

## **EVALUATION OF THE CURRENT MAINTENANCE PRACTICE FOR TERTIARY INSTITUTIONAL BUILDINGS IN DELTA STATE, NIGERIA**

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### **Abstract**

Selecting an appropriate maintenance strategy can help to improve the present conditions of buildings in tertiary institution in Nigeria. However, there are few studies on the most appropriate maintenance strategies to be engaged by maintenance department to improve the conditions of the existing academic buildings in tertiary institution in Nigeria. Therefore, the aim of this research is to evaluate the current maintenance practice for tertiary institutional buildings in Delta State in a view to develop a guild to minimized building defect in the study area. To achieve this aim, objectives were developed. They include: evaluating the current maintenance practices of tertiary institutional buildings in Delta State and hypothesis was formulated; Being qualitative research, the study adopts questionnaire, interview and review of related literature to source the data needed for the analysis. Structured questionnaire was used to extract primary data from maintenance staff and professional in the build environment of the institutions, while direct observations were employed in deriving data on the state of disrepair of the buildings. The data collected was analyzed using standards application software's which include Statistical Package for Social Sciences (SPSS version 20) and Microsoft Word 2020. Relative Important Index (RII) was used for ranking. One hundred and thirty-three (133) copies of the questionnaire were administered, and the results obtained were presented in a frequency table and a chart; From the analysed data, it was concluded that the Maintenance policy and practice adopted by the institution are the very significant factor responsible for the current state of institutional buildings in the study area. The result from the hypothesis shows that there is a very significant moderate correlation between maintenance practices and current conditions of the building. The positive coefficient shows that as maintenance practices tends to be always implemented, the condition of the buildings tends to become very good.

**Keywords:** Building Conditions, Maintenance Framework, Maintenance Policy, Maintenance Practice, Tertiary Institution Buildings

### **Introduction**

Tertiary Institution building are buildings used for tertiary educational purposes, such as lecture buildings, administrative offices, residential buildings, libraries, laboratories,

hostels, recreational and sports facilities, and any other uses and buildings which may be ordinarily associated with a university/college and its activities as a diverse multi-faceted learning and research institution, whether or not such buildings are

located on the same land unit. Maintenance enhances the quality of a building structure to meet modern requirements in order to prolong the life span of the building. It is required to ensure the safety of building occupants. Shohet, Puterman and Gilboa (2002) made it clear that there are increasing demands on maintenance programme to provide tools that will support maintenance planning. This is also confirmed by Olagunju (2012) who also notes that the absence of appropriate tools for predictive maintenance of existing buildings can have a detrimental effect on the future of such buildings. It is necessary to carry out maintenance works for the safety of users and properties in the buildings, to also preserve the physical condition of the buildings and keep the buildings in good operational state at all times. Appropriate building maintenance can be achieved by providing maintenance tools for public buildings, especially in public institution.

Policies have been formulated by the government in an effort to maintain the condition of existing buildings in Nigeria and Policy defined as the direction or action taken by the central or local or city government to achieve the objectives. After policy is formulated, then the implementation of the policy is needed to overcome the problems (Tan, 2008). Nevertheless, long-term maintenance strategies with long-term inspection without considering the possible variations in the systems used and available technologies, may lead to implementation without appropriate strategies may not be effective. Some policy issues that occur in maintenance work lie in resource allocation, performance requirements, executions, administrative activities and maintenance department positions in the organization (Chanter, 2008). An inappropriate strategy selection can impact on maintenance budgets and reduce productivity and profitability (Shafiee, 2015). According to (Pintelon 2006), the definition of a maintenance

strategy is still too shallow and too floating. (Silva 2009) explains that the problem that causes the difficulty of defining an optimal maintenance policy is due to the many interests of various sectors such as technical, political, environmental. According to Zubairu (1999), many of the strategic plans, which are recorded, fail to materialize because they are only designs that are ultimately stored at the executive level.

