AN ASSESSMENT OF THE MAINTENANCE OF PUBLIC INSTITUTIONS IN ABUJA; A CASE STUDY OF KUJE CORRECTIONAL FACILITY (KUJE PRISON)

BY

MAMMAN YABAGI JOEL M.TECH/SET/2018/8045

DEPARTMENT OF ESTATE MANAGEMENT AND VALUATION,
SCHOOL OF ENVIRONMENTAL TECHNOLOGY
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

JULY, 2023

ABSTRACT

Public buildings represent significant investment of the tax payers' money and therefore preserving these building systems is important. Due to the neglect of the maintenance component of the housing sector in the country, a lot of public buildings are in a state of disrepair. In view of the above, this study was designed to assess the current condition of public buildings, identify the underlying principal causes of poor maintenance of public buildings, analyse the maintenance policy and practice and capacity of the maintenance and estate departments of public institutions and make suggestions and recommendations towards the adoption of effective maintenance policy and innovations that would address the building maintenance problem in public institutions. The field investigation focused on Kuje correctional facility. Through the application of purposive and random sampling technique in conjunction with structured observation of the researcher. The survey revealed that they are indeed a problem of maintenance of public properties in Abuja. The study also established the following factors as being responsible for the poor maintenance of public buildings: The age of the buildings, Lack of maintenance culture, Inadequate funds and high maintenance cost, Pressure on building facilities by number of users and Poor construction work and maintenance work done by maintenance personnel of the institution. Stakeholders in the housing sector also added to the problem has arisen as a result of lack of preventive maintenance plan, low capacity of maintenance personnel in terms of staffing and training, absence of a national maintenance policy and apathy and lack of patriotism. The study concludes by enumerating a number of

recommendations aimed at providing the necessary framework for proper and effective maintenance of buildings. These are: the need for public institutions to embrace preventive maintenance practice as a high priority rather than adhoc maintenance. Managers are to oversee periodic inspections of buildings' conditions and create an inventory of buildings' components and equipment. Public institutions should ensure that their maintenance department is adequately staffed. There is also the need for a national policy on maintenance to be formulated to protect buildings, institution of a maintenance awards scheme for public institutions and establishing a maintenance or sinking fund to be managed for maintenance of public buildings in the country.

TABLE OF CONTENTS

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

One of Nigeria's cities with the quickest growth is Abuja which is the nation’s administrative capital. Physical infrastructure accounts for a sizable amount of the nation's investment in Abuja. Therefore, it is essential for the buildings, which comprises structures that houses public institutions, are well-maintained so that they are not only provide occupants and contents with a safe, secure, and environmentally controlled living space, but also fulfill the architectural and aesthetically pleasing purposes they were built to meet. The basis for the society's initial evaluation of the quality of the services to be given is the outward look of public buildings and institutions.

According to (Cobbinah 2010) despite the enormous capital outlay in public buildings and institutions, public institutions allowing their buildings to be maintained sustainably with minimal financial investment would help them maintain the quality of the structures. Except for few public institutions in Abuja, inadequately maintenance of the buildings housing these public institutions is preponderant. The windows, doors, and other amenities and parts of the structure frequently display signs of wear and tear, damped walls and exposed electrical wires are visible to the by-passers and users.

Since their construction, certain residential and office buildings owned by governmental institutions—some going back to the early days when Abuja was designated as the Federal Capital Territory of Nigeria—have not received major upkeep. This has led to such structures, some of which are decaying and others of which are abandoned (Ogunbayo *et al.*, 2022). The goal of these structures, which primarily is to guarantee that the country's stock of structures was used as efficiently as possible as a component or factor of production and or housing, is inevitably defeated by the failure to maintain or upkeep by the users of the facilities or the relevant agencies of government (Melvin, 1992). Public institutions must be maintained since their structures cannot withstand the impacts of weather-related damage and ageing (Chanter and Swallow, 2008).

Building's housing public institution are capital asset of the nation, hence the need to ensure that they are effectively and efficiently maintained over time. According to Ayuk *et al*, (2013) maintaining correctional facilities will help enhance the living standard of the prison inmate and also generate more resources for the Government. Public institutions need to be maintained not just to protect the structure but also to ensure the safety of everyone who uses

them and in the case of correctional centers, the inmates. According to Adejimi (2005), neglect of maintenance of public institutions has compounding effect, fast degradation of a building's structure and finishes, along with negative repercussions on its contents and occupants. Public institutions and structures are therefore too precious of an asset to be ignored in this manner.

Kuje council been one of the six area council within the Federal Capital Territory with relatively fewer government buildings which includes public schools, hospital, police stations, area council secretariat, correctional facility among others. However, much research works has been carried out on maintenance of public institutions with reference to public schools and hospitals with fewer or non-on correctional facility hence the need for the research.

1.2 Statement of the Problem

In Kuje Area Council of Federal Capital territory, in addition to satisfying the minimum standards for health, ventilation, floor space, heat, and lighting, prison facilities must also be in excellent condition, safe from assault, and aid in the rehabilitation of offenders before their release (United Nations Office on Drugs and Crime [UNODC], 2014). Numerous detention facilities in Nigeria have maintenance-related issues, including decrepitude of the facility; sick building syndrome which is the most typical cluster of problems related to buildings. It includes irritation of the mucous membranes of the eyes, nose, and throat as well as headaches, unusual exhaustion or weariness, and, less commonly, dry or itchy skin, inadequate ventilation, subpar standards of hygiene, and a dearth of cell block repairs. Due to insufficient financing from the appropriate authorities, it frequently happens that facility

maintenance is not carried out in accordance with real maintenance policy. Reactive maintenance approach syndrome is the major cause of these issues. Consequently, the maintenance and performance appraisal of detention centres will encompass methodical rating of view-points about the detention centres in use, principally from the perspective of end users with includes workers and internee. With the use of such critical evaluation, owners of the centres, maintenance officers, and builders may compare the quality of services stretching from office furniture provision to maintenance, management, and cleaning.

Critical evaluations also make it possible to provide solutions for enhancing facility services. By increasing the lifespan of correctional centres and the contentment obtained from the calibre of maintenance operations, this would likely be advantageous to the correctional service and end users of the place. Thus, it is crucial to establish an organised programme that can manage and maintain jail facilities to the necessary standards, assuring their availability and improving their performance.

Lack of maintenance of prison facility in contemporary times has ensued to decampment in some correctional facilities across the nation, which enabled the escape of some inmates (June 2016 and July 2022 jail break of two inmates in the earlier and hundreds of inmates escaped from Kuje correctional facilities). Crucial documents in some of these public structures due to the building's inadequate or absent maintenance, having not been spared. The residents' properties are now subject to the whims of nature due to the deteriorated state of these infrastructures. The workers' self-esteem is affected negatively by this issue that has imaged as a direct consequence of the current condition of maintenance in the public sector, which has a significant impact on productivity.

Noting the aforementioned in sight, it became imperative to study the maintenance of Kuje correctional facility to point out the elements influencing the building's status at the moment since there are increasing evidence to acknowledge that it is in the best interest of the society and the nation at large to carry out maintenance in a planned manner.

1.3 Aim and Objectives of the Study

The study is principally required to evaluate the building maintenance practices being employed in public institutions with particular reference to Kuje correctional facility, Abuja with a view to:

i. Assess the current state of structures or physical facilities in Kuje correctional facility.
ii. Examine the factors responsible for the current state of the facility iii. Analyse the maintenance policy and practice and capacity of the maintenance department of public institutions.
iv. Identify the underlying principal causes of lack maintenance of public buildings.

1.4 Research Questions

The following inquiries are made to address the study's goals:

i. What is the current condition of the structures or physical state of the facilities in Kuje correctional facility.?
ii. What are the factors responsible for the current state of the structures?

iii. What maintenance policies and procedures are in place, and what is the technical capability of their maintenance department?

iv. In order to preserve their present stock of buildings and maintain them in good shape, how may public institutions assure sustainable upkeep of their buildings or physical facilities?

1.5 Significance of the Study

This study will be very important since it offers crucial data that is a compilation of the research efforts of many academics in the area of managing and maintaining public institutions. All the relevant parties in the public and private sectors will benefit from the study in a variety of ways. It will be able to speak for itself or show how some of the difficulties in administering and sustaining public institutions may be addressed.

Additionally, it will provide information to policymakers, important figures in public institutions, and the government on how to develop policies and programmes that will guarantee effective and efficient administration and maintenance of public institutions and penal facilities. Last but not least, it is anticipated that the study will not only add contribute to the corpus of knowledge on the topic but will also give decision-makers, key stakeholders in public institutions, and managers of correctional facilities crucial information on how to best introduce policies and programmes that will improve better management and maintenance of public institutions and correctional facilities in Abuja.

Furthermore, among several research works has covered the maintenance of public institutions with particular reference to public buildings or structures that welcomes a host of guest on a daily basis, from public health care centres to educational facilities, administrative

offices and many others. However, correctional facilities which are meant not just for punishment of offenders but also aid in the reintegration of inmates who have completed their term into the society ought to be in a habitable state for the inmates and the workers or personnel of the prison service who spend their working hours within the facility.

Hence, the need to touch light in to the physical environment of the facility as the quality of the infrastructure within the facility is an important indicator of the mental and physical wellbeing of the occupants, inmates and personnel of the prison service. The facility is rarely seen hence the possibility of neglect from those directly responsible for the maintenance.

1.6 Scope of the Study

This research thesis was restricted to the assessment or evaluation of maintenance of public institutions within the federal capital territory with specific reference to the physical facilities or structures in Kuje correctional facility. It examines the current state of the physical facilities in use, factures responsible for non-maintenance of the physical facilities and technical capacity of the maintenance department if any.

1.7 Limitations of the Study

The following are some of the limitations encountered during the course of the research paper.

i. Pictorial evidence was not allowed within the facility ii. Lack of trust from respondents to answer questions that are perceived to be sensitive iii. Access for

physical inspection was denied in many areas within the facility, this was attributed to the heighten insecurity in Kuje area council and environs.

1.8 The Study Area

1.8.1 Geographical Orientation and Climate

Abuja is the location of the study area, it is situated in the middle belt geographical region; it has common perimeter borderline with the following states: Nasarawa, Niger and Kogi states respectively. Abuja is the capital of Federal Republic of Nigeria and can be located with coordinate of longitude 9.0765" N to latitude 7.3986" E of the equator. Abuja city is said to have a height of about 1181.1 feet above ocean surface. It has a total land area of 1,769 km2. Accordingly, the population of the nation's capital according to 2006 National Population Census was said to house a total population of about 1,406,239 people. Abuja which is the administrative capital of Nigeria has the following area council: Abaji Area Council, Abuja municipal area council, Bwari area council, Gwagwalada Area Council, Kuje and Kwali Area Council. The Federal Capital has a fairly stable climate with relatively small interchange in weather, temperature and humidity. The calendar year is subdivided into rainy which usually commenced in April and dry seasons that generally October.

1.8.2 Historical Development of the Study Area

Abuja was created by an administrative fiat on February 4, 1976 from the states of Kwara, Niger, Plateau and Kaduna states with bulk of the landmass curved out of Niger. It is located in the middle belt region of the geopolitical stretch of Nigeria. Gbagyi, Gwandara, Ebira, Ganagana, Koro, Gade, Bassa, Gbari and Amwamwa are the original inhabitant of Abuja.

1.8.3 Administrative Structure

Abuja is the administrative capital of the country Nigeria hence houses the three arms zones consisting of the national assembly complex, the presidential villa and court of appeal headquarters. It also hosts majority of the ministries, agencies and departments of the Federal Government hence it is the seat of administrative power in the federal republic of Nigeria. The affair of Abuja is administered by the honourable minister of the territory who is an appointee of the elected president and commander in chief of the Federal Republic of Nigeria while the affairs of the area councils are coordinated by the council chairmen who are elected representative of the people.

Figure 1.1: Map of Nigeria showing Abuja

Source: Omirin (2022)

One of the six area councils of Nigeria's Federal Capital Territory is Kuje, and it is home to some public institutions like the Nigerian Meteorological Agency, FCT Veterinary clinic among others public buildings like schools and hospitals including Local Government Area headquarters. It is approximately 40 km southwest of the three-arm zone. Currently, Kuchiyako is the most developed part in Kuje area council. It has an approximate land area of 1,644 km².

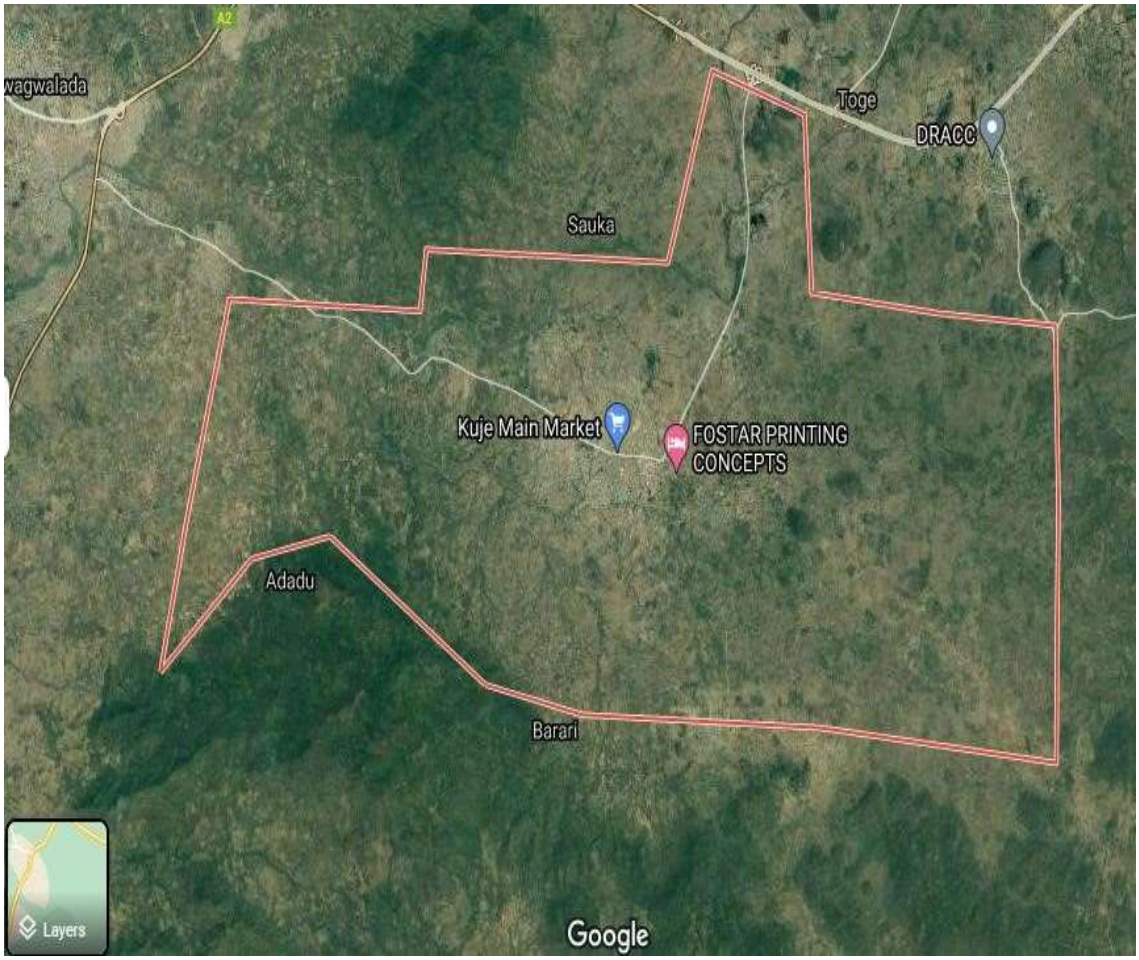

Figure1.2: Map of Kuje Area Council

Source: Google Earth (2021)

Nigeria correctional Service (NCS) is the third branch of the judicial system in Nigeria. Kuje correctional facility which is a medium security prison is situated in Kuje Area Council, Abuja, middle belt region of Nigeria. It has an initial capacity of three hundred and sixty (360) and was increased to Five hundred and sixty (560) inmate's capacity although Eight hundred and Fifty-two (852) Inmates were on ground as at the time of this Evaluation. Based on the NPS 3Rs mission, which stands for Rehabilitation, Reformation, and Reintegration, it

offers correctional services. In order to achieve this, one strategy is to provide capacity training to inmates on vocational skills before their reintegration into the society.

Figure 1.3: Arial view of Kuje correctional facility

Source: Google Earth (2021)

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Conceptual Framework

2.1.1 The Maintenance Concept

According to the British Standard Glossary of Maintenance Management Terms in Terotechnology (BS 3811: 1993), maintenance is "a combination of all technical and administrative actions, including supervisory actions, intended to retain items in, or restore it to, a state in which it can perform its required function." The initiation, organization, and implementation-related acts are those being discussed. Two procedures are contemplated: retaining, which is a job done in prolepsis of failure and is sometimes called preventive maintenance, and restoring, which is work done after fault or failure and is also called corrective maintenance. Beyond the aforementioned, there is also the idea of Acceptable Standard (subjective view), which can be seen as acceptance by the party paying for the labor, the party getting the benefit, or a third party charged with upholding minimal standards.

Additionally, it might be understood more broadly as acceptance by the general public or by particular demographic groups. However, it is obvious that no ultimate criterion exists that would be equally acceptable to everybody in the society over a defined period of time. The specifications that are considered acceptable at the period the work started may have changed from the initial design. In many instances, the work would include an element of enhancement and the standards considered acceptable would be greater than those initially offered. However, with time, buildings undergo modifications to meet new purposes, making it becomes harder and harder to imagine preserving or reestablishing the original design. As

a consequence, the standards would be established by the amount of money allotted rather than by evaluating the advantages of preserving the building to a given state, and they would be tied to safety, efficiency and legal requirement. (Cobinnah, 2010).

Maintenance, as described by the British Standard (B. S. (3811) 1984), as stated in Afranie and Osei-Tutu (1999), is labour done to maintain or repair every facility, which includes every component:

(i.) To maintain here is to stop any potential flaws from arising.

(ii.) If small flaws are permitted to develop, restoration entails correcting them;

(iii.) An acceptable standard and an affordable price show that maintenance work is tailored to each customer's demands and circumstances.

According to Seeley (1993), maintenance is the sum of all technical and related administrative procedures designed to maintain or restore a piece of equipment to a state where it can carry out its necessary duties to an acceptable quality. 'All acts taken to maintain material in or to return it to a specific state' is another definition of maintenance. Inspection, testing, servicing, and categorization in terms of suitability for repair, rebuilding, and reclamation are all included. It encompasses the regular, ongoing maintenance work necessary to keep a facility, such as a plant, building, structure, ground facility, utility system, or other real property, in a condition that allows it to be continuously used, at its original or designed capacity and efficiency, and for its intended purpose.

Practical interpretation offered was the statement made by Lee (1993) cites, is that "maintenance is identical with maintaining the condition of a structure such that its pattern rests within prescribed regions." The word "control" implies a constructive action that is designed to reach a certain end result, and the phrase "specified regions" likely has a connotation akin to "accepted standards." According to his concept, the building's conditions must be kept within a range allowable between upper and lower bounds.

Therefore, maintenance refers to the tasks required to keep a structure, along with its fixtures and fittings, in good condition so that it may continue to offer the same or nearly identical services, amenities, and facilities as it did when it was initially constructed. It includes the expenses required to keep the property's rental value up and includes:

(i.) Routine maintenance like painting;

(ii.) Periodic upkeep like foundation work; and

(iii.) Major repair requiring a significant investment and the expertise of technical experts, like foundation work and roof replacement (Afranie *et al* 1999).

According to the British Standards Institute (1993), maintenance is collection of technical and administrative steps taken to maintain or safeguard a structure, system, or piece of equipment so that it may continue to operate as intended. While Esther (2015) proposed that maintenance is an action taken to stop a device or component from failing or to repair typical equipment degradation experienced with the operation of the device to keep it in proper working order, Ernest (2015) defines maintenance as the action or process of preserving an object, activity. Therefore, maintenance is viewed in this study as a procedure that keeps a

facility or asset in use and functioning continuously, above a minimal level of acceptable performance, over the duration of its design life.

Companies make attempts to lower costs while raising productivity and quality. These activities also involve assessing the upkeep necessities. Any company's production system has to be well maintained in order for it to continue operating (Tijani, *et al*., 2016). As a result, the equipment will last longer, be more accessible, and continue to operate as intended. Conversely, poorly maintained equipment may result in frequent equipment breakdown, low utilisation, and a delay in the production schedule. Equipment that isn't working properly or is out of alignment might result in more trash or generate items of doubtful quality. Swanson (2001) saw shoddy equipment maintenance as a necessary evil. In contrast, Alsyouf (2007) believed that routine facility upkeep might be a source of revenue as opposed to only being inevitable and uncontrollable costs.

2.1.2 Types of Maintenance

The following terminology and meanings from the British Standard vocabulary of maintenance management terms in terotechnology 3811 were used to grade building maintenance.

i. **Planned Maintenance**: Maintenance that is structured and carried out according to a specified plan with foresight, control, and the use of records. On the continuum, planned maintenance comes after, albeit the different types of maintenance are not mutually exclusive. The care of building elements known as general maintenance is done to return

them to their original states or to keep them in excellent functioning order. On the continuum, preventive maintenance comes after.

Another level of planned maintenance is provided by predictive maintenance. It employs methods like during operation, moving components are subjected to vibration analysis to look for patterns that indicate excessive wear. This makes it possible to make repairs prior to equipment failure, but only when necessary, as opposed to frequently as with preventative maintenance. Predictive maintenance assists in avoiding irrelevant overhauls when analysis reveals that the equipment is in sound condition and does not require repair. One approach is to examine the motor's vibration frequencies to look for amplitude variations that might indicate bearing deterioration or to predict the lifespan of an energy-converter bulb from the manufacturer's instructions and replace it to prevent blackouts (Ben *et'al.*, 2021).

A step further is proactive maintenance is a method that uses data from equipment analysis and is well structured to pinpoint the causes of equipment problems rather than merely their symptoms. For instance, proactive maintenance might determine whether excessive wear was due to a poor installation, an inappropriate design, or some other issue. Proactive maintenance avoids reoccurring issues, as well as the downtime and other expenditures related to such recurrences, because it deals with the primary causes of equipment problems.

ii. **Unplanned Maintenance:** The plan was implemented without a planned plan. It refers to work that is required because of unanticipated damage or breakdown. Unforeseen damages include things like a structure being torn apart by a storm and the repairs needed to fix it. It might also be referred to as unavoidable and unplanned maintenance.

iii. **Preventive Maintenance:** maintenance that is done on an item on a regular basis or in accordance with guidelines in order to lessen the likelihood of failure or performance degradation. A scheduled program of recurring inspections, modifications, and replacements is known as preventive maintenance. Preventive maintenance is defined as the routine repair and upkeep required maintaining a building component top performance and increasing its useful life. It entails routine tasks designed to stop malfunctions, like recurring inspections, lubrication, calibrations, and equipment replacement.

Preventive maintenance includes things like routinely replacing the filters in an air-handling unit. Preventive maintenance frequently necessitates both capital and operating expenses since extending Periodic equipment replacement is necessary due to the lifespan of main building systems. Preventive maintenance's major goal is to preserve every component. (Cobinnah, 2010).

iv. **Corrective Maintenance:** the repair work done to an item after it has failed and is designed to get it back to working order so it can perform its intended function in other words maintenance done after a failure has occurred with the goal of putting an object back in a state where it can carry out its intended function.

v. **Emergency Maintenance:** the upkeep that must be completed right away to prevent significant effects. This is known as day-to-day maintenance, it needs to be done right away to prevent significant effects.

vi. **Condition-based Maintenance:** the preventive maintenance that is started after learning about an item's condition through regular or continuous monitoring, it started after normal or continuous monitoring reveals information about equipment’s condition.

vii. **Scheduled Maintenance:** this is a preventive maintenance that is required to be performed according to a defined period for example a generator maybe required to be serviced every three months or after 200 hours of usage whichever comes first.

viii. **Running maintenance:** Maintenance needed to be carried or that can be done while a product is in use. For example, sweeping of a premise or changing of oil filter for an equipment or motor

2.1.3 Needs for Maintenance

Managers can concentrate on capitalization by preventing facility breakdown or malfunction through strict compliance to precise and clear-cut maintenance strategy. (Dabara *et al.*, 2016). In its absence, a maintenance strategy will need to be developed and defined, communicated, and finally focused on the tactical option on how to do it. The actual implementation of the strategy, which focuses on the management of people, processes, and physical asset infrastructure, requires tactics. (Herbert, 2010). The management's goals must be accomplished while adhering to health, safety, environmental, and budget. It takes essential managerial skill to integrate machines, people, processes, and means into a well-designed strategy. (Pintelon *et al.*, 2006).

Below are few of the accruable benefits of sound maintenance culture embraced in our society:

(i.) Keep assets in utmost working or sound condition in order to minimize downtime and disruption to services

(ii.) Keep facilities in a state of good repair and sound working condition for the owner's health and safety

(iii.) Keep assets from deterioration and reserve its aesthetics

(iv.) Keep facilities so as to optimally achieve their full potential service life

(v.) Leveraging efficiencies that can be reflected on the owner’s statement of financial position

(vi.) Satisfying a legislated duty that is owed to owners, occupants and guests on the property

(vii.) Preventing unnecessary damage to assets or facilitation that may result in their performance failure

Another classification for maintenance work is "predictable" and "avoidable."

Predictable maintenance is routine maintenance that may be required to preserve a product's performance qualities as well as to replace or repair the product once its usable lifespan has passed. Avoidable maintenance is the work necessary to fix failures brought on by subpar design, improper installation, or the use of subpar materials.

Even a little carelessness with building maintenance might lead to danger. The term "appropriate condition" can be understood as the preservation of a structure in a condition that enables its usage for the intended purpose with the least amount of capital outlay. The use of the building, its reputation in the community, and even its stature on the international stage will all have an impact on the proper condition. Getting good value for the money spent on maintenance should be the major goal of building maintenance. Sullivan (2014) has used a different method to maintenance categorization as cited in Seeley (1987), subdivided maintenance into three broad categories:

i. Major repair or restoration: a practical example of this is rebuilding defective walls and replace of roofing sheet.

ii. Periodic maintenance a good example of this is periodic redecoration such as paintings iii. Routine or day-to-day maintenance: a practical example of this is sweeping and cleaning building facets.

2.1.4 The Value of Preventive Maintenance

Preventive maintenance that is carefully planned is encouraged because of its benefits for increasing equipment operating effectiveness, preventing premature component replacement, and preventing disruptions for building occupants. Preventive maintenance is frequently believed to save long-term expenses by increasing equipment's operational capacity, reducing downtime, and preventing malfunctions that might otherwise result in greater repair costs later. Preventive maintenance may adversely impact the productivity and health of inhabitants. For example, a study carried out on the assessment of physical conditions of public schools found that, while controlling for other factors.

The standardized achievement scores of kids in schools with top-notch facilities outperformed those in schools with fair facilities and even outperformed those in schools with subpar facilities, the same hold true for productivity in work place. The quality of indoor air can be improved by certain preventative maintenance, and it can be negatively impacted by inadequate preventive maintenance. A practical example, lack of proper maintenance in of roofing sheet could result in leaking roof sheet, creating conditions for mould growth and potentially affecting the air quality of the indoor environment which may result in respiratory illness on the users; this may have been prevented by driving in a loosed bolt or nail. The possible adverse effect is potentially dramatic, as commonly seen in public buildings like LEA primary schools and community health centers.

Successful preventative maintenance initiatives should aim to achieve the following:

i. **Conserve the investments in public structures made by taxpayers:** Preventive maintenance may increase the lifespan of building components, preserving the value of structures and the substantial tax revenue they represent.

ii. **Assist in making buildings work as efficiently as possible, particularly reducing energy use:** Preventive maintenance lowers operational inefficiencies and energy consumption because it maintains equipment operating as intended. **iii. Avoid system failures in buildings that might impede tenant activities and the provision of public services:** Employees in the public sector may do their duties and provide services in trouble-free buildings. Maintenance personnel minimizes issues that may otherwise result in a breakdown in operations because preventative maintenance involves routine inspections and the repair of equipment essential to running a facility.

iv. By maintaining structures and the parts that make them up in good condition and structurally sound, you can maintain a safe and healthy environment. Through preventative maintenance, building components may maintain their structural integrity while maintaining a sound working abode for staff, visitors and other users

v. Offer maintenance in a method that is economical, preventive maintenance can save small issues from becoming costly repairs caused by catastrophic system and equipment breakdowns. Preventive maintenance improves efficiency by preventing the need for costly major repairs. Increasing preventative maintenance can save the amount of time spent responding to emergencies, which makes

operating buildings more economically efficient. Over time, postponing preventative maintenance may result in increased expenditures.

vi. Boost morale and confidence of the occupants of the buildings.

2.1.5 Components of Maintenance

Maintenance requires a significant amount of work as quoted in (Afranie and Osei-Tutu, 1999) has been categorized into three components namely; Servicing, Rectification and Replacement.

i. **Servicing:** Servicing, which is frequently referred to as daily maintenance, is basically a cleaning procedure carried out at regular intervals with different regularity. Examples of service include frequent floor sweeping, window washing and cleaning once a month, and regular painting for protection and adornment every four years. However, when more advanced technology is developed, it necessitates increasingly intricate servicing schedules. Because facilities are used often and because weather and climatic conditions have an impact on building components, servicing is required.

ii. **Rectification:** Rectification work often takes place rather early in a building lifespan, however it can sometimes happen later on. It results from a design flaw, an inherent flaw in or an inappropriate component, damaged items during shipping or installation, and improper assembly. Because it is available, rectification is a beneficial point at which to lower maintenance expenses. The only thing required, at least in principle, is to make sure that material and components are installed properly and are appropriate for their intended use. By creating and using performance requirements and installation codes, remediation effort might be minimized. Rectification is the solution to ingrained flaws in the building process' design, construction, or installation phases.

This offers the chance to "trade off" present capital expenses against upcoming maintenance expenses.

iii. Replacement: In buildings, replacements are made wherever possible. It is unavoidable since various materials deteriorate at varying rates due to service circumstances. The majority of replacement work is caused more by loss of appearance than by actual material or constituent failure (Seeley, 1987). This is due to the fact that various materials are exposed to the weather to varying degrees, the weather in different places varies, and different construction components are capable of withstanding variations in the weather and varying degrees of intensity. As a result of material breakdown brought on by these varying rates of climatic conditions, this becomes required. Replacements may be necessary due to the physical degradation of components or materials as well as changes in appearance.

This raises the issue of separating maintenance from improvement, which many definitions have not fully addressed. However, it is widely agreed that maintenance should incorporate logical aspects of improvement, such as replacing a worn-out component with a more recent model. Work should be classified as improvement when it has the goal of improving building efficiency through the addition of amenities that weren't previously there. It seems natural to expand the definition of maintenance to include some localized improvement, though Renovations, which involve extensive overhauls to return a building, service, or piece of equipment to its original design and specification or to improve upon it, fall under the category of maintenance. This can involve making modest renovations and extensions to the old structure.

2.1.6 Other Maintenance-Related Concepts and Definitions as related to Housing Prevention

In order to safeguard housing, one must manage its environment. This keeps agents that cause decay and destruction from becoming active. It entails maintaining a cleaning schedule, doing decent housekeeping, and managing housing appropriately.

i. **Consolidation:** In order to maintain the housing's structural integrity or durability, consolidation entails the actual application of glue or supporting materials to the housing's fabric.

ii. **Rehabilitation:** This process modernizes outdated structures, either with or without functional adaptations. It entails the addition of contemporary services while maintaining the building's original purpose.

iii. **Repair:** Restoring a home to its original condition will ensure that it functions as it did when it was initially erected or constructed. It is largely ad hoc in nature and includes reactive measures to home degradation.

iv. **Renovation:** It entails work done to upgrade the original design or to restore a building, services, and equipment to their former state through a significant overhaul. This might involve major renovations, extensions, and even whole rebuilding of the old building. Improvement and refurbishing are in contact with renovation. In some ways, remodeling is unavoidable because new designs are used when updating fixtures like baths.

v. **Refurbishment:** In the context of architecture, refurbishment refers to the replacement of broken components or the addition of new aesthetic aspects to a

building. Additionally, it entails repairing housing to restore its brightness, cleanliness, and freshness.

vi. **Extension:** In terms of housing, it entails the addition of components to widen or enlarge housing in responses to what is need to meet demand.

2.2 Technology of Maintenance

Maintenance technology addresses every factor that influences and necessitates maintenance work. The emergence of flaws in a building's structure can be caused by a variety of unconnected design choices, including the use of inappropriate materials, erroneous load calculations, a lack of understanding of the conditions of use, and an inadequate evaluation of exposure. Rainfall, the direction of the prevailing winds, the microclimate, air pollution, and the aspect and height of the structure all have an impact on exposure. Frost action, salt crystallization, sunshine, biological agents, abrasions, impact, chemical action, corrosion, and incompatibility with current construction materials are further factors that affect a building material's durability. Building cracks typically originate from poor or flawed construction and are always unsatisfactory to the residents. If they are severe, they could lead to instability loss.

Additionally, fissures typically result in air penetration, heat loss, and decreased sound insulation, all of which lower building performance. Tensile stresses that are greater than the material's tensile strength often result from loads imposed from the outside or internal motions brought on by changes in temperature or moisture. The design of a roof may be used to show other crucial maintenance concepts. It is a false economy to save money on the roof

during construction since if it ever has to be replaced, it will seriously disrupt production, occupancy, or other operations within the structure. A decent roof that is adequately maintained should last the life of a building. Apart from the obvious nuisance it causes to users, a leaky roof can hasten the decay of other building components including the ceiling, flooring, and walls as well as seriously harm any decorations and electrical installations. A roof should not see much traffic, but when it is necessary, there should be adequate pathways and access ladders available. Roofs should preferably be examined every three (3) years, or alternatively, one-third of the time each year, to make sure they are kept up properly.

2.3 Concept of Correctional Facility

A correctional facility is a centre in wherein detainee are kept against their free will and denied a range of freedom by the state. The facilities are usually utilised in a criminal justice system: persons who have been charged with crimes may be kept before their trial; those who plead guilty to crimes or are found guilty at trial may be sentenced for a time in the detention facility. Simply said, a prison is a structure where individuals are confined against their will in order to punish them for a crime they have committed (Ajayi, 2016). Authoritarian governments may also employ prisons as a tactic of political repression. Their perceived enemies may be put behind bars for political crimes, sometimes without a trial or other form of due process; this practise is prohibited by the majority of international legal frameworks governing the impartial administration of justice. Large numbers of civilians may be imprisoned in internment camps during times of war, together with prisoners of war or other detainees, in military detention centres.

Prison and jail diverging meaning in American English, however this is not often observed in everyday usage. A state or federal government runs a jail or penitentiary, which houses inmates for lengthier periods of time often years. A prison is typically run by a local government and houses individuals for shorter lengths of time (such as shorter sentences or pre-trial custody). Outside of North America, the terms "prison" and "jail" are synonymous.

2.4 Economic and Social Significance of Maintenance

Regular building upkeep gives its residents advantages like comfort and happiness. The structural upkeep of an asset guarantees that investment made will not only provide the maximum profits over the course of the asset, but will also fulfil the ultimate duty of supplying the essential human comfort and pleasure. According to (Afranie and Osei-Tutu, 1999), a house is considered to be an economic asset that has to be maintained in order to increase in value and provide the owner with a return, either socially or economically, to the owner.

In actuality, the major goals of preserving a building are to keep it as close to its original state as is practical so that it can efficiently fulfills that purpose. In general, building capital assets are so precious and frequently appreciating that periodic maintenance should be carried out to extend their useful lives. Therefore, maintaining a structure serves the purposes of protecting the investment, ensuring that it continues to serve its purpose, and presenting a pleasing look. That the built environment physically represents the complex social and economic variables that contribute to the structure and existence of the community is a claim made by many authors on the economic and social relevance of maintenance is

understandable. Building condition and quality so reflect popular pride or apathy, the degree of local affluence, social values and behavior, and all the myriad factors both past and present that work together to give a country its distinctive traits.

2.4.1 Goals of Maintenance

Making ensuring a structure keeps performing the function for which it was erected is the major goal of maintenance. The goals of maintenance work include the following: **(i.) Maintain the Value of a Building: -** A building that is properly maintained often has a higher worth, although this gain in value may only be little because location and site size are other essential factors in determining value. (Afranie and Osei-Tutu, 1999), generally the market value of well-maintained facility is higher than a property that ill maintained.

(ii.) Ensure Optimum Use of Buildings: - Good maintenance should allow buildings to be used to their full potential and all space would be appropriately utilized.

(iii.) Create or Maintain Suitable Appearance: -Can make a positive contribution to external environment and social conditions and by extension, the environment. Dilapidated buildings can contribute to social deprivation and badly maintained services and facilities, waste energy and resources and can affect the environment

(iv.) Maximize the Life of Main Components and Materials: -maintenance can reduce cost of subsequent maintenance by extending periods between repairs and replacements. Various building component have different lifespan, proper maintenance ensures replacement of failed component before it affects other building component. For example, conduit water channels.

(v.) To preserve an appropriate aesthetic and prevent structures from detracting from the surrounding area appearance.

2.4.2 Factors Influencing Maintenance Decision

Derek and Paul, (1987), determine which of the following influences the choice to do building maintenance:

(i.) Inadequate Finance: - It is commonly known that inadequate finance is a major constraint on effective property management, partly because maintenance budgets are the easiest to cut when money is scarce. According to him, maintenance expenditure can be absorbed more easily in commercial and industrial organizations where it may account for as little as 0.5% of turnover, but even in these cases maintenance is taken for granted except when it threatens production or profitability. However, the situation is more serious in the public sector where damaging effects of poor maintenance are less immediately obvious. Also, in the case of housing estates, it is common for organizations to emphasize the provision of new houses, with little funding provided for maintaining existing stock. Not are day-to-day repairs neglected, but efforts at improvements and rehabilitation are considered lower priority than new construction. This problem of inadequate finance indeed result in rapid deterioration of existing stock resulting in increases in the demand for new houses because poorly maintained houses are not only unpopular; but they soon reach the stage where the structure itself deteriorates and rebuilding has to be considered.

(ii.) Bad Management: -This refers to irrelevant task or idleness, waste and incompetence in the maintenance unit.

(iii.) Poor Building Design: - it is not unusual to find that some structures are unnecessarily expensive to maintain because of inappropriate priorities applied during the design phase. Poor detailing and the specification of unsuitable components and materials are common complaints. In addition, construction errors arising from inadequate drawings and specifications, coupled with poor workmanship because of contracts awarded to incompetent contractors are frequent causes of rapid physical deterioration in buildings. Good design should allow accessibility and adequate working space for essential maintenance such as cleaning, and minor repairs to pipes, ducts and cables.

(iv.) according to Afranie and Osei-Tutu (1999), states that a number of factors, including the following, influence the choice to do maintenance:

(a) **Cost** – Investors want to have the most cost-effective technique for performing maintenance work, whether corrective or preventative, thus they compare the building's actual maintenance costs to those of similar structures;

i. Accounting for the money spent to obtain the current acceptable standard; ii. The expense of upholding the same quality in the future and the savings from replacing facilities, and iii. The amount of work that is available and its priority.

(b) **Physical Resource Availability -** The availability or lack thereof of physical resources has an impact on decisions since it is challenging to perform maintenance when the necessary materials are not readily accessible. Again, it will discourage individuals from performing maintenance tasks even if acceptable materials are accessible but not in sufficient numbers and the substitute materials are not decisions

to do maintenance can also be influenced by the quality of workmanship in terms of abilities and productive numbers;

(c) **Work urgency**: Investors take this into account when making maintenance decisions when determining if postponing work now would result in more costly work down the road. This typically considers two factors:

i. User safety; and ii. Potential harm to the building's structure and finishes.

(d) Interfering with what is being done within the building. Afranie and Osei-Tutu (1999), citing Seeley (1993), however, quickly lists the primary factors that might affect the choice to do maintenance, including cost, the age and condition of the property, the availability of necessary resources, urgency, future usage, and sociological concerns.

2.5 Physical Causes of Poor Maintenance

All the physical and natural elements that compromise the building's durability are referred to as the physical causes of maintenance issues. The longevity of a constructed facility is an indicator of the pace at which a material or component degrades, in an inverse sense (Afranie and Osei-Tutu, 1999). According to Afranie and Osei-Tutu (1999) the British Standard Institution (BSI) Code of Practice, durability is the capacity to keep an acceptable look and carry out necessary duties. The value is measured by the code as the minimal number of years of acceptable life. Age or time of building, environment, and geographic element are the three primary reasons of degradation and therefore maintenance issues. It has been noted that newly built houses are often in better shape than old buildings.

The structure is affected by environmental elements such as salt-laden winds, high and changeable temperatures, and severe moisture content (both too high and too low) (Afranie and Osei-Tutu, 1999). While certain materials may degrade or fail to develop their potential qualities due to hydration in places of prolonged high humidity, others may hold more moisture sufficient to have negative consequences. Extreme moisture encourages fungus and insect assault on organic materials as well as metal corrosion. Building's roofs, cement-based sections, and timber members are those that are proven to be most impacted especially the corrugated iron sheets (Afranie and Osei-Tutu, 1999).

A building's location directly affects the maintenance issue. The specific position of the structure is referred to as the location. So, in addition to high temperatures and abrupt temperature variations, location is also impacted by the geography of the environment, soil, character of social and seismic action, salt-laden winds, and impacts of saline water.

2.5.1 Organisation of Maintenance Department

The maintenance unit or department in an organisation is headed or supervised by a maintenance manager. Planning and overseeing maintenance activities are within the purview of the maintenance manager. In a small company, a staff member may perform the tasks in addition to his other responsibilities, but in a larger company, a distinct team would be in charge of maintenance alone. According to Samuel *et al.* (2016) there is no formal organisational chart showing the distribution of power and responsibility in most institution.

There is therefore need to construct a proper organisational chart showing the distribution of power and responsibility for proper functioning of the organisation and personnel. More so,

maintenance work should be categorised according to their order of importance or severity as such maintenance work should be based on need “need driven” and not based on budget “budget driven”. User satisfaction survey should also be carried out regularly and maintenance work should be carried out in line with users’ requirement, this is necessary because the fundamental principle entails the participation of the users.

2.5.2 The Role of the Maintenance Unit

The maintenance department among other things performs the following basic functions.

i. **Advisory Function:** This entails communication with users and tenants as well as engagement with top management on issues like;

   a) The standards that must be upheld and the impact that standards violations have on user activities.

   b) The benefits of various maintenance strategies and the degree to which hiring workers directly for the job would be beneficial.

   c) Estimation of maintenance cost on both long term and short term, including, the cost of initially bringing up to the required standard and the possibility of phasing any such backlog over a period of years

   d) Clarification of all constraints in connection to limits of expenditure, desirable cash flow patterns, acceptable delay times, or restrictions on time and method of work executed in any material time.

   e) Technical specifications for modest building modifications or expansions; although not strictly maintenance, the maintenance organisation often takes complete responsibility for this kind of work.

f) Providing cost and other information to let senior management choose between repairing and renewing.

g) Guidance on the maintenance ramifications of new building designs that are being considered.

ii. **Organizational Role:** The execution system, whether it uses direct labour or contracts, or the central administration and supervision structure, may be the subject of this.

iii. **Control Role:** The timely reception of correct information about the system's condition is necessary for the control functions. The following regions are where the control functions are active:

a) Determine the amount of effort required to meet the requisite standards within the established limits. The procedures entailed would be planned inspections, user request evaluation, and priority assignment.

b) Execution time: Programming the workload to timing the completion of the job in line with the demands of the user and the labour force that is available

c) Quality: Work execution oversight and subsequent control inspections to find latent flaws

d) Cost: System for controlling spending on the budget that includes forecasting resource needs in terms of cost and performance for subsequent comparison with actual costs and results.

e) Feedback: This is a component of all control functions and entails maintaining the records required for effective operation control.

iv. **Miscellaneous Functions:** The maintenance organisation may also be in charge of additional duties including groundskeeping, cleaning, and refuse disposal. Safety and security may also fall within their purview, particularly in connection to the upkeep of firefighting apparatus and adherence to legal fire precautions.

2.6 Maintenance Performance Measurement

The ability to correctly acknowledge the impact of maintenance on the functioning of a system and business is made possible by focusing on the status of facilities in relation to customer service (Murthy *et al.,* 2002). A collection of measurements known as maintenance performance indicators is used to quantify the effect of maintenance on the process (MPIs).

There are numerous sets of metrics used to assess the effectiveness and efficiency of maintenance efforts (Parida and Kumar 2009). These measures are equipped with baselines and realistic targets to enable associated decisions and subsequent actions at appropriate levels in the organisation to provide value to the business process and facilitate prognostic and diagnostic procedures (Åhrén and Parida, 2009). Numerous performance metrics on productivity, availability, and dependability are often employed in connection to manufacturing facilities, equipment, and services.

While individual system effectiveness only evaluates specific objects or components, overall system effectiveness evaluates whole organisations. It is possible to determine whether there have been significant advancements in particular systems or whether there has been continual development by evaluating the performance of entire organisations or any objects, components, or facilities. The efficacy of the entire system deviates when a specific system

or facility deteriorates quickly. As a result, this discrepancy prompts organisations to adopt corrective measures (Åhrén and Parida (2009).

MPIs assist organisations in understanding the impact of maintenance on operational efficiency and the dependability of their facilities, equipment, and structures (Åhrén and Parida (2009). In essence, MPIs assess performance gaps between the existing state and the intended state and recommend improvements to fill in the gaps. There have been established performance indicators that may be used to gauge how well the organization's facilities and business processes are doing. According to Ellingsen *et al.,* (2002) as cited in Cobbinah (2010), a balanced scorecard-based framework for measuring success in the Norwegian oil and gas sector should consider infrastructure, innovation, and financial metrics. Key Performance Indicators were created by Hagerby and Johansson (2002), and six process industries in Norway and Sweden were reviewed and benchmarked using them.

These KPIs include total effective equipment productivity, direct maintenance costs, redundancy, customer satisfaction with the maintenance service, direct maintenance costs associated with rework, and direct maintenance costs linked with health and safety costs. Their study investigated the companies' strategies and processes as well as their influence on the indicators. The study confirmed difficulties in benchmarking maintenance organizations due to the poor and inconsistent classification of data as well as the diversity of operating conditions.

Financial indicators like operation cost, maintenance cost, equipment availability, labour productivity, and the number of incidents resulting from in-service failures were found to be the most frequently used performance indicators in six large-scale steel, public utility,

transportation, and process industries in Hong Kong and Canada. These metrics, which indicate short-term performance results, are largely utilized for operational control purposes. The study also demonstrates that management and organizations were not aware that measuring systems may enable horizontal activity integration and vertical goal alignment as stated by Parida and Kumar (2009), The study identifies helpful maintenance indicators, such as equipment dependability, execution quality and reaction time, maintenance costs, and failure prediction. According to the study's findings, proactive maintenance performance should be driven by KPIs and integrated into the organization's operations.

According to Parida and Kumar (2009), performance measurement entails assessing staff satisfaction and maintenance against a set of maintenance performance indicators. The list includes metrics linked to equipment, maintenance tasks, costs, and the effect on customer satisfaction. Indicators for learning and development, HSSE (health, safety, security, and the environment), and employee satisfaction are also supported by the study.

Further, research by Kotze and Visser (2012) on the mining sector in South Africa revealed how widely 32 maintenance performance metrics were used in maintenance organisations. The most commonly utilized metrics include the results of safety audits, reliability, breakdown frequency, equipment utilization, lost time frequency rate, cost per unit, total downtime, in-between repair, and schedule compliance. Total productive maintenance, the proportion of maintenance jobs completed by operations, continuous improvement, and customer satisfaction are among the least-used metrics. Some elements in staff housing maintenance performance are identified by Oladapo (2006), including customer satisfaction

metrics, the dependability of building services, the volume of tenant complaints, and the maintenance unit's response to tenant requests.

According to the research, 31.1% of the respondents gave their satisfaction with the staff house's general maintenance a below-average rating, while 28.4% gave it an above-average rating. The degree of occurrences on maintenance performance metrics is highlighted in a more balanced approach to measuring maintenance performance. Technical, economic, and safety measurements, as well as human resources, are the most often used metrics, whereas training/learning, skills/competencies, work incentives, process performance, customer happiness, and employee satisfaction are the least frequently utilised metrics (Simoes, *et al.*, 2011).

Unquestionably, the state of buildings or facilities is a measuring maker and a common method to assess and forecast the performance of facilities (Wahida, *et al.*, 2012). This implies that in order for the maintenance management process to be completed in systems or facilities, the system's performance must be assessed in order to determine its state. In essence, examining the effectiveness of jail facilities will assist in determining how maintenance operations will affect the facilities' worth (Parida and Kumar 2009). It is crucial to classify performance factors for adaptation within the Nigerian prison setting since the current study concentrates on the performance of jail facilities. The relevant variables are quality of space, response to complaints, maintenance-task related indicators, and costrelated indicators.

2.7 Cases and Problems of Non-Maintenance Culture

In Nigeria, for example, there have been so many things abandoned that what was once considered to be a non-issue or not even a problem has now grown into a major concern. Due to inadequate infrastructure and several other economic and social indices, Nigeria is one of the world's poorest nations.

Early in the 1970s, the Ministry of Work had a division known as the Public Work Department (PWD) that was responsible for fixing roads around the nation and keeping them free of erosion threats. The PWD was eliminated as a result of political changes in the nation, which also marked the beginning of Nigeria's extensive road network's dramatic decline. Some areas of the nation were inaccessible as a result of the unpleasant scenario. The recent development of the Federal Road Maintenance Agency was defined by a fire brigade strategy, which involved waiting until the federal highways gave way before beginning any repairs.

This is mostly a result of the lack of a maintenance culture in the nation. Nigerians struggle to maintain their own homes and view public spaces as government property that belongs to no one in particular (Adeleye, 2009). Without any constructive activities from the public to promote the sustainability of the property, many public buildings built primarily to benefit the people are left to deteriorate. As a result of poor upkeep, public facilities do not last as long as they should. Lack of maintenance practises across all economic actors in the nation has significantly contributed to the nation's continued high infrastructure deficit, inadequacy, and massive waste. It is regrettable that Nigeria has a very low level of maintenance cultural

awareness. A stunning building brings everyone tremendous delight when it is first built, but it is soon allowed to degrade and crumble.

According to Haruna (2009), Nigeria's hosting of FESTAC in 1977 saw the addition of the National Arts Theatre, Igunmu, Lagos, an architectural wonder. Due to a lack of maintenance culture, the building has become a lizard habitat, has damaged furniture, a malfunctioning air conditioner, and is generally disorganised, giving it the appearance of being haunted. Lack of maintenance caused the building to lose its magnificence. Infrastructure condition and quality reflect the users' or suppliers' concern or lack thereof. Few years after being put into service, the condition of Nigeria's infrastructure demonstrates a lack of maintenance practises that have shortened the lifespan of priceless assets.

According to Odediran *et al.*, (2012), buildings are primarily made accessible to provide a safe environment for the performance of diverse economic and social activities, and a yardstick for sustaining such a function is based on a building's capacity to do so. However, the degradation of a building's components and elements forces the choice of actions designed to ensure that the features that support the building's convenience and safety are given and relocated. An infrastructure's status quo must be maintained in order to continue providing the appropriate satisfaction for which it was installed.

Nigerian roads are in a terrible state, as demonstrated by a 2003 CBN assessment. Many of the roads built more than 30 years ago have not been repaired once, resulting in cracks, chasms, depressions, fallen bridges, and other hazards that make Nigerian highways a death trap. This condition significantly hastens the deterioration and demise of vehicles by impeding the effective movement of industrial input from places of abundance to areas of

shortage. Our roads' current condition is causing us to lose a lot of money economically. If and only if a maintenance culture is in place, this scenario could not have reached its zenith.

Inadequate maintenance is one of the key issues in developing nations, according to Cobinnah (2010). In the majority of developing nations, these jobs are thought to be trivial. The Power Holding Company of Nigeria's primary issue, despite having sophisticated technology, is that it is unable to implement necessary maintenance, which has hampered target achievement. As a result, it is challenging to have or experience a consistent supply of electricity in Nigeria in the regions where the National power networks are present.

Nigeria's public and private sectors have collapsed as a result of poor upkeep. In Nigeria, there is a high degree of non-maintenance that causes significant investments in the sectors to become obsolete, which is equivalent to purposeful destruction of one's prized possessions. Both private and governmental structures have collapsed due to a culture of poor upkeep. Due to a lack of a maintenance culture, even human capital has diminished in vigour, aptitude, and capability. Actually, the lack of a maintenance culture affects every aspect of the nation, thus reorientation is necessary right away. Infrastructure facilities, often known as economic and social overhead capital, include systems for providing energy, water, and sewage.

In addition, there are roads, hospitals, telecommunications, and postal services. (Dabara, *et al.*, 2013). To ensure the sustainability of their infrastructure, governments (federal, state, and local), commercial organisations, and people must have a maintenance strategy. This is possible because to maintenance culture, which is seen to be related to a country's progress. It is widely known that stakeholders are extremely concerned about the appalling condition

of public infrastructure in Nigeria. The state of Nigeria's airports, hospitals, schools, and other infrastructure would suggest that society lacks a manager who might have helped assure the smooth operation of the institutions and promoted national growth.

The deficiencies in the Nigerian aviation industry, according to Nahimah (2008), were caused by a lack of maintenance culture and inadequate training for professional engineers. The author went on to say that maintaining current aircraft correctly is more important to the business than purchasing new ones, adding that a well-kept older aircraft is just as good as one that is not well maintained. This paper totally concurs with the author. Studies by Tijani, *et al.,* (2016) suggested that the condition of public facilities, such as street lights installed by previous and current governments' years ago that would have served as a means of beautification and lighten our society, was deteriorating because of a lack of maintenance practises, such as not changing bulbs or repairing little problems.

In terms of building infrastructure (industrialization), protecting the environment, creating jobs, and aiding government firms with timely tax payments, the contribution of private groups to national growth cannot be overstated. These are possible, according to Nahimah (2008), if a company's operating facilities (machines) are consistently dependable, accessible, and maintained over the duration of their installed service years. A developing society, according to Cobinnah, (2010), required to adapt to change and more rapid inventiveness.

According to these authors, pursuing continuous development and putting in place a smart maintenance programme are crucial in the modern day. They also suggested that difficulties with maintenance management in Nigerian industries led to low production and material

availability, which eventually would force certain businesses to close. Since assets and facilities are crucial to an organization's resources, enhancing the working environment and maintaining their wellbeing is a crucial issue that needs to be taken seriously. In order to achieve the company's collaborative aim, it is necessary for all people participating in the organization's facilities management to have proper and ongoing maintenance knowledge.

However, the issue of sustaining national facilities is now a top priority for the nation and puts pressure on the government to manage its resources and assets (Dabara, *et al.*, 2015). We consequently require a maintenance habit at the governmental level, in the commercial sector, and on an individual level if we are to improve the quality of infrastructure in our society as agents of national growth. To help our country attain its objectives, the article discusses the origins, consequences, and solutions to the problem of bad maintenance.

2.8 Causes of Poor Maintenance Habit in Public Institutions

According to Omirin 2022, these are a few of the difficulties that have been noted that are responsible for the poor maintenance of public buildings in Nigeria:

i. Corruption: Obayelu (2007) Attempting to obtain wealth or power illegally for personal gain at the expense of the public, or abusing public authority for personal gain, is what is meant by corruption, according to Omirin (2022), who also compared the expansion of corrupt practises in all of their forms to the progress of the human race In his writings, Ogundiya (2009) defined corruption as the use of official authority, resources, and positions for personal benefit. Along with democratic and autocratic political systems, corrupt practises also exist in feudal, capitalist, and communist economies. Cultures of the Christian, Muslim, Hindu, and Buddhist faiths are all plagued by corruption (Obayelu,

2007). Because there is no efficient and functioning method to control the threat, corruption has jeopardised the growth of our country.

A sitting administration grants projects (without the resources to complete them), only for its successor to discard them for personal benefit. Because they believed that awarding new projects at inflationary costs would benefit the administration rather than the public, government are only interested in cutting ribbon project, they award contracts to build infrastructural facilities while succeeding governments that ought to consolidate on the earlier achievement would only be interested in new projects thereby abandoning the old. **ii. Leadership:** For a country to flourish, leadership must be strong and effective. The key characteristics of an effective leader are the capacity to create policies, turn potential into reality, and provide adequate leadership to subordinates. Persuading people to perform a job and directing the group in a way that promotes its coherence and cohesion are both aspects of leadership. It entails convincing others to see and concur with what must be done and how to achieve it. (Yukl, 2006). Additionally, leadership entails elevating one's goals, boosting one's performance to higher standards, and developing one's personality beyond its typical bounds.

Few of our leaders are up to the task, and the bulk of them lack the qualities necessary for effective leadership, which may explain why most of the country's infrastructure is in a state of disrepair and decay. The idea that one cannot offer what one does not have is widely held. According to Tijani *et al*. (2016), the majority of our leaders lack the maintenance culture, vision, passion, and empathy that are necessary to inspire and motivate employees to maintain and preserve current facilities.

iii. **Attitudinal Problem**: More concerning is Nigerians' attitude toward both their private and public property. According to Jagun (2022), public office holders almost ever renovate their official structures or facilities until such time as such assets pose a risk to the users' lives. It is a well-known fact in Nigeria that most newly elected administrations spend little to no money maintaining and renovating the facilities they inherit, preferring instead to build new ones in order to spend the few resources of the state on them. According to Tijani *et al*., (2016), Individuals have spent a great deal of money on things that may have been avoided or remedied by following maintenance procedures, such as their health, buildings, automobiles, and other items.

iv. **Lack of Policy:** Lack of a maintenance policy is another factor contributing to the complete disaster that is most of our public and private infrastructure. A policy may be a piece of law, a regulation, a procedure, an administrative choice, an inducement, or a voluntary practise of a government or other organisation. There isn't a single blueprint, plan, or strategy that specifies how public infrastructure should be maintained at the federal or state levels. Our elected officials in both the federal and state legislatures have not yet taken any decisive action to enact laws that would recognise the serious maintenance issues that arise in the management of public buildings. Executive branches are establishing ad hoc committees or agencies to deal with the national development while also sustaining, maintaining, and renovating the nation's facilities.

2.9 Maintenance Policy

According to BS 3811, maintenance policies give decision-makers a framework. The guidelines for distributing resources (people, materials, and money) among the many

maintenance tasks that management is capable of performing may also be considered. The advantages of such measures to the organisation as a whole must be determined and contrasted with the expenses involved in order to deploy resources properly.

A number of factors are considered while developing a policy, including aims, benefits, and policies. In Nigeria, it is not a common practice to provide maintenance manuals. Such a document together with adequate funds, will it much easier for proper planning of maintenance activities. There is no legislation that makes it mandatory for premises to have a maintenance manual. A national maintenance policy would have provided this necessary legal framework and backing for provision of maintenance manuals.

2.10 National Building Code

In Nigeria today, the mother of every policy document that has to do with the built environment is the national building code. This building code which came into effect on August 2nd 2006 arose from the following existing conditions of our cities and environment:

(a) Our towns and cities don't have any planning;

(b) The frequent collapse of structures, fire infernos, misuse of the built environment, and other catastrophes;

(c) The lack of referenced design standards for experts;

(d) Use of quacks and unqualified individuals;

(e) Utilizing materials and goods that haven't been thoroughly evaluated;

(f) The absence of a maintenance culture.

Given the foregoing, the National Council on Housing and Urban Development decided it was important to start developing a National Building Code in order to reverse the negative trends in the building sector. The code's goal is to provide a minimal standard for construction during the preconceived, design, construction, and post-construction stages in order to guarantee the built environment's quality, safety, and competence.

(a) Phase before design

(b) planning stage

(c) Stage of Construction

(d) Phase following Construction

"The requirements of this Code shall be applicable to and govern all aspects relating to building design and specification, costing, construction, addition, modification, relocation, demolition, location, repair, and usage for existing or prospective building works within the Federal Republic of Nigeria.," states paragraph 3 of section 1 subsection 2 of the code. (2006) National Building Code.

For the purposes of this research, institutions are being classified into use group F, which is further subcategorized into F1, F2, and F3. Every building or structure, whether currently in existence or subsequently constructed, shall be as classified in this Code according to its use or character of occupancy into one of the Use Groups.

Use Group F-1: This use group consists of structures or portions of structures that house six or more people who must live under supervision due to their age, mental disability, or other circumstances, but who are physically able to respond to an emergency situation without the

need for personal assistance. When housing people who fit the aforementioned description, the following types of institutions are to be categorised as F-1 facilities: board and care facilities, halfway houses, group homes, social rehabilitation facilities, alcohol and drug treatment facilities, and convalescent facilities. A structure like the one above must be categorised as a residential use group if there are five or fewer residents.

Use Group F-2: This use group consists of structures or portions of structures used to provide medical, surgical, mental, nursing, or custodial care to six or more people who are unable to defend themselves on a continuous basis. When housing individuals who fit the aforementioned description, the following types of institutions should be categorised as F-2 facilities: hospital, nursing home (both intermediate care facility). A structure like the one above must be categorised as a residential use group if there are five or fewer residents.

Child care facility: A child care facility must be classed as Use Group F-2 if it can house more than five children who are 4 years old or less.

Use Group F-3: This use group consists of structures or portions of structures occupied by six or more people who are subject to some kind of security or restriction.

Due to security measures beyond of the residents' control, the F-3 facility is populated by people who are often unable to defend themselves.

Prisons, jails, reformatories, detention centres, correctional institutions, and pre-release centres fall under the category of F-3 facilities when housing people who fit the aforementioned description.

Group F occupancy requirements are outlined in Section 7.1.12 of the national building code.

2.11 National Public Building Maintenance Policy

The negative effects of public construction neglect in Nigeria necessitated the Federal Government on April 6, 2022 to issue an order for the implementation of the national public buildings maintenance policy, executive order 11. This was necessary to minimize maintenance cost. Following the executive order, the head service of the federation has established the department for federal public asset maintenance with the following mandate

1. The department oversees the coordination, implementation, management and maintain public assets
2. Provide training and support to the relevant department of ministries, departments and agencies for public building maintenance.
3. Carry out maintenance needs assessment and develop maintenance plan accordingly
4. Maintenance procurement management and the management of outsourced maintenance services.
5. Data collection and establishment of comprehensive database of all public buildings
6. Collaborate with MDAs to modify public buildings to accommodate persons with special needs.

According to Onokwai, (2022), the order is major policy pronouncement of the federal government that is already impacting on the built environment.

2.12 Public Institutions

Public institutions, generally institutions created by the government to provide services to the general public, or any establishment created or under the jurisdiction of the federal

government, a state government, a local government, or a municipality. This definition includes institutions of higher education. Public institutions exist to give services to the general public for the general wellbeing of the state (Onokwai, 2022). Services and activities provided by public entities should constantly be assessed in light of demand.

2.13 Public Asset Maintenance Framework

Public assets are any tangible or intangible property created or purchased with state funds; this includes real estate, stock ownership rights, land, and buildings. Assets and infrastructure are key concepts used to assess the degree of development of a nation.

This is true because they are actual parts of complex networks that deliver goods and services necessary to enable, maintain, or improve society living standards.

In order to promote productivity and the expansion of trade and industries in society, a country must have an effective system for managing infrastructure upkeep. Therefore, from a management standpoint, it is crucial that the government develop a thorough strategy for planning, managing, using, and disposing of public assets. This calls for upkeep, particularly of urban infrastructure, which has a significant impact on a nation's economic progress. In order for this infrastructure to function properly or continue to be useful, it is crucial to maintain it in good shape.

According to Jagun, (2022) public asset managers should adhere to the following ethical standards

i. Shun Nepotism: simply defined, ensure the most qualified is taken for the job; no form of compromise should be entertained.

ii. Avoid Conflict of Interest: ensure personal interest doesn't interfere or supersede organizational interest.

iii. Continuous professional development in the field of property and facility management

iv. Ensure profit maximization is not the goal, rather, social goals take center stage

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Study of the Population

The population of the study consists of the entire staff of the Kuje Correctional Facility which stands at 406 personnel., consisting of maintenance staff and the general duty officers of the facility.

3.2 Sample Frame

Every person in the population from whom a sample is to be drawn is listed in a sample frame. The sample frame includes all the personnel working at the facility under consideration. The study used a sample frame of 196 based on Krejcie and Morgan (1970) formula sample frame determinant and consideration of the sample size.

3.3 Sample Size and Sampling Procedure

The fundamental idea behind sampling is that by selecting a subset of a population, the researcher may infer information about the complete population. To create a small crosssection, the sample selected should be as representative of the entire population as feasible and the process of selecting a sample is known as the sampling procedure, and the

survey that is done as a result is known as the sample survey. The respondents in this study were divided into two groups; the maintenance department was chosen using the "purposive Sampling Technique" on a non-probability basis. The researcher's assessment served as the foundation for selecting the sample's components. The researcher's natural focus while selecting the sample was on components that were accessible, reachable, and eager to participate. The researcher employed a straightforward random sampling approach to pick the sample in order to obtain the respondents' opinions on the overall state of the building component. Four hundred and six (406), which represented the full staffing strength, of the Kuje Correctional Facility were employed as the sample size. Using a sample frame, this was further deconstructed.

In equation 1:

$$S = \left[\frac{[X^2 * N * P(1-P)]}{D_{2(N-1)} + X^2 * P(1-P)}\right] \quad \text{Eq 1}$$

Where;

S = required sample size,

X^2 = the table value of chi-square for one degree of freedom at the desired confidence level (3.841),

N = population size,

P = the population proportion assumed to be 0.5, since this would provide the maximum sample size,

D = the degree of accuracy expressed as a proportion of 0.05.

3.4 Sampling Technique

The correctional facility in the research region were chosen using the stratified random approach, which is a non-probability sampling technique that was accepted as being suited for this study because it is a public institution that does not receive guest like public schools and hospitals hence, it does not have the public attention.

3.5 Method of Data Collection

The study used quantitative research and used first-hand information that was directly gathered from the case study location. A closed-ended questionnaire and organised observation were used.

3.5.1 Observation

In order to determine the maintenance state of the structures, a physical observation in the form of structural inspection was conducted using a structured observation sheet as shown in appendix x. Some of the variables taken into cognisance just to mention a few were leakage, rust and damage in the roof, condition of the windows and doors, painting state and the physical appearance of the floors and walls.

3.5.2 Structured Closed End Questionnaire

To determine the structural state of buildings in the facility, a total of Two Hundred and Fifty - Five (255) of General Duty Officers from different departments was sampled, an allowance of 30% was included to take care of nonresponse of respondent. Self-administered, closedended questions were used to gauge respondents' opinions of the buildings' structural health. The questionnaires were physically handed out to participants, who then had enough

of time to complete them after being clearly informed of the objective of the questionnaire and how to complete it.. From the 255 distributed questionnaires, 196 were recovered for the purpose of analysis. Also, to understand the maintenance system in place for the facility and level of implementation, a different structured questionnaire was administered in a similar manner as earlier explained to a representative of the maintenance department see appendix.

3.6 Data Analysis

The frequency of each category found was qualified in percentage terms and, when appropriate, rendered in a pie or bar chart using Microsoft Excel Software 2010. Data gathered via field observation and closed-ended questionnaires were represented in a tabular manner. Despite the fact that data were retrieved using numerical data, it only helped to identify the existence of each condition of the structure as it was observed. Due to the impossibility of quantitatively defining the requirement, they were thus summarised using nominal data. Wherever a condition scored 70% or more in the observation section, it was labelled as the facility's identified condition. For the questionnaire portion, a generalised thought was identified by the greatest percentage for each item.

3.7 Research Ethics

An organised approach that adheres to the standards of research writing has been taken into consideration for the purpose of this study. Both direct observation and self-administered questionnaires were used in the data collection process. The earlier method did not incorporate the participants' concepts and was an identification of the condition and state of the physical buildings with the Kuje facility. On the other hand, as participants were supposed to be busy people, the latter, which requires the opinions of those directly involved in decision

making verging on maintenance, was designed to be less stressful, time-consuming, and to effectively explain the process to them.

Participants' understanding of the goal of the questionnaire helped to prevent deception and non-voluntary behaviour by outlining the information that was needed. The distribution process was conducted with courtesy, and the phrases used were carefully chosen to prevent participant discomfort and unwanted reactions. Finally, there is absolutely no participant quote at all in the data analysis design.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Brief History of the Facility

4.1.1 Age of the facility

According to the maintenance department, the facility was initially constructed by the federal government of Nigeria in year 1989 with a capacity of 380 and in 1995; the capacity was increased to its current capacity of 560 inmates which is it current capacity as at time of this research.

According to (Cobbinah 2010) Houses deteriorate with age, since the lifespan of most buildings are constructed to last at least sixty (60) years, but may exceed this period if the building is well maintained over time. Above 60 years most houses exhibit serious maintenance problems which will demand at least major renovation, rehabilitation, replacement or repair. The present condition of the buildings within the facilities is chiefly attributed to lack of maintenance.

The facility which is a medium security facility now accommodates high profile criminals like the boko haram and bandit commanders that ought to be kept in a maximum-security facility.

4.2 Maintenance Policy

Our finds reveal that with the assistance and periodic interventions of the British council, the facility has a maintenance program which is more of a reactive measure in its implementation. No clear policy document on maintenance of the physical fabrics of the facility. Maintenance task are reactive in implementation and are on ad-hoc basis. The absence of clear-cut maintenance program for the facility is a clear indication that the facility would someday become obsolete and capital intensive to venture however, the facility adopts a centralized approach in handling maintenance. This responsibility for building maintenance rests largely with one office which is the Maintenance department that oversees maintenance for all buildings building.

The department are responsible for all maintenance of the buildings including: painting, replacement of wooden members and net, roof, electricity, sewerage, and plumbing.

4.3 What Necessitate Maintenance in the Facility

Findings reveals that reactive maintenance is the norm within the facility, this is attributed to some factors which includes the procurement pattern which requires due process to be followed before maintenance task is been carried out. Secondly, the absence of a feedback mechanism to measure service specification is been met by the vendor, this has caused substandard maintenance work to be carried out within the facility. Reactive or emergence maintenance which is the normal practice does not give value for money which is a scarce resource in this regard.

4.4 Response Time for Maintenance Request

Findings reveal that maintenance within the facility is classified on the basis of the cost implication, maintenance beyond a certain threshold requires approval from authorities outside the facility, this has implication on the response time, maintenance schedule and when further deterioration occurs due to inaction of the authorities, the maintenance cost goes higher.

4.5 Funding for Maintenance

Findings reveal that funding for required maintenance work is not given the necessary importance until it becomes a security threat to the facility. Several causes are attributed to menace which includes, competing need of funds leading to underfunding, lack of maintenance program for the facility and statutory framework for public buildings maintenance practice.

Because of the centralised nature of the service and the aforementioned, funding of maintenance works are grossly under budgeted.

4.6 Frequency of Facility Audit

Findings reveals that the facility in its capacity as a medium security facility requires frequent inspection of every component of the building fabric as such facility audit is been carried out frequently to ascertain the condition of the facility. Professionals from within the built environment are the detailed in the maintenance department however; their recommendations are generally subjected to competing needs of budgetary allocations.

4.7 Physical Condition of the Roofing Sheet

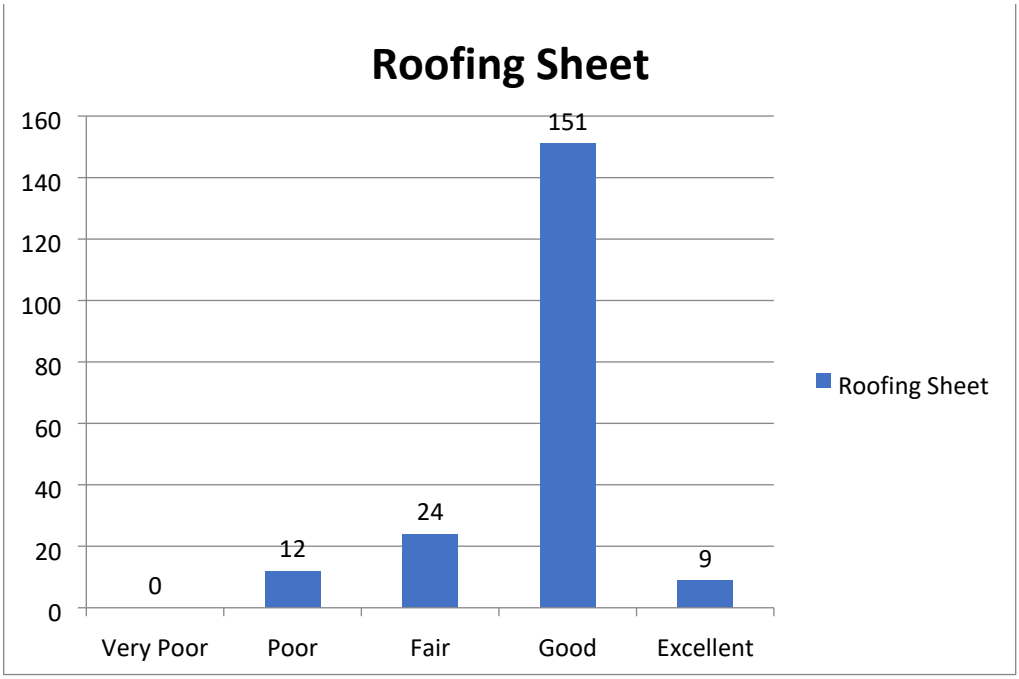

Figure 4.1: Physical Condition of the Roofing Sheet

Source: Data analysis (2022)

From Figure 4.1, the 196 study population for the purpose of this analysis showed that 151 of them (which signifies 77% of the total population) rated the roofing sheet of the Kuje Prison as Good in relation to its physical condition; 24 participants (12.2%) consider the

physical condition of the roofing sheet to be fair; 12 participants (6.1%) thought the roofing sheet of the prison to be in a poor physical condition while; 9 of the study population, which represent 4.6% consider the roofing sheet to be in an excellent physical condition.

4.8 Physical Condition of the wall

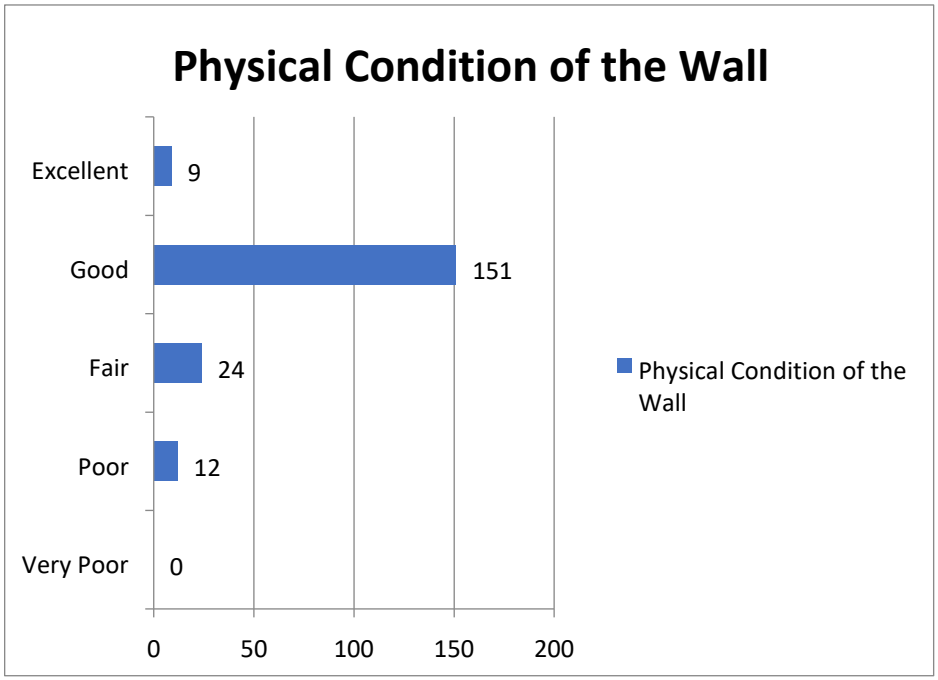

Figure 4.2: Physical Condition of the Wall

Source: Data analysis (2022)

Figure 4.2, the 196 study population for the purpose of this analysis represented that 151 participants (which signifies 77% of the total population) rated the Walls of the Kuje Prison as Good in relation to its physical condition; 24 participants (12.2%) consider the physical condition of the Walls to be fair; 12 participants (6.1%) thought the Walls of the prison to

be in a poor physical condition while; 9 of the study population, which represent 4.6% consider the Walls to be in an excellent physical condition.

4.9 Physical Condition of the Paintings

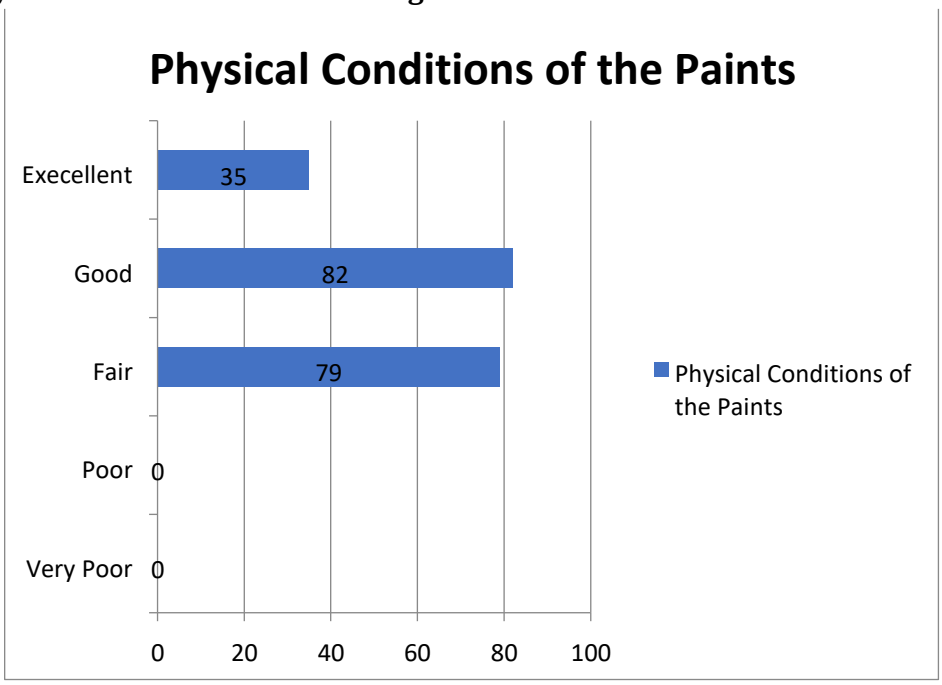

Figure 4.3: Physical Condition of the Paints

Source: Data analysis (2022)

Figure 4.3 shows that from study population of 196, 86 participants (which represents 41.8% of the total population) rated the physical condition of the paints of the Kuje Prison as Good; 79 participants (40.3%) consider the physical condition of the Paints to be fair while; 35 of the study population, which stands for 17.9% consider the Paints to be in an excellent physical condition.

4.10 Physical Conditions of the Window

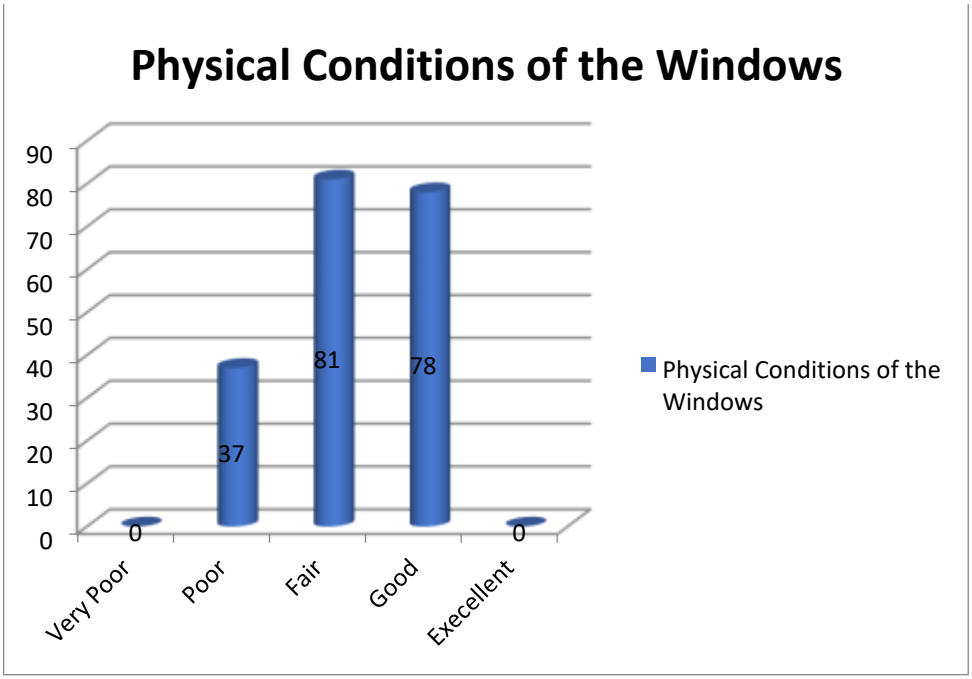

Figure 4.4: Physical Conditions of the Windows

Source: Data analysis (2022)

Figure 4.4 shows that from the study population of 196, 81 participants (that is 41.3% of the total study population) rated the physical condition of the Windows of the Kuje Prison as Fair; 78 participants (39.8%) consider the physical condition of the Windows to be Good while; 37 of the study population, which stands for 18.9% consider the Windows to be in a Poor physical condition.

4.11 Physical Condition of the Floor

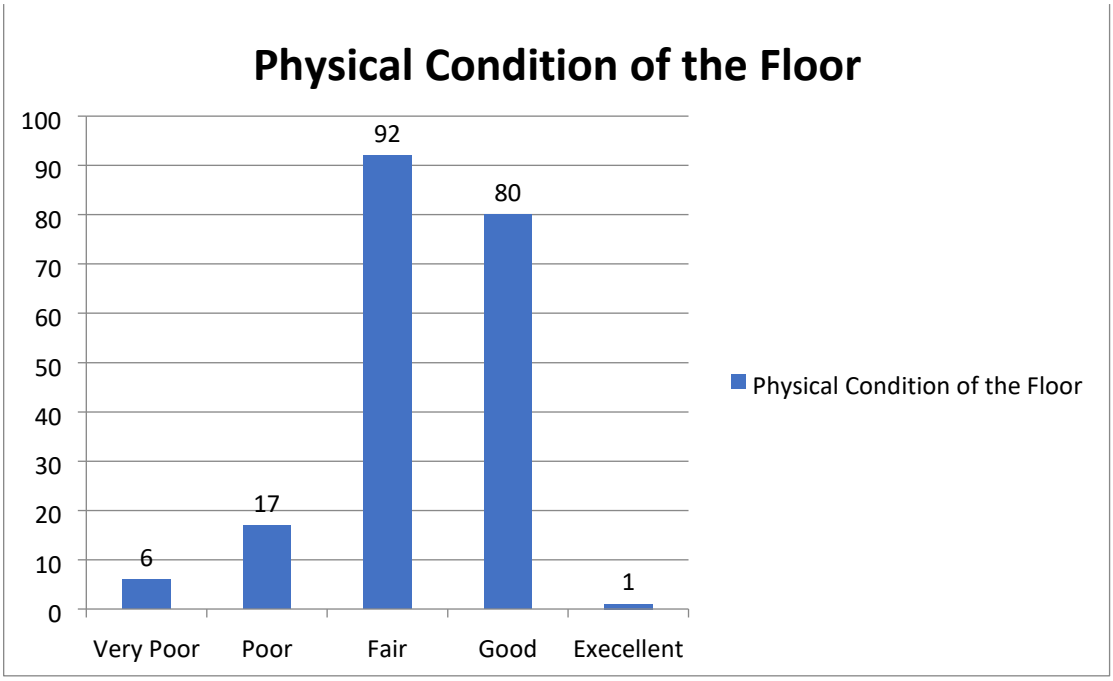

Figure 4.5: Physical Condition of the Floor

Source: Data analysis (2022)

Figure 4.5, the 196 study population for the purpose of this analysis showed that 92 of participants (which signifies 46.9% of the total population) rated the Floor of the Kuje Prison as Fair in relation to its physical condition; 80 participants (40.8%) consider the physical condition of the Floor to be in a Good condition; 17(8.7%) thought the Floor of the prison to be in a poor physical condition while; 6 of the study population, which represent 3% consider the Floor to be in a Very Poor physical condition and; 1(0.5%) participant had a notion that the Floor is in an Excellent physical condition.

4.12 Condition of the Building Services

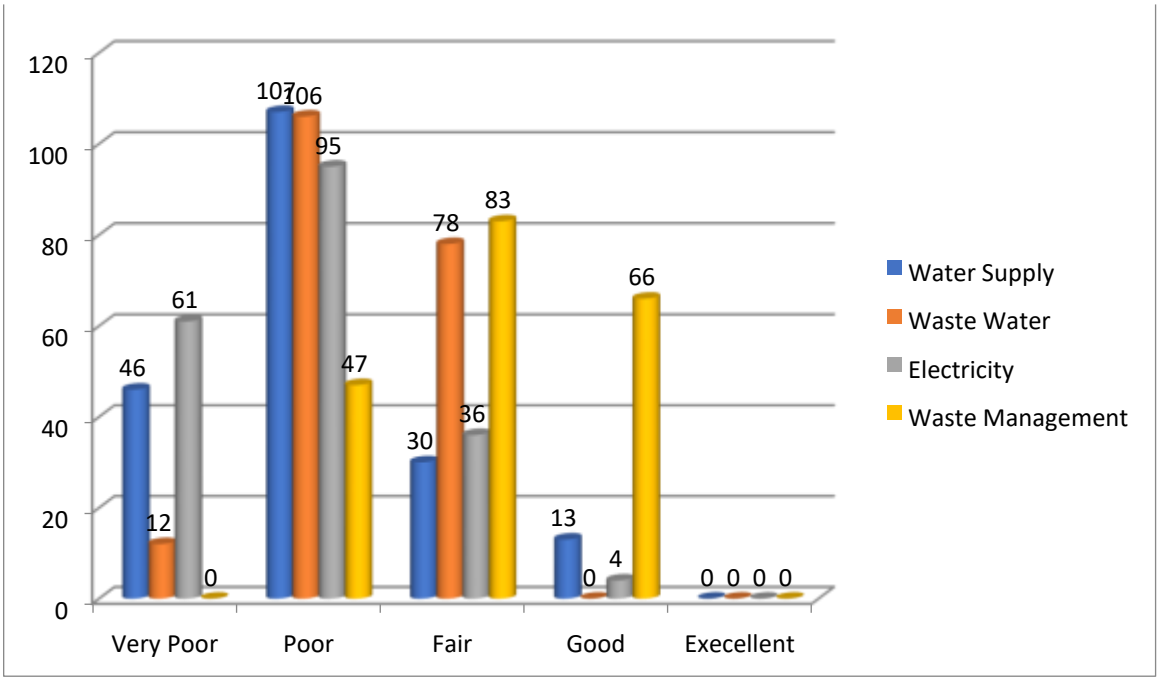

Figure 4.6: Conditions of the Building Services

Source: Data analysis (2022)

Figure 4.6 shows that from the study population of 196, the condition Water Supply was rated as follows; 46(23.5%) as Very Poor; 107(54.6) as Poor; 30(15.3) as Fair and; 13(6.6) of the participants consider the Water Supply as Good. For the condition of waste water handling, the study participants rated as follow: 12(6.1) consider it Very Poor; 106(54.1%) rated it Poor while; 78(39.7%) consider the condition of waste water handling to Fair. In the case of Electricity, the study population rated as follow: 61(31.1%) participants consider it to be Very Poor; 95(48.5%) thought Electricity Supply was Poor; 36(18.4%) consider it Fair while; 4(2%) of the study participants rated Electricity Supply as Good. Figure also shows

rating of the study population Waste Management Services as follow: 17(8.7%) thought it was poor; 83(42.3%) consider it Fair while; 66(33.7%) consider the Waste Management Services as Good.

4.13 Summary of Findings

This section summarizes the finds of the research work; it is summarized in order of the objectives of the research work.

i. Findings from the research reveals that the environmental envelop of the facility are structurally sound however; the rate of deterioration is high chiefly because of no or lack of maintenance policy and program within the facility, poor maintenance of sound structure would result into fast deterioration of the same because of usage over time, environmental factors and differing lifespan of building component. Delay in fixing leaking roofing sheet early had resulting effect on other building components. Also, the facility is overstretched as it was redesigned to accommodate 560 inmates but currently accommodates an approximately 900 inmates. Users above the occupancy capacity exact pressure on buildings. There is correlation between density ratio and the quality of services as the services is designed for a specific number of users. Anything above the required or specific number it was initially designed for means stress on the facility.

ii. Findings revealing that the facility does not have a clear-cut policy direction for maintenance activities. Maintenance is mostly carried out on a reactive basis which is generally more expensive and time wasting. It also reveals that the procurement system in the country is not favourable to public building maintenance, particularly

planned maintenance schedule because of the administrative bottleneck. With respect to capacity of the maintenance department, the manpower on ground cut across the professional from the built environment, however, training and retraining, continual professional development is required. Funding cannot be overemphasized in building maintenance of public assets as it is required both for capacity building and capital expenditure. The current status of public buildings is mostly a result of inadequate funding and administrative barriers to the distribution of cash. This has been made worse by the high cost and low-quality building materials available in the market, new constructions that frequently receive more attention than ongoing building maintenance projects, and high maintenance costs as a result of work done by private contractors because maintenance staff has little technical difficulty performing such tasks. The national building code which ought to have addressed the matter from design to post occupancy stage have not been implemented. Also, executive order 11, which is mainly to address public buildings and infrastructure is not detailed enough to address the matter.

iii. The research reveals the factors that causes the lack of maintenance from poor funding which is chiefly due to competing budgeting needs of other sectors of the economy, lack of the implementation and enforcement of government policies that would aid public asset maintenance like the national building code which was formulated in 2006 and the executive order eleven, local laws and regulations to force both managers of public assets and occupiers to undertake maintenance failure which shall be penalized are not in place. The political class are more interested in new projects than allocating resources for the maintenance of existing public

infrastructure; this has a detrimental effect of existing stock of infrastructure.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The analysis has shown that there is a significant issue with maintenance in public buildings for the government, with no maintenance program for public buildings which is a national asset, large sum of resources would be used for emergency maintenance.

Building maintenance problems are very pronounced in public institutions in Abuja. There are two basic reasons why this happened: absences of building maintenance plan and the administrative bottleneck of the procurement system in Nigeria. In addition, maintenance culture of the users or occupants of the buildings is relatively poor as they lack the sense of ownership and need to ensure basic or routine simple activity is carried out.

The analysis found that the most frequent maintenance issue was faded painting, partly broken windows, exposed foundation and leaking roofs among others.

The age of the buildings, the absence of enforceable national maintenance policy, inadequate funding and deferred maintenance programmes, low capacity of maintenance staff, pressure on buildings due to the number of users, among other factors, have all had a significant impact on the maintenance challenges the study observed.

5.2 Recommendations

The following suggestions are ways to address the upkeep issues of Abuja's public institutions.

i. Public institutions must adopt preventative maintenance rather than adhoc maintenance or corrective maintenance. To gain optimum benefits from preventive maintenance, professional from the built environment should incorporate preventive maintenance tasks into a work-order system and keep systematic maintenance records with the aid of information and communications technology. The expert should assess the preventative maintenance programme so that it may be improved over time. This can be achieved by preparing a condition assessment of the assets and then the building component should be evaluated based on the lifespan of the component. This would go a long way to aid planning and allocation of resources.

ii. Public institutions should ensure that their maintenance department is adequately staffed with the requisite manpower and that employees have appropriate training and competence to safely undertake and complete the maintenance tasks expected of them. Training and retraining cannot be overemphasised, unskilled staff who carry out daily maintenance task should be trained to report any noticeable changes or fault on any building component.

iii. Professional from the built environment should carry out, at regular interval inspections for assessing the buildings conditions and create an inventory of buildings' components and equipment. They should plan building inspection, since proper planning of inspection is a sure way to reduce maintenance cost since doing

so can provide insight into future maintenance needs and avoid unplanned maintenance.

iv. Robust state regulation, legal frame work and public buildings maintenance policy for state owned properties should be formulated and enforced. The national building code which governs building construction should be updated to cater for maintenance of public structures by clearly mandating preventive maintenance for public institutions. Accessibility, power, energy, fire safety, plumbing, and other mechanical elements like elevators should all be impacted. Additionally, a National Maintenance Policy should be developed as part of the National Building Code to compel building managers and owners to perform maintenance on the structures they occupy in order to prevent the loss of significant sums of taxpayer money due to the deterioration of public structures as a result of poor maintenance.

v. Professionals in the built environment particularly from the private sector to on a continuous basis to advice the government on the need for planned maintenance schedule.

To increase a building's lifespan and reduce the pace of degradation, managers of public buildings or infrastructures should make sure that quality and durable building materials are employed. Public institutions should include materials with less maintenance issues into their current building designs.

vi. To meet the varying knowledge demands of their diverse levels of employees on building or infrastructural maintenance, maintenance managers ought to establish a multi-level education approach.

vii. Inadequate maintenance should be discussed in terms of its effects on safety and health, such as sick building syndrome and food poisoning brought on by falling paint particles. Until the topic gains currency and the general public are made to understand the negative impact on health and general wellbeing of the occupiers and users, maintenance would not be taken seriously.

People who work in government buildings should likewise put aside their lack of concern for the ownership and upkeep of such property in favour of displaying a strong feeling of ownership. This can be accomplished by public sensitization, and enlightenment the stringent enforcement of sanctions, such as charging building residents for damage sustained and evicting them from the property, a maintenance budget that will be used to fund all maintenance tasks must be established by the government.

For the purpose of planning and supervising the implementation of maintenance requirements for public institutions, it is necessary to establish a national maintenance agency that is comparable to the Federal Roads Maintenance Agency. As we all know, deferred maintenance leads to backlogs, this backlog decreases facility performance and rises cost of repairs. But as commence to carryout maintenance plaguing public buildings, we contend to prioritize growing maintenance demand with limited budget, we must not lose sight of the goal.

5.3 Contributions to Knowledge

i. The research indicated the need for the government to enact maintenance policy at the national level and it should be enforced to the latter. ii. The research shows that planned maintenance in the long-run is a cost saving measure that eliminates downtime and boost

productivity. iii. The research equally revealed the need for users of public institution buildings to own the structures as it is a collective national asset.

REFERENCES

Adejimi, A. (2005). Poor Building Maintenance in Nigeria: Are Architects free from Blames? Being paper presented at the ENHR International conference on "Housing: New Challenges and Innovation in Tomorrow's Cities" in Iceland between 29th June3rd July, 2005.

Adeleye, S. I. (2009). Maintenance Practice in Nigeria [Paper presentation]. Policy, Budgeting and Legislative Issues. A paper presented at "Sensitization Campaign or Maintenance Culture" Organized by National Orientation Agency, Oyo State Directorate, Ibadan.

Afranie, S. & Osei-Tutu, E. (1999). Analysing of Problems, Practices and Policy perspectives. Ghana: World Bank

Ahrén, T., & Parida, A. (2009). Maintenance performance indicators (MPIs) for benchmarking the railway infrastructure. Benchmarking: An International Journal, 16(2), 247-258. https://doi.org/10.1108/14635770910948240

Ajayi, O. O. (2016). Maintenance Management of Prison Facilities in South-West, Nigeria [Unpublished doctoral dissertation].

Alsyouf, I. (2007). The Role of Maintenance in Improving Companies' Productivity and Profitability. *International Journal of Production Economics*, 105(1), 70-78.

Ayuk, A. A., Emeka, J.O. & Omono, C. (2013). The impact of reforms of on the welfare of the inmates: A case study of Afokang prison, Calabar, Cross River state, Nigeria. Global Journals of Human Social Science, 13 (2), 1-6

B.S. 3811(1974); British standard Glossary of maintenance Terms in Technology maintenance March/April.

Ben, J., Mohamed, A. O., & Muduli, K. (2021). Effect of preventive maintenance on machine reliability in a beverage packaging plant. *International Journal of System Dynamics Applications*, 10(3), 50-66. https://doi.org/10.4018/ijsda.2021070104

British Standard Institution (BS 3811) (1984). Glossary of general terms used in maintenance organisations. Blackwell Science Ltd, Oxford. U.K.

British Standards Institution. BS 3811: (1984) Glossary of Maintenance Management Terms in Terotechnology Chicago: APWA, 1992.

British Standard Institution (1993). BS3811: 1993. *Glossary of Maintenance Management Terms in Terotechnology*. Chicago: BSI

Chanter, B., & Swallow, P. (2008). Building maintenance management. John Wiley & Sons.

Cobbinah, J.P (2010) Maintenance of Buildings of Public Institutions in Ghana. A Thesis submitted to the Department of Planning, Kwame Nicrumah University of Science and Technology, Kamasi.

Dabara, D. I., Anthony, A. I., Guyimu, J., Oladimeji, E. J., & Oyediran, O. O. (2016). Infrastructure financing and urban development in Nigeria. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2784497

Derek, M. & Paul, S. (1987). Building Maintenance, Intermediate Technology. London

Ellingsen, H. P., Kumar, U., Liyanage, J., Nerhus, O., Hamre, R., Waldeland, R., Martinus N.N., & Dreagesaet, K., (2002), Management of assets, resources and maintenance by using a balanced scorecard-based performance framework, proceedings of the 16th European maintenance congress: Euro maintenance, Helsinki, Finland. 203211.

Ernest, M. (2015). *Challenges of maintenance management of commercial Buildings in Ghana: A case study of social security and national insurance trust properties in Accra*. A Thesis submitted in partial fulfilment of the requirement of Kwame Nkrumah University of science and technology for a degree of masters of science in construction management. Kumasi: Kwame Nkrumah University of Science and Technology.

Esther, I. O. (2015). The challenges of healthcare facilities maintenance in tertiary hospitals in south east Nigeria. *International Journal of civil engineering construction and estate management* Vol. 3, No.2, 1-6, June 2015

Google Maps. (n.d.). [kuje area council map]. Retrieved August 5, 2021, from https://google/maps/search/kuje+area+council/@8.8810698,7.2263168,862m/data=!3m1!1e3?entry=ttu

Hagerby, M., & Johansson, M., (2002), Maintenance performance assessment strategies and indicators. Masters thesis, department of production economics, Linkoping Institute of technology, Sweden.

Haruna, G (2009). 'Bring Back the Culture of Maintenance'. This Day 27 April, 2009

Herbert, W. S. (2010). Effective Building Maintenance: Protection of capital asset. Lilburn: Fairmont Press, Inc.

Jagun, S. O. (2022). Ethical framework for managing and maintaining public asset [Paper presentation]. Nigerian Institution of Estate Surveyor and Valuers, Abuja.

Kotze, R., & Visser, J. (2012). An analysis of maintenance performance systems in the south African mining industry. The South African Journal of Industrial Engineering, 23(3), 13–29. https://doi.org/10.7166/23-3-508

Krejcie, R. V. & Morgan, D. W. (1970). Determining sample size for research activities. Educational and Psychological Measurement, 30(3), 607-610. https://doi.org/10.1177/001316447003000308

Lee, H. S & Yuen G. C. S. (1993) Building Maintenance Technology. Macmillan Press Lee, R. (1987); 'Building Maintenance Management" Oxford U.K.

Lee, R. (1992). Building maintenance. London: BSP professional books.

Melvin, E., Knorr, R. E., American Public Works Association, & National Research Council. Building Research Board, (1992). Plan - Predict - Prevent: How to reinvest in public buildings.

Murthy, D., Atrens, A., & Eccleston, J. (2002). Strategic maintenance management. Journal of Quality in Maintenance Engineering, 8(4), 287-305. https://doi.org/10.1108/13552510210448504

Nahimah A.N. (2008). Poor Aircraft Maintenance Hinders Aviation Safety. Daily Trust, Pp 10-12. www.allafrica/stories/200804280730.

Obayelu, A. E. (2007) "Effects of Corruption and Economic Reforms on Economic Growth and Development": Lessons from Nigeria, Paper prepared and submitted for the African Economic Conference.

Odediran, S. J., Opatunji, O. A., & Eghenure, F. O. (2012). Maintenance of Residential Buildings: Users' Practice in Nigeria. Journal of Emerging Trends in Economics and Management Sciences (JETEMS) 3(3), 261-265.

Ogunbayo, B. F., Aigbavboa, C. O., Thwala, W., Akinradewo, O., Ikuabe, M., & Adekunle, S. A. (2022). Review of culture in maintenance management of public buildings in developing countries. 12(5), 677. https://doi.org/10.3390/buildings12050677

Ogundiya, I. S. (2009). Political corruption in Nigeria: Theoretical perspectives and some explanations. The Anthropologist, 11(4), 281-292. https://doi.org/10.1080/09720073.2009.11891117

Oladapo, A. A. (2006). A Study of Tennant Maintenance Awareness, Responsibility and Satisfaction in Institutional Housing in Nigeria. Int. J. Strategic Prop. Manage. Vilnius Gediminas Technology University. 10: 217 – 231

Omirin, M. (2022, November). *Emphasizing the role of estate surveyors and valuers in the management of public assets* [Paper presentation]. Nigerian Institution of estate surveyors and valuers, Abuja.

Onokwai T. (2022, November). *Management and Maintenance of Public assets for Sustainable Development in Nigeria: Executive order 11* [Paper presentation]. Nigerian Institution of estate surveyors and valuers, Abuja.

Parida, A., & Kumar, U. (2009). Maintenance productivity and performance measurement. Handbook of Maintenance Management and Engineering, 17-41. https://doi.org/10.1007/978-1-84882-472-0_2

Pintelon, L., & Puyvelde, F. V. (2006). Maintenance decision making. ACCO.

Samuel, O., Olatunji, D., Omoregie, A., Ayodeji E. & Oke A. T. (2016):" Assessment of Maintenance Management Culture of Tertiary Institutions in Nigeria, Civil and Environmental Research ISSN 2224-5790 (Paper) ISSN 2225-0514 (Online) Vol.8, No.6, 2016.

Seeley, I.H. (1987); Building Maintenance'. The Macmillan Press. London, U.K.

Seeley, I.H. (1993) Building Maintenance, Macmillan Press Limited

Simões, J., Gomes, C., & Yasin, M. (2011). A literature review of maintenance performance measurement. Journal of Quality in Maintenance Engineering, 17(2), 116-137. https://doi.org/10.1108/13552511111134565

Sullivan, O.L. (2014). What is Building Technology? [Online]. Available from: https://www.constructionspecifier.com/what-is-building-technology/. [Accessed: 16th April 2022].

Swanson, L. (2001). Linking Maintenance Strategies to Performance. International Journal of Production Economics. 70(3). Pp.237-244.

Tijani S. A., Adeyemi, A. O. & Omotehinshe, O. J. (2016) Lack of Maintenance Culture in Nigeria: Lack of Maintenance Culture in Nigeria: The Bane of National Development

United Nation Office on Drugs and Crime (2014). Custodial and non-custodial measures the prison system. Criminal Justice Assessment, toolkit. Available on www.unodc.org/criminal_justice.html

Wahida, R. N., Milton, G., Hamadan, N., Lah, N. M., & Mohammed, A. H. (2012). Building condition assessment imperative and process. Procedia - Social and Behavioural Sciences, 65, 775-780. https://doi.org/10.1016/j.sbspro.2012.11.198 Yukl, G. A. (2006). Leadership in organizations. Prentice Hall.

Zubairu, S. N. (1999). Maintenance of Government Office Buildings in Nigeria: A Postoccupancy Evaluation Approach. Unpublished PhD thesis, University of Lagos, Nigeria

APPENDIX

FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, FACULTY OF ENVIRONMENTAL TECHNOLOGY, DEPARTMENT OF ESTATE MANAGEMENT AND VALUATION

The series of questions in this interview schedule are designed to responses on maintenance of public buildings with particular reference to the correctional facility.

Please, answer the questions that follow by ticking the appropriate option (if provided) or writing unrestrictedly for open-ended questions. Please answer all questions freely but objectively.

The information is for academic purposes only and will be treated with the strictest confidentiality.

Thank You

Mamman Yabagi Joel MAINTENANCE DEPARTMENT

1. What is the age of the facility?
2. Does the facility have a maintenance Policy?
3. What type of maintenance program is in use in the facility?
4. How readily available are findings for maintenance?
5. Do you inspect the facility to determine its maintenance needs?
6. When last was the facility audited?

7. What necessitate the carryout of maintenance in the facility?
8. How long does it take to respond to maintenance in the facility?
9. Do technician receive training to conduct the condition assessment of the facility
10. Does the institution have a written long-range plan her building maintenance that contain in inventory of all the component of the facility & the condition & estimates of their expected useful life.
11. How well are you equipped in terms of personal & Equipment for maintenance tasks.
12. How would you rate the facility condition over the year?
13. Which components of the facility require regular attention & maintenance & why?
14. In your opinion, what is the condition assessment rating of the following components of the facility

    a. Roofing sheet: [Very poor, Poor, Fair, Good, Excellent]
    b. Windows: [Very poor, Poor, Fair, Good, Excellent]
    c. Doors: [Very poor, Poor, Fair, Good, Excellent]
    d. Paintings: [Very poor, Poor, Fair, Good, Excellent]
    e. Walls: [Very poor, Poor, Fair, Good, Excellent]
    f. Floor: [Very poor, Poor, Fair, Good, Excellent]
    g. Water supply: [Very poor, Poor, Fair, Good, Excellent]
    h. Effluent: [Very poor, Poor, Fair, Good, Excellent]
    i. Electricity: [Very poor, Poor, Fair, Good, Excellent]
    j. Waste management: [Very poor, Poor, Fair, Good, Excellent]

CONDITION RATING: Scale of Asset Condition and Definitions

CONDITION STATUS	GENERAL DESCRIPTION	BUILDING CONDITION	CONDITION RATING (C)
Very poor	Asset has determined badly; serious structural problems; general appearance is poor with eroded protective coatings; elements are broken, services are not performing; significant number of major defects exists	0.00 to 0.19	1
Poor	Asset is in poor condition; deteriorated surfaces require significant attention; services are functional but failing often; significant backlog maintenance work exists.	0.20 to 0.49	2
Fair	Asset is in average condition; deteriorated surfaces require attention; services are functional, but require attention; backlog maintenance work exists.	0.50 to 0.74	3
Good	Asset exhibits superficial wear and tear, minor defects, minor signs of deterioration to surface finishes; but does not require major maintenance; no major defects exist.	0.75 to 0.94	4
Excellent	Asset has no defect; appearance is as new	0.95 to 1.00	5

NOTE:

Facility/Building Condition Index: The Building Condition Index (BCI) is an index number that indicates the current condition of the asset measured relative to its ‘as-new’ condition.

$$BCI = \frac{\text{Asset Current Condition}}{\text{As-New Condition}}$$

FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, FACULTY OF ENVIRONMENTAL TECHNOLOGY, DEPARTMENT OF ESTATE MANAGEMENT AND VALUATION

The series of questions in this interview schedule are designed to responses on maintenance of public buildings with particular reference to the correctional facility.

Please, answer the questions that follow by ticking the appropriate option. The information is for academic purposes only and will be treated with the strictest confidentiality.

Thank You

Mamman Yabagi Joel

GENERAL DUTY OFFICER

PHYSICAL CONDITION OF STRUCTURES

Instruction: Please thick where applicable

S/N	Building Component	V. Poor	Poor	Fair	Good	Excellent
i.	Roofing Condition					
ii.	Windows Condition					
iii.	Doors Condition					
Iv	Paintings					
V	Walls Condition					
Vi	Floors Condition					
Vii	Leaking Pipes					
Viii	Electric Installations					
Ix	Ceiling Condition					

Structured Observation:

Components	**Roof**		**Windows**		**Doors**	
	Leakage		Partly Broken Down		Partly Broken Down	
	Rusty		Completely Broken Down		Completely Broken Down	
	Partly Ripped Off		Good Condition		Good Condition	
	Completely Ripped Off		No Window		No Window	

Components	**Painting**		**Walls**		**Floor**	
	No Painting		Partly Broken Down,		Develop Cracks	
	Faded Painting		Cracked		Peel-Off	
	Dirty Paint		Peeled Off		Partly Broken Down	
	Completely Ripped Off		Tilted		Good Condition	
	Well Painted		Good Condition			