null hypotheses were formulated and tested for the study at 0.05 level of significance. Descriptive research survey design was adopted for the study. A population of 18 electrical installation and maintenance works teachers was used for the study. Due to small population size, there was no sample ad sampling technique. The instrument used for data collection was a structured questionnaire which was validated and a reliability coefficient of 0.87, 0.83 and 0.80 were obtained for different sections of the instrument using Kuder-Richardson-21 (KR-21) and Pearson Product Moment Correlation (PPMC) coefficient. Descriptive statistics of frequency and percentage was used to answer research question 1 while

mean was used to answer research questions 2 and 3. F-test (One Way Analysis Of Variance) was used to test the hypotheses at 0.05 level of significance. Where F-value was significant, the Scheffe's Post Hoc Multiple Comparison Test was used to determine the significant group. The study found that majority of the facilities was available while few were not available. It was also found that teachers of electrical installation and maintenance works utilized the facilities for teaching while maintenance culture adopted was found to be low. Based on the findings, it was recommended among others that all the technical colleges in Rivers State should be properly equipped with facilities through provision by donor agencies such as government, Parent Teachers Association (PTA), UNDP, UNESCO, UNICEF, philanthropist and so on. These will enhance teaching of electrical installation and maintenance works; Teachers of electrical installation and maintenance works should be knowledgeable on how to use the available facilities in teaching and in some cases; improvisation should be encouraged and adopted.

Igwe (2021) carried out a research to assess the availability and maintenance practice of office technologies in government Parastatals in Ebonyi state. The study adopted descriptive survey design. The population of the study was 86 office managers in government Parastatals in Ebonyi state. The entire population was used for the study; therefore, no sample size was drawn. Three research questions and three hypotheses guided the study. A checklist titled: Availability of modern office equipment (AMOE) and a structured questionnaire "titled Maintenance practices of modern office equipment questionnaire (MPMOE)" was designed and used for data collection. Mean and standard deviation were utilized to answer the research questions and t-test statistics was employed to test the hypotheses at 0.05 level of significance. Results from the data analyzed showed that majority of the modern office technologies were not available in government Parastatals in Ebonyi state, Ebonyi state government Parastatals do not adopt good preventive and

corrective maintenance practice for office technologies which result to equipment failure when carrying out office duties. It was concluded that assessment of maintenance practices of office technologies used by office managers in Government Parastatals in Ebonyi state is very important in order to improve the service delivery. Based on the findings, the study recommended among others that: Ebonyi State government should continually invest in the acquisition of the latest office equipment that would enhance the productivity of its staff in Government Parastatals. Government of Ebonyi State should formulate a policy on preventive and corrective maintenance practice of ICT facilities and office equipment in Government Parastatals to prevent damages and complete breakdown ICT facilities and equipment. Management of Government Parastatals should employ qualified computer laboratory attendant and computer technician in Government Parastatals to carry out basic maintenance and repairs on the office technologies. Maintenance department that is well equipped and funded should be created and domiciled in every government establishment in Ebonyi state.

2.4 Summary of Review of Related Literature

The literature review is discussed under the following subheadings. The Concept of Maintenance, Maintenance practice, Total Quality Maintenance (TQM). The Concept of Performance, Total Productive Maintenance (TPM). It was deduced from the study that Preventive maintenance is carried out according to the recommendations of the manufacturer of the hardware, in terms of frequency and method of maintenance. Corrective maintenance is normally done to identify, isolate and rectify a fault in equipment. Relevant and adequate literatures were reviewed in the study.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Design of the Study

The study adopts the descriptive survey research design used to assess the maintenance practices adopted by electrical/electronic technicians in Nigerian television authority (N.T.A.) Minna, Niger state. The design is suitable for the study because it solicits information from electrical technicians and NTA directors.

3.2 Area of the study

The study will be carried out Nigerian television authority (N.T.A.) Minna, Niger state

3.3 Population for the Study

The population for the study consists of 50 respondents comprising 5 electrical technicians and 45 electrical technicians.

3.4 Sample and Sampling Technique

There will be no sampling since the population was small and manageable.

3.5 Instrument for Data Collection

The researcher designed a structured questionnaire as an instrument that will be used in collecting data for the study. The questionnaire was made up of four sections (A, B, C, and D). Section 'A' contains items on personal information of the respondents. Section 'B' seeks preventive maintenance carried out on transmission equipment and machine in the television station. Section 'C' find out corrective maintenance carried out on transmission equipment and machine in the

television station. While Section 'D' find out strategies that can enhance maintenance of transmission equipment, machine and facilities to satisfy the society. The questionnaire items were based on four points scale types. Items for section 'B', 'C' and 'D' contain four responses category each. The response categories for section 'B', 'C' and 'D' are strongly Agree (SA), Agree (A), and Disagree (D) and strongly disagree (SD). These response categories will be assign numerical values of 4, 3, 2 and 1 respectively. Respondents were require checking (√) against the response category that best satisfies their opinion.

3.6 Validation of instrument

The instrument will be validated by three lecturers in the department of Industrial and Technology Education, Federal University of Technology, Minna and contributions on the appropriateness of the instrument will be considered in the production of the final copy of the research instrument.

3.7 Reliability of instrument

In order to determine the reliability of the research instrument, a pilot test will be conducted using fifteen in other locations. During the test, the questionnaires were distributed by the researcher. The questionnaire was filled by the respondents and then returned to the researcher. The data collected will be analyzed using Crombach Alpha.

3.8 Administration of instrument

The instrument that will be used for the data collection will be administered to the respondents by the researcher and three research assistants in the study area.

3.9 Method of data analysis

Data collected will be analyzed using mean and standard deviation for the research questions while t-test will be used to test the hypothesis at the 0.05 level of significant. A four (4) point rating scale will be to analyze the data as shown below.

Strongly Agree (SA) = 4points (3.5 – 4.0)

Agree (A) = 3points (2.5 - 3.49)

Disagree (D) = 2points (1.5 – 2.49)

Strongly Disagree (SD) = 1point (1.0 – 1.49)

Therefore, the mean value of the 4 point scale is:

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

3.10 Decision Rule

The cutoff point of the mean score of 2.50 will be chosen as the agreed or disagreed point. This will be interpreted relatively according to the rating point scale adopt for this study. Therefore, an item with response below 2.49 and below will be regard or consider as disagreed while an item with response at 2.5 and above was regard or considered as agreed.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

4.1 Research Question 1

- 1 What are the preventive maintenance carried out on transmission equipment and machine in the television station?

Table 4.1: Mean responses of the NTA Director and electrical technicians on the preventive maintenance carried out on transmission equipment and machine in the television station.

N ₁ = 5 N ₂ =45				
S/N	ITEMS	\bar{X}	SD	Remark
1	Clean the body of instrument after use	2.75	.799	Agreed
2	Select correctly the frequency required	3.40	.500	Agreed
3	Adjust the transmitter to fit the station channel	3.35	.886	Agreed
4	Protect the encoder from dust	3.16	.688	Agreed
5	Adhere to the standards of equalizer effectiveness	3.24	.816	Agreed
6	Accurate setting of modulator	3.76	.436	Agreed
7	Consistently adhering to position of synthesizer	2.60	.760	Agreed
8	Earthing appropriately the transmitter equipment	3.68	.557	Agreed
9	Effect the metal contact part of the equipment	3.84	.536	Agreed
10	<u>Audio Mixer</u> Inspection and examination of the cables and selection knob	3.80	.408	Agreed
11	Adjusting of the control knob or switches	2.60	.993	Agreed
12	Maintaining the regular voltage and current supply	3.56	.712	Agreed
13	<u>Vision Mixer</u> Utilizing proper point with appropriate buttons	3.58	.658	Agreed
14	Maintaining the proper connection rate during the transmission process	3.80	.408	Agreed

15	Consistently adhering to the use of protective device	3.56	.660	Agreed
16.	Maintaining the constant Electrical Engineers regulations	3.48	.714	Agreed
17.	Inspection and examination of earthling regulation	3.80	.590	Agreed
18.	Maintaining appropriate brightness or intensity on the equipment	3.56	.712	Agreed
19.	Constant checking of proper connection in line with colour coded-cable to appropriate terminals	3.73	.651	Agreed
20.	DVD Machine Proper contact of the cable terminals	3.72	.458	Agreed
21.	Consistently adhering to the use of cable rubber grommet where they enter metal-case	3.75	.584	Agreed
22.	Cleaning the moving part of the machine	3.76	.436	Agreed
23.	Adjust DVD machine to suite the production	3.60	.655	Agreed
24.	Inspection of the output signal	3.48	.653	Agreed
25.	Insert correctly the USB or memory card required	3.67	.640	Agreed
26.	Picture Monitor Inserting correctly the monochrome required for the exercise	3.68	.476	Agreed
27.	Utilizing proper point with appropriate feed	3.15	.558	Agreed
28.	Cleaning the appropriate part for the required performance	3.68	.476	Agreed
29.	Adjust properly for accurate matching of the feed loads or input	3.13	.610	Agreed
30.	Consequently adhering to transmission code regulation	3.80	.408	Agreed

N=50

\bar{X} = mean of the respondents

N₁ = NTA directors

N₂= Electrical technicians

SD = standard deviation of the respondents

Table 4.1 showed that both the NTA Director and electrical technicians agreed on all items from 1 to 30. This is because none of the mean response was below 2.50 which was the beach mark of agreed on the 4-points response options. This showed that the responses of the NTA Director and electrical technicians on the items were not divergent.

4.2 Research Question 2

What are the corrective maintenance carried out on transmission equipment and machine in the television station?

Table 4.2: mean response of the NTA Director and electrical technicians on the corrective maintenance carried out on transmission equipment and machine in the television station.

		N ₁ = 5 N ₂ =45		
S/N	ITEMS	\bar{X}	SD	Remark
1	Replacement of worn-out or burnt component parts with spare part	3.35	.726	Agreed
2	Correct use of synchronizer component	3.96	.200	Agreed
3	Remedy breaking of scanning component	3.67	.668	Agreed
4	Correct earthing and arcing protection	2.96	.200	Agreed
5	Correct catastrophic fire alarm breakage equipment	2.95	1.224	Agreed
6	Correct wrongly feed of frequency signal generator	3.88	.440	Agreed
7	Correct wrongly position of sidebands carrier Frequencies	3.44	.714	Agreed
8	Correct wrongly fixed encoder attachment	3.64	.995	Agreed
9	Remedy wrongly fixed or position equipment	2.96	1.036	Agreed
10	Correct position of modulator	3.84	.473	Agreed
11	Correct installment of synthesizer	3.64	.704	Agreed
12	<u>Audio Mixer</u>	2.20	.408	Agreed
13	Correct poorly position of audio mixer			
13	Prompt replacement of worn-out knob	3.42	.658	Agreed
14	Correct the burnt socket plugs	3.96	.200	Agreed
15	Correct the sound detector unit	3.71	.629	Agreed
16.	Correct the wrongly regular supply of voltage and current supply	2.96	.200	Agreed

17.	Correct the wrongly generated vestigial sideband transmission	2.98	1.225	Agreed
18.	Replace worn-out microphone	3.88	.440	Agreed
19.	Replace the kink cord or cable strip	3.35	.799	Agreed
20.	<u>Vision mixer camera</u> Replace the broken lens promptly	3.80	.645	Agreed
21.	Correct the scanning of a particular line	3.56	.570	Agreed
22.	Tighten the loose screws on the camera case	3.84	.473	Agreed
23.	Correct the field pulse sent into the camera	3.58	.786	Agreed
24.	Correct the interlaced scanning in the camera	3.80	.500	Agreed
25.	DVD Machine Repair minor faults	3.49	.879	Agreed
26.	Remedy the scan coil	3.36	.860	Agreed
27.	Correct replacement of Harmonic filter	3.40	.735	Agreed
28.	Picture monitor Reduction the light-brightness in the tube	3.56	.712	Agreed
29.	Remedy the electron gun of a cathode ray tube	3.56	.660	Agreed
30.	Correct the interlaced scanning in the camera	3.08	.277	Agreed

N=50

\bar{X} = mean of the respondents

N₁ = NTA directors

N₂ = Electrical technicians

SD = standard deviation of the respondents

Table 4.2 showed that both NTA Director and electrical technicians agreed on all items. This was because none of the mean response was below 2.50 which was the bench mark of agreed on the 4-point response options. This showed that the responses of the NTA Director and electrical technicians on the items were not divergent.

4.3 Research Question 3

What are the strategies that can enhance maintenance of transmission equipment, machine and facilities to satisfy the society?

Table 4.3: mean responses of the NTA Director and electrical technicians on the strategies that can enhance maintenance of transmission equipment, machine and facilities to satisfy the society.

N₁= 5 N₂=45

S/N	ITEMS	\bar{X}	SD	Remark
1	Ability of the manager to assist in solving maintenance problem	3.36	.620	Agreed
2	Good management support by television station authority e.g. finance	3.72	.737	Agreed
3	Clear definition of responsibility by management	3.58	.786	Agreed
4	Engineering staff exhibit engineering expertise	3.84	.473	Agreed
5	Formulation of ambiguous goals by the transmission authority	2.95	.621	Agreed
6	Employment of Electrical/Electronic experts in the television transmission station	4.00	.000	Agreed
7	Create job opportunities for technician to acquire more skills	3.58	.567	Agreed
8	Good reinforcement given to technician for workshop or job hazard allowance	3.76	.597	Agreed
9	Good communication of maintenance requirement between technician and television station authority	3.45	.571	Agreed
10	Promotional opportunities provided to technician by the government	3.72	.678	Agreed
11	Proper planning of maintenance schedule	3.36	.868	Agreed
12	Professional recognition of technician staff by the government	3.88	.332	Agreed

N=50

\bar{X} = mean of the respondents

N₁ = NTA directors

N₂= Electrical technicians

SD = standard deviation of the respondents

Table 4.3 showed that both the NTA Director and electrical technicians agreed on all items from 1 to 12. This was because none of the mean response was below 2.50 which was the bench mark of agreed on the 4-point response options. This showed that the responses of the NTA Director and electrical technicians on the items were not divergent.

4.4 Hypothesis 1

There is no significant difference in the mean response of NTA Director and electrical technicians on the predictive maintenance carried out on transmission equipment and machine in the television station

Table 4.4 T-test on predictive maintenance carried out on transmission equipment and machine in the television station.

N₁ = 5 AND N₂ = 45							
Respondents	N	X	SD	Df	Tcal	P-value	Remark
NTA directors	5	3.12	0.43	48	2.795	0.007	NS
Electrical technicians	45	3.47	0.52				

N=50

\bar{X}_1 = mean of NTA directors

\bar{X}_2 = mean of electrical technicians

N₁ = NTA directors

N₂= Electrical technicians

SD₁ = standard deviation of NTA directors

SD₂ = standard deviation of Electrical technicians

NS=Not Significant

Table 4.4 showed that there was no significant difference in the responses of NTA Director and electrical technicians on all the items as predictive maintenance carried out on transmission equipment and machine in the television station; therefore, the null hypothesis of no significant difference was upheld at 0.05 level of significance.

Findings of the study

The following are the main findings of the study; they are prepared based on the research questions and hypothesis tested.

1. The finding on the preventive maintenance carried out on transmission equipment and machine in the television station showed that all the respondents agree on all the items, among all is Adjusting of the control knob or switches and Maintaining the regular voltage and current supply.
2. The finding on the corrective maintenance carried out on transmission equipment and machine in the television station shows that showed that all the respondents agree on all the items, among all is Correct the wrongly generated vestigial sideband transmission.
3. The findings on strategies that can enhance maintenance of transmission equipment, machine and facilities to satisfy the society shows that showed that all the respondents agree on all the items, among all is Good reinforcement given to technician for workshop or job hazard allowance, Good communication of maintenance requirement between technician and television station authority, Promotional opportunities provided to technician by the government.

4. There was no significant difference in the mean response of NTA Director and electrical technicians on the predictive maintenance carried out on transmission equipment and machine in the television station

Discussion of findings.

The result from table 4.1 shows the preventive maintenance carried out on transmission equipment and machine in the television station. The findings among others revealed the Clean the body of instrument after use, Select correctly the frequency required, Adjust the transmitter to fit the station channel ,Protect the encoder from dust, Adhere to the standards of equalizer effectiveness, Accurate setting of modulator, Consistently adhering to position of synthesizer, Earthling appropriately the transmitter equipment, Effect the metal contact part of the equipment, Maintaining the proper connection rate during the transmission process, Consistently adhering to the use of protective device, Maintaining the constant Electrical Engineers regulations, Inspection and examination of earthling regulation, Maintaining appropriate brightness or intensity on the equipment, Constant checking of proper connection in line with colour coded-cable to appropriate terminals, Consistently adhering to the use of cable rubber grommet where they enter metal-case, Cleaning the moving part of the machine, Adjust DVD machine to suite the production, Inspection of the output signal, Insert correctly the USB or memory card required. The findings of the study is inline with Wang *et al.* (2017) that preventive maintenance enhances the lifespan of equipment and facilities

The result of the hypothesis on the predictive maintenance carried out on transmission equipment and machine in the television station shows that there was no significant difference in the responses of NTA Director and electrical technicians on all the items as challenges faced by women in carrying out the building construction skills in building industries.

Table 4.2 shows the result of the findings on the corrective maintenance carried out on transmission equipment and machine in the television station. The findings of the study among others revealed that Replacement of worn-out or burnt component parts with spare part, Correct use of synchronizer component, Remedy breaking of scanning component, Correct earthing and arcing protection, Correct catastrophic fire alarm breakage equipment, Correct wrongly feed of frequency signal generator, Correct wrongly position of sidebands carrier Frequencies, Correct wrongly fixed encoder attachment, Remedy wrongly fixed or position equipment, Correct position of modulator, Correct installment of synthesizer, Correct the burnt socket plugs, Correct the sound detector unit, Correct the wrongly regular supply of voltage and current supply, Correct the wrongly generated vestigial sideband transmission, Replace worn-out microphone, Replace the kink cord or cable strip. The findings of the study is inline with Yu *et al.* (2019) that corrective maintenance such replace of faulty part of an equipment is important for smooth running of activities and processes.

The result from table 4.3 reveal the findings on strategies that can enhance maintenance of transmission equipment, machine and facilities to satisfy the society. The findings of the study among others reveal the Ability of the manager to assist in solving maintenance problem, Good management support by television station authority e.g. finance, Clear definition of responsibility by management, Engineering staff exhibit engineering expertise, Formulation of ambiguous goals by the transmission authority, Employment of Electrical/Electronic experts in the television transmission station, Create job opportunities for technician to acquire more skills, Good reinforcement given to technician for workshop or job hazard allowance, Good communication of maintenance requirement between technician and television station authority, Promotional

opportunities provided to technician by the government, Proper planning of maintenance schedule,
Professional recognition of technician staff by the government.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the Study

The main focus of this research study was to assess the maintenance practices adopted by electrical/electronic technicians in Nigerian television authority (N.T.A.) Minna, Niger state.

Chapter 1 of the study discussed the background of the study, the statement of problem, purpose, significance, scope and the research questions were all stated and discussed for the conduct of this research.

The review of related literature looked into The The Concept of Maintenance, Maintenance practice, Total Quality Maintenance (TQM), The Concept of Performance, Total Productive Maintenance (TPM). Various views of different authors concerning the topic were harmonized in a comprehensive literature review and empirical studies.

A survey approach was used to developed instrument for the study; the respondents identified as the population of the study were the NTA Director and electrical technicians. The entire respondents were used. A number of 50 questionnaires were administered. The instrument used was analysed using frequency count, and mean scores. The research questions were discussed base on the findings from the responses and results of the instrument used.

Implication of the study and conclusions were also drawn from the findings discussed. Recommendations and suggestions for further study were formulated and stated according to the findings of the study.

5.2 Implication of the Study

The findings of the study had implications for government, NTA and the electrical technicians. From the outcome of the study, it implies that If the identified areas where put in place it will give electrical technicians more access to carry out proper maintenance.

5.3 Conclusion

Based on the findings of the study, the following conclusions were drawn: the technician at the Nigeria television Authority (NTA) transmitting station rarely pay attention to preventive and corrective maintenance of the television station in Minna, Niger state. The federal government of Nigeria should be wary that information is very important and delayed in rightful information through the appropriate channel is dangerous to our society, therefore, all necessary spare part should be adequately provided.

5.4 Recommendations

Based on the findings of the study, the following recommendations were made:

1. Operation and maintenance should be handled with all seriousness.
2. Value engineers should be employed and positioned at all existing television transmission station who will carry out the costs, consistent with specify performance maintainability, consistent with specify performance maintainability, aesthetics, safety and security criteria.

5.5 Suggestion for Further Study

The following are suggested for further studies:

1. Assessment of maintenance practices adopted by electrical/electronic technicians in Nigerian television authority (N.T.A.) in other location.
2. Assessment of human resources management in Nigerian television authority (N.T.A.).

References

- Abiodun, T. S., Olayemi, A. A., & Joseph, O. O. (2016). Lack of maintenance culture in Nigeria: the bane of national development. *Civil and Environmental Research*, 8(8), 23-30.
- Ahmad, N., Hossen, J., & Ali, S. M. (2018). Improvement of overall equipment efficiency of ring frame through total productive maintenance: a textile case. *The international journal of advanced manufacturing technology*, 94, 239-256.
- AK, F. R. (2017). Impact of total quality management on customer satisfaction. *International Journal of Management and Commerce Innovations*, 4(2), 702-709.
- Al Mannai, B., Suliman, S., & Al Alawai, Y. (2017). An Investigation into the Effects of the Application of TQM, TPM and JIT on Performance of Industry in Bahrain. *Int J Ind Eng Res Dev*, 8.
- Alcaraz, C., & Zeadally, S. (2015). Critical infrastructure protection: Requirements and challenges for the 21st century. *International journal of critical infrastructure protection*, 8, 53-66.
- Cheah, W. C., Watson, S. A., & Lennox, B. (2019). Limitations of wireless power transfer technologies for mobile robots. *Wireless Power Transfer*, 6(2), 175-189.
- Chiekezie, O. M., NZEWI, D. H. N., & Odekina, F. (2017). Maintenance Culture And Performance Of Selected Manufacturing Firms In Benue State, Nigeria. *Archives of Business Research*, 5(3).
- Cooper, D. J., Ezzamel, M., & Qu, S. Q. (2017). Popularizing a management accounting idea: The case of the balanced scorecard. *Contemporary Accounting Research*, 34(2), 991-1025.
- Dyikuk, J. J., & Chinda, F. E. (2017). Digital Terrestrial Television: A Critical Assessment of the Adventures and Misadventures of Nigeria's Digital Switch Over. *International Journal of Applied Research and Technology*, 6(12), 40 – 49
- Gilbert, N., Ahrweiler, P., Barbrook-Johnson, P., Narasimhan, K. P., & Wilkinson, H. (2018). Computational modelling of public policy: Reflections on practice. *Journal of Artificial Societies and Social Simulation*, 21(1).
- Hepp, A., Hjarvard, S., & Lundby, K. (2015). Mediatization: theorizing the interplay between media, culture and society. *Media, culture & society*, 37(2), 314-324.
- Higgs, A., McGrath, B. A., Goddard, C., Rangasami, J., Suntharalingam, G., Gale, R., ... & Society, D. A. (2018). Guidelines for the management of tracheal intubation in critically ill adults. *British journal of anaesthesia*, 120(2), 323-352.
- Hooi, L. W., & Leong, T. Y. (2017). Total productive maintenance and manufacturing performance improvement. *Journal of quality in maintenance engineering*, 23(1), 2-21.
- Ibe, L. C., & Oyim, J. E. (2019). Effect of Maintenance Negligence on Landed Properties in the Environment, Nigeria. *Journal of Agricultural*, 6, 01-06.

- Igwe, K. O. M., & Utebor, J. N. M. (2021). Extent Of Availability And Maintenance Practice Of Office Technologies In Government Parastatals In Ebonyi State, Nigeria. *International Journal of Innovative Information Systems & Technology Research*, *9(3)*,149-160.
- Kim, N. H., An, D., & Choi, J. H. (2017). Prognostics and health management of engineering systems. *Springer International Publishing. Switzerland*:
- Körner, U., Müller-Thur, K., Lunau, T., Dragano, N., Angerer, P., & Buchner, A. (2019). Perceived stress in human–machine interaction in modern manufacturing environments—Results of a qualitative interview study. *Stress and Health*, *35(2)*, 187-199.
- Madureira, S., Flores-Colen, I., de Brito, J., & Pereira, C. (2017). Maintenance planning of facades in current buildings. *Construction and building materials*, *147*, 790-802.
- Malik, N., Tripathi, S. N., Kar, A. K., & Gupta, S. (2022). Impact of artificial intelligence on employees working in industry 4.0 led organizations. *International Journal of Manpower*, *43(2)*, 334-354.
- Nogueira, A., Ashton, W., Teixeira, C., Lyon, E., & Pereira, J. (2020). Infrastructuring the circular economy. *Energies*, *13(7)*, 1805.
- Ohanu, I. B., Ogonnia, O. O., & Shodipe, T. O. (2020). Maintenance Practices Required by Electrical Installation and Maintenance Work Personnel for Repairing Industrial Motors in Enugu State. *Vocational and Technical Education Journal*, *2(1)*.
- Osei-Mensah, E., Thabet, S. K. S., Luo, C., Asiedu-Ayeh, E., Bamisile, O., Nyantakyi, I. O., & Adun, H. (2022). A Novel Distributed Media Caching Technique for Seamless Video Streaming in Multi-Access Edge Computing Networks. *Applied Sciences*, *12(9)*, 4205.
- Raji, I. O., Shevtshenko, E., Rossi, T., & Strozzi, F. (2021). Industry 4.0 technologies as enablers of lean and agile supply chain strategies: an exploratory investigation. *The International Journal of Logistics Management*.
- Ren, Z., Verma, A. S., Li, Y., Teuwen, J. J., & Jiang, Z. (2021). Offshore wind turbine operations and maintenance: A state-of-the-art review. *Renewable and Sustainable Energy Reviews*, *144*, 110886.
- Saboori, A., Aversa, A., Marchese, G., Biamino, S., Lombardi, M., & Fino, P. (2019). Application of directed energy deposition-based additive manufacturing in repair. *Applied Sciences*, *9(16)*, 3316.
- Sahal, R., Breslin, J. G., & Ali, M. I. (2020). Big data and stream processing platforms for Industry 4.0 requirements mapping for a predictive maintenance use case. *Journal of manufacturing systems*, *54*, 138-151.
- Sahoo, S., & Yadav, S. (2018). Total quality management in Indian manufacturing SMEs. *Procedia Manufacturing*, *21*, 541-548.
- Selcuk, S. (2017). Predictive maintenance, its implementation and latest trends. *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture*, *231(9)*, 1670-1679.

- Shrivastava, P., & Kumar, R. (2015). Soil salinity: A serious environmental issue and plant growth promoting bacteria as one of the tools for its alleviation. *Saudi journal of biological sciences*, 22(2), 123-131.
- Singh, U., & Ahuja, I. S. (2015). Evaluating the contributions of total productive maintenance on manufacturing performance. *International Journal of Process Management and Benchmarking*, 5(4), 425-455.
- Six, B., Van Zimmeren, E., Popa, F., & Frison, C. (2015). Trust and social capital in the design and evolution of institutions for collective action. *International Journal of the Commons*, 9(1).
- Su, C. J., & Huang, S. F. (2018). Real-time big data analytics for hard disk drive predictive maintenance. *Computers & Electrical Engineering*, 71, 93-101.
- Tankard, M. E., & Paluck, E. L. (2016). Norm perception as a vehicle for social change. *Social Issues and Policy Review*, 10(1), 181-211.
- Wang, J., Koblyakova, A., Tiwari, P., & Croucher, J. S. (2020). Is the Australian housing market in a bubble?. *International Journal of Housing Markets and Analysis*, 13(1), 77-95.
- Wang, J., Zhang, L., Duan, L., & Gao, R. X. (2017). A new paradigm of cloud-based predictive maintenance for intelligent manufacturing. *Journal of Intelligent Manufacturing*, 28, 1125-1137.
- Wilson, P. M. (2022). Succession Planning Strategies at the Bahamas' Ministry of Education: A Case Study. *Open Journal of Business and Management*, 10(6), 3142-3184.
- Yisa, E., Okwori, O. R., & Hassan, M. A. (2021). MACHINES MAINTENANCE MANAGEMENT PRACTICES IN SAWMILL INDUSTRIES IN NIGER STATE, NIGERIA. *AU eJournal of Interdisciplinary Research (ISSN: 2408-1906)*, 6(2), 92-102.
- Yu, T., Zhu, C., Chang, Q., & Wang, J. (2019). Imperfect corrective maintenance scheduling for energy efficient manufacturing systems through online task allocation method. *Journal of Manufacturing Systems*, 53, 282-290.
- Zhang, L., Li, W., Wu, Y., Wang, X., Park, S. I., Kim, H. M., ... & Montalban, J. (2016). Layered-division-multiplexing: Theory and practice. *IEEE Transactions on Broadcasting*, 62(1), 216-232.

APPENDIX A

Letter of Request for Instrument Validation

Department of Industrial and Technology Education,
School of Science and Technology Education,
Federal University of Technology Minna, Niger State.
Date.....

Dear Sir,

REQUEST FOR VALIDATION OF RESEARCH INSTRUMENT

I am an undergraduate student of the Department of Industrial and Technology Education (Electrical/Electronics Technology), School of Science and Technology Education, Federal University of Technology Minna, currently undertaking a research project titled: **Assessment Of Maintenance Practices Adopted By Electrical/Electronic Technicians In Nigerian Television Authority (N.T.A.) Minna, Niger State.**

Kindly read the attached questionnaire and assess its validity, your comments and suggestions that could enhance the validity of the instrument and also improve the quality of the instrument will be highly appreciated. I count on your co-operation while thanking you in anticipation.

Yours Faithfully,

Ajiboye Precious Olushola
2016/1/64074TI
BTech Research Student.

APPENDIX B

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

**A QUESTIONNAIRE ON ASSESSMENT OF MAINTENANCE PRACTICES ADOPTED
BY ELECTRICAL/ELECTRONIC TECHNICIANS IN NIGERIAN TELEVISION
AUTHORITY (N.T.A.) MINNA, NIGER STATE**

INTRODUCTION: Please kindly complete this questionnaire by ticking the column that best present your perception about the topic. The questionnaire is for research purpose and your view will be confidentially and strictly treated in response to the purpose of the research work.

SECTION A

PERSONAL DATA

NTA Directors:

Electrical technician:

Note: A four (4) point scale is used to indicate your opinion, tick the options which best describe your agreement as shown below:

Strongly Agree (SA) = 4points

Agree (A) = 3points

Disagree (D) = 2points

Strongly Disagree (SD) = 1points

SECTION B

What are the preventive maintenance carried out on transmission equipment and machine in the television station?

S/N	Items	Scales			
		SA	A	D	SD
1.	Clean the body of instrument after use				
2.	Select correctly the frequency required				
3.	Adjust the transmitter to fit the station channel				
4.	Protect the encoder from dust				
5.	Adhere to the standards of equalizer effectiveness				
6.	Accurate setting of modulator				
7.	Consistently adhering to position of synthesizer				
8.	Earthing appropriately the transmitter equipment				
9.	Effect the metal contact part of the equipment				
10.	<u>Audio Mixer</u> Inspection and examination of the cables and selection knob				
11.	Adjusting of the control knob or switches				
12.	Maintaining the regular voltage and current supply				
13.	<u>Vision Mixer</u> Utilizing proper point with appropriate buttons				
14.	Maintaining the proper connection rate during the transmission process				

15.	Consistently adhering to the use of protective device				
16.	Maintaining the constant Electrical Engineers regulations				
17.	Inspection and examination of earthing regulation				
18.	Maintaining appropriate brightness or intensity on the equipment				
19.	Constant checking of proper connection in line with colour coded-cable to appropriate terminals				
20.	DVD Machine Proper contact of the cable terminals				
21.	Consistently adhering to the use of cable rubber grommet where they enter metal-case				
22.	Cleaning the moving part of the machine				
23.	Adjust DVD machine to suite the production				
24.	Inspection of the output signal				
25.	Insert correctly the USB or memory card required				
26.	Picture Monitor Inserting correctly the monochrome required for the exercise				
27.	Utilizing proper point with appropriate feed				
28.	Cleaning the appropriate part for the required performance				
29.	Adjust properly for accurate matching of the feed loads or input				
30.	Consequently adhering to transmission code regulation				

SECTION C

What are the corrective maintenance carried out on transmission equipment and machine in the television station?

S/N	Items	Scales
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		SA	A	D	SD
1.	Replacement of worn-out or burnt component parts with spare part				
2.	Correct use of synchronizer component				
3.	Remedy breaking of scanning component				
4.	Correct earthing and arcing protection				
5.	Correct catastrophic fire alarm breakage equipment				
6.	Correct wrongly feed of frequency signal generator				
7.	Correct wrongly position of sidebands carrier Frequencies				
8.	Correct wrongly fixed encoder attachment				
9.	Remedy wrongly fixed or position equipment				
10.	Correct position of modulator				
11.	Correct installment of synthesizer				
12.	<u>Audio Mixer</u> Correct poorly position of audio mixer				
13.	Prompt replacement of worn-out knob				
14.	Correct the burnt socket plugs				
15.	Correct the sound detector unit				
16.	Correct the wrongly regular supply of voltage and current supply				
17.	Correct the wrongly generated vestigial sideband transmission				
18.	Replace worn-out microphone				
19.	Replace the kink cord or cable strip				

20.	<u>Vision mixer camera</u> Replace the broken lens promptly				
21.	Correct the scanning of a particular line				
22.	Tighten the loose screws on the camera case				
23.	Correct the field pulse sent into the camera				
24.	Correct the interlaced scanning in the camera				
25.	DVD Machine Repair minor faults				
26.	Remedy the scan coil				
27.	Correct replacement of Harmonic filter				
28.	Picture monitor Reduction the light-brightness in the tube				
29.	Remedy the electron gun of a cathode ray tube				
30.	Correct the interlaced scanning in the camera				

SECTION D

What are the strategies that can enhance maintenance of transmission equipment, machine and facilities to satisfy the society?

S/N	Skill Items	Scale			
		SA	A	D	SD
1.	Ability of the manager to assist in solving maintenance problem				
2.	Good management support by television station authority e.g. finance				
3.	Clear definition of responsibility by management				
4.	Engineering staff exhibit engineering expertise				
5.	Formulation of ambiguous goals by the transmission authority				

6.	Employment of Electrical/Electronic experts in the television transmission station				
7.	Create job opportunities for technician to acquire more skills				
8.	Good reinforcement given to technician for workshop or job hazard allowance				
9.	Good communication of maintenance requirement between technician and television station authority				
10.	Promotional opportunities provided to technician by the government				
11.	Proper planning of maintenance schedule				
12.	Professional recognition of technician staff by the government				