Thus, according to Olanrewaju (2002), an organization can increase its profit margins, productivity and user satisfaction by using systematic maintenance management. Efforts to improve the performance of maintenance and maintenance of buildings in the context of appropriate use of resources need to be accompanied by policy steps that are in line with the strategy in realizing building structures that ensure technical reliability in terms of safety, health, comfort and convenience as provided for in the Nigeria Maintenance Order 11, 2019. It takes the right policy and strategy for maintenance of government building to improve performance feasibility of building function. This underscores the need for a study to provide a guild for implementation of national public maintenance framework for effective maintenance of tertiary institutional buildings in Delta State.

### **Literature Review**

A building is an asset whose value changes in line with the quantity and quality of maintenance invested in and they are procured to create a conducive and adequate environment that can support, encourage and stimulate teaching and learning, innovation and research activities. Setback in the supply of these essential services is loss in value of the building to the institution, Olarenwaju (2009). Tertiary institution is believed to be a major engine of equal opportunity, social justice in order to serve the current population of students, tertiary institutions must be maintained, renovated and expand

their buildings where necessary, workshops and laboratories must be equipped to meet the require standard for tertiary institutions, Akinsola *et. al.* (2012). The state and performance of the tertiary institution buildings and their components depends in large extend on continuous and planned periodical maintenance, which challenges the manager and management, to establish precise planning based on a well structure maintenance programme, Lateef *et. al.*, (2010). Maintenance of building received little attention from the users, designers and contractors, Siyanbola *et.al.*, (2013). Gross neglect of maintenance coupled with other factors such as structural failure which may be due to poor design, poor construction, settlement, act of God, poor materials, defect of component part including joints and connections has led to the state of structures of most federal universities today, Samuel Oluwole (2016). Building maintenance has until recently been a neglected field of technology. It possesses little glamour and is unlikely to attract very much attention (Baba and Buba, 2013).

School buildings should be one of the most important public buildings in the society. It is amazing that such an important structure has been allowed to fall into disrepair in the society. institution building quality can be measured by the level of resources, infrastructure and facilities available in a school. It is the responsibility of government to play a substantial role in providing good education for their citizens. A variety of reasons usually motivate government and this can be either economy or politics. School quality may be measured by the amount of investment from the government not minding the society. Ekundayo (2010) found that most Nigerian school buildings were of poor quality. However, the poor quality was linked with numerous problems bedevilling the system, such as inadequate funding, inadequate facilities, low morale of staff,

poor supervision of schools and frequent changes in policies.

Jegede and Owolabi (2003) observed that in Nigeria, emphasis is increasingly placed on academic qualifications; hence, schooling is beginning to be part of people life style. For people to be encouraged, a befitting academic environment must be established. According to Wong. (2006), in Singapore, schools are handled with care to the extent of having guidelines on standards and criteria for the planning of both primary and secondary school's higher institutions. In South Africa, great attention is also given to schools, as explained and there is increased liability in school buildings, considering the importance of schools. The owners, public or private, need informed decision in setting out the priorities that could drive maintenance of their properties, Silva (2009). Shohet *et al.* (2002) noted that regular inspection is a fundamental part of preventive maintenance. That study suggested a condition survey for effective maintenance work to carry out an assessment of the present condition, identification of the intervention moment and maintenance priority for maintenance planning. The study stated clearly that preventive maintenance must have inspection cycle until when failure becomes impossible to avoid. As a follow up to the study, Iyagba (2005) noted that more emphasis should be on preventive maintenance because it is the most important of all types of maintenance practice. The study recommended that regular inspection should be carried out for good maintenance; this must be done with sound knowledge of causes of decay and understanding of building construction. It was further explained that all building properties should be inspected at stipulated intervals to identify existing deterioration and recommend required maintenance planning work. That study concluded that deterioration should be measured within a stipulated time and that, the state and period of interval

between one condition survey and the other should be stated.

In the same manner, Olotuah (2006) carry out an appraisal of the state of repairs of buildings in Akure, Ondo State, Nigeria. The study revealed that most buildings were in poor state and required major repairs. The variables investigated were floor finish, building age, household size, number of bedrooms, amenities, mode of construction, wall materials and type of tenure. These variables significantly showed the state of disrepair and the need for rehabilitation. The problem of poor maintenance culture has been widely recognized in Nigeria (Mbamali, 2003; Adejimi, 2005; Usman, 2012). The lack of maintenance culture was also attributed to the factors responsible to the present conditions of tertiary institution buildings in Nigeria by Waziri and Vanduhe (2013). The lack of maintenance culture reduces the life of buildings before the obsolescence state. Shohet *et al.* (2002) remarked that resource scarcity gives limitation to building maintenance because people do not have maintenance budget in their agenda. In many developing countries, maintenance of buildings and infrastructures had not been well planned, as remarked in the studies of Zubairu (2001); Almeida (2011).

The physical and functional state of a building is the major feature by which its condition can be evaluated. Adenuga and Dosumu (2012), in a study of the assessment of procurement methods used for maintenance works of buildings, found that only 27% of surveyed respondents perceived their buildings as being in very good condition. Once they have been completed, buildings are generally expected to perform certain functions for a certain period. However, a building must be maintained to keep it in optimal operation since it is impossible to have maintenance-free buildings (Ajetomobi and Olanrewaju, 2015). In fact, the physical and functional condition of any building is a reflection of the

amount of maintenance attention given to it. Lateef, Khamidi, and Idrus (2010) assert that a building is an asset whose value changes in accordance with the quality and quantity of maintenance activities invested in it. The essence of building maintenance is, therefore, to increase the service life of a building by delaying deterioration, decay, and failure.

Building maintenance must, therefore, be considered as a strategic process if the value of a building is to be sustained (Idrus, Khamidi and Lateef, 2009). It has thus been established in the literature that for optimum performance in tertiary institutions, functional assets are required. Waziri and Vanduhe (2013) observe that both public and private buildings in Nigeria are faced with neglect owing to lack of maintenance, which in turn results in a rapid rate of defects, deterioration, and failure in some cases. Adenuga (2012) presents a comprehensive list of various building elements and maintenance services that are required for keeping a building well maintained: building fabrics, services, environment, and aesthetic. This study adopts the list of maintenance services as presented by the authors of reviewed literature to evaluate the operational state of buildings in tertiary institutions in South-West Nigeria.

A well-planned preventive maintenance is advocated for its effects on improving equipment's operating efficiency, preventing premature replacement of components, and avoiding interruptions for building occupants. Preventive maintenance is widely thought to reduce long-term costs by maximizing the operating capacities of equipment, minimizing downtime, and avoiding breakdowns that would otherwise lead to higher repair costs later.

Preventive maintenance may indirectly affect occupants' productivity and health. For example, a study of public-school conditions in the District of Columbia found that, while controlling for other factors, students in

schools with excellent building conditions had higher standardized achievement scores than students in schools with fair building conditions and even higher scores than students in schools with poor conditions. Certain preventive maintenance can improve the quality of indoor air, and insufficient preventive maintenance can be detrimental to it. For instance, lack of preventive maintenance may result in roof leaks, creating conditions for mold growth and potentially affecting some users' respiratory systems. The costs of poor indoor air are potentially dramatic, as exemplified recently by the Capitol Square building in St. Paul, which had problems that forced the relocation of its occupants and led to its demolition in early 2000 (office of Legislative Auditor, Minnesota U.S.A).

Maintaining good indoor air can have direct, positive effects on building occupants. As an example, one study-quantified savings from improved worker productivity and health associated with making indoor air quality improvements in government, school, and other non-industrial buildings. The study in the District of Columbia, estimated that a one-time upgrade of HVAC systems, including the preventive maintenance required to sustain the upgrade over 20 years would provide net benefits of \$13.31 per square foot and \$11,227 per worker Buys, (2004)

Successful preventive maintenance programs should achieve these goals:

1. Preserve taxpayers' investments in public buildings. Preventive maintenance can extend the life of building components, thus sustaining buildings' value and the significant tax dollars they represent.
2. Help buildings function as they were intended and operate at peak efficiency, including minimizing energy consumption. Because preventive maintenance keeps

equipment functioning as designed, it reduces inefficiencies in operations and energy usage.

3. Prevent failures of building systems that would interrupt occupants' activities and the delivery of public services. Buildings that operate trouble-free allow public employees to do their jobs and serve the public. Because preventive maintenance includes regular inspections and replacement of equipment crucial to operating a building, maintenance staff reduces the problems that might otherwise lead to breakdown in operations.
4. Sustain a safe and healthful environment by keeping buildings and their components in good repair and structurally sound. Protecting the physical integrity of building components through preventive maintenance preserves a safe environment for employees and the public.
5. Provide maintenance in ways that are cost-effective. Preventive maintenance can prevent minor problems from escalating into major system and equipment failures that result in costly repairs. In avoiding costs of major repairs, preventive maintenance creates efficiencies. Increasing preventive maintenance can reduce time spent reacting to crises, which is a more cost-effective way to operate buildings. Deferring preventive maintenance can generate higher costs over the long term.

### **Maintenance manuals**

A maintenance manual is a document which provides clearly and concisely, all the information needed to maintain and operate a building satisfactorily. Maintenance manuals should be prepared for new buildings by the design team as part of the building contract at

an appropriate fee (Dept of Environment,1970, Seeley,1976).

A maintenance manual should consist of the following:

- (a) A physical record of the building and site.
- (b) Inspection and maintenance cycles of the various building components and lists of specialist subcontractors and suppliers.
- (c) Information and instructions on maintenance delegated to the occupier.

The type and amount of information in a maintenance manual will vary with the nature, size and complexity of the building(s) or premises.

In Nigeria, it is not a common practice to provide maintenance manuals. Such a document will make it much easier for proper planning of maintenance activities.

### **Maintenance policy**

BS 3811(1984), defines maintenance policy as a strategy within which decisions on maintenance are taken. Alternatively, it may be defined as the ground rules for the allocation of resources (men, materials and money) between the alternative types of maintenance actions that are available to management. In order to make a rational allocation of resources the benefits of those actions to the organization as a whole must be identified and related to the costs involved. Issues under consideration in a policy include; objectives, benefits and policies. A maintenance policy should be a clear and comprehensive written document(s), stating the condition of the building(s) and the standard of maintenance for every building component. RICS (1990) states that a maintenance policy should be clear, written documents that takes into consideration the followings; (i) Life cycle of the building, their fittings and services. (ii) The standards to which the building and its services are to be maintained. (iii) The length of time for which the buildings are required

to be in their present use/ state and at which point will they require maintenance. (iv) The reaction time between when a defect occurred and when a repair is being carried out. Sherwin (2000), also emphasized the need for a written maintenance policy for buildings and suggested some factors to be considered in the formulation of policy. The factors include; the function and requirements of the parent organization, the required standard for each building, compliance with statutory requirements, cost / method of financing and method of execution, to describe if it is direct labour or contracts

A maintenance policy should be a clear and comprehensive written document, prepared by an organisation, stating the condition of the building(s) belonging to the organisation and the standards of maintenance for every building component.

The following factors should be considered when formulating a maintenance policy, James (1972), RICS (1990):

- (a) The functions of the parent organisation – what it requires of its building(s).
- (b) The standards required for each building.
- (c) Legal liability – compliance with statutory requirements.
- (d) Method of execution – such as direct labour or outside contractors.
- (e) Cost and method of financing.
- (f) The length of time for which the buildings are required for their present use and whether they will need to be upgraded during that time to better serve their present purpose.
- (g) The life cycles of the buildings, their fittings and services.
- (h) The standard to which the building and its services are to be maintained.
- (i) The reaction time required between a defect occurring and a repair being carried out.

Quick reaction times tend to be expensive but the consequences to the clients' operations

may well justify this in certain locations. Each organization should have a maintenance policy and the policy should conform to the National Maintenance Policy of the country where the organisation is based. Unfortunately, many developing countries including Nigeria, do not have a National Maintenance Policy before now to determine the minimum standards for the maintenance of buildings and other infrastructure. It is absolutely important that these countries should establish such a policy. This will ensure that all building owners will maintain their buildings to ensure the safety and health of the users or residents of buildings.

### National maintenance policy for Nigeria

The definition of maintenance indicates that the work done to maintain a building has to be to a currently acceptable standard. This implies that there must be a minimum standard that is to be used as a yardstick. A national maintenance policy will specify the minimum maintenance standards for all buildings in the country. It will first address top priority work, maintenance work that is required to ensure the health and safety of the occupants or users of the buildings. In Nigeria, a study has been carried out to determine the most common maintenance problems in government office buildings (Zubairu, 1999). The results indicate that the

most common maintenance problems that fall under the category of top priority include the following:

Blocked water and waste pipes, leaking roofs, Electrical problems, Structural cracks in walls, Cracks in floors, Emptying of soak away pits.

Other maintenance problems that fall under the top priority category include: Damaged balustrades on high-rise buildings and Ineffective damp proof courses leading to rising damp in buildings

Sweeping of rooms and cleaning of toilets are jobs that are expected to be carried out daily in all building types to ensure a healthy environment. Second priority jobs which are maintenance work that are necessary within the year to prevent serious deterioration of the building should then be addressed by the policy. These jobs include repair of damaged windows, ceiling boards, minor cracks in walls and floors, clearance of gutters and routine checks of inspection chambers, light bulbs and electrical outlets. Third priority maintenance work is that which may be deferred beyond one year but is desirable to maintain the quality of the environment. These include repainting of buildings and repairs to access roads. Table 1 provides a sample of the minimum job requirements of some common maintenance work.

**Table 1:** Common Maintenance jobs and maintenance intervals

s/n	Maintenance job	Maintenance interval
1.	Repair of roof	Leaking roofs must be repaired immediately. Routine checks – annually.
2.	Structural cracks in walls	Must be addressed immediately to prevent possible building collapse
3.	Blocked water pipes	Must be cleared immediately. Routine checks - 6 months to one year.
4.	Blocked WC and waste pipes	Must be cleared immediately. Routine checks - 6 months to one year.
5.	Exposed electricity wires	Must be covered up immediately. Routine checks every 6 months.
6.	Damaged balustrades on high-rise buildings	Must be repaired immediately. Routine checks every 6 months.
7.	Emptying of soak away pit	As soon as it is filled up. Checks will depend on number of people and size.
8.	Sweeping of building	Everyday.

9.	Cleaning of toilets	Everyday.
10.	Ineffective DPC	Repair immediately to prevent rising damp in walls.
11.	Refuse disposal	Everyday.
12.	Cutting of grass	Weekly during rainy season.
13.	Clearing of drains	Weekly. Routine checks every 6 months.
14.	Clearing of cobwebs	Weekly.
15.	Mopping of floors	Weekly.
16.	Cleaning of windows	Monthly.
17.	Road repairs	Monthly.
18.	Watering of plants	Seasonal. During dry season every other day.
19.	Repainting of building	Every four years.
20.	There should be routine checks of all components and services like lifts, ACs, fans, socket outlets, bends in pipes & inspection chambers.	Every 6 months.

**Source:** Stella (2009)

Part of the Maintenance Policy should include:

### **Mandatory inspection of all buildings**

Specified maintenance internals for all building components taking into cognisance the specific environments e.g. proximity to the Atlantic Ocean, proximity to the Sahara Desert, and swampy riverine condition of the Delta region.

Expected life span for each building component will be indicated in the policy and specific components that must be replaced after a specified period e.g lift cable and electrical cables.

### **Policy framework for building maintenance**

The worth of buildings largely relies on the safety, quality and service of the standard of policy given and enforced in them (Yahya and Ibrahim, 2011). The definitions of policy of maintenance have been given as a system by which decisions on maintenance are made. Several studies have defined the policy of maintenance as a framework of management embracing varying type of strategic maintenance to guarantee that properties/facilities are adequately maintained (Lee and Scott, 2008).

The policy of maintenance framework stands as document that is official which indicate the parameters, procedure, guidelines in full description. The situations of management of maintenance have no general acceptable suitable layout. A format being used for a specific situation must be geared towards a specified need and program of the host organization (Royal Institution of Chartered Surveyors (RICS), 2013). The policy of maintenance has to guarantee the certainty of worth for money spent are attained and also protect the asset and the resource value of the buildings concerned. It should also ensure that the building owner is not held liable of any breach of statutory or legal obligations (BS 8210:1986). The policy of properties/facilities maintenance standard should yield much profit on expenditure incurred on actions of maintenance (Lee and Scott, 2008).

The safe environment and benefit guaranteed by the maintenance policy has made it much important to stakeholders such as facilities/maintenance managers, customers, owners and tenants (Yahya and Ibrahim, 2011).

### **(a) Building Maintenance Policy Framework in Context**

RICS, (2013); Lee and Scott, (2008) have argued that, the costs sustained, and the sum



benefit of properties/facilities maintenance result to substantial influence of users' welfare and output. Management of maintenance henceforth must be perceived to be a significant part in advancing the objectives of the host organization's business. Consequently, the policy of maintenance has to include with the broader statement of the mission, business strategy and the management's policy of the organization which oversee the properties/facilities management, be it a tenant, client, or landlord.

In effect, the top management of the organization should accept and revise the policy of maintenance as an inclusion to the total management strategy involving the facilities/maintenance personnel in the processes. The top management of the organization must be vigilant of the requirement of maintenance and make suitable available funds expected to guarantee any future hostile penalties if funding is not adequate since it may lead to added expense as a result of carrying out maintenance not planned formerly, which means that planned maintenance is less expensive than corrective maintenance. Where there are no official policies of maintenance, this may result to deficiencies in issues of works maintenance, requirement and funds showing as inappropriate move, misdirection, abandonment and waste of resources. This will eventually lead to unlikely disturbance to users and tenants of the facility creating health hazard, safety hazard, and depreciating asset and deficient value for money. In effect, a policy for maintenance is very vital requirement for an effective and efficient maintenance to be engaged (RICS, 2013). The type of facility will determine the kind of policy for maintenance to be adopted, hence there is no one policy that is completely suitable for all types of building facility (Lee and Scott, 2008).

#### (b) Element of Building Maintenance Policy Statement

The following literature argues several issues to be considered or addressed when developing and formulating building maintenance policy statement.

Lee and Scott, (2008) argues that there are three essential elements for consideration when formulating building maintenance policy statement.

#### (c) Key elements of a maintenance policy

Maintenance Management Framework Guideline (2007) establish Essentially, a departmental maintenance policy should identify how, and by whom, the maintenance of the department's building assets is to be managed. The policy should be structured to include the following components: a statement of the policy's intent and objectives, the scope of the policy, the details of the policy (i.e. the policy requirements), allocation of responsibility for implementing the various policy requirements, continuous improvement arrangements for the policy, including policy review procedures.

In the "details" section of their maintenance policy, departments should outline their approach to achieving the policy's objectives. Departments should also explain how the maintenance policy relates to their other asset management policies and to their capital works and asset disposal programs. The "details" section of the policy should briefly address the department's approach to the following:

1. establishment and periodic review of condition standard ratings for all building assets
2. preparation of a departmental maintenance strategy incorporating a balance of planned (i.e. preventative, statutory and condition-based) maintenance and unplanned maintenance)

3. formulation of a Strategic Maintenance Plan (SMP) that reflects the department's maintenance needs over the immediate, medium and long term
4. development and implementation of a program of regular condition assessments
5. an assessment of maintenance demand across the department's building portfolio
6. formulation of a budget based on a realistic calculation of the level of funding needed to maintain the department's portfolio to specified condition standard ratings
7. production of an annual maintenance works program based on condition assessments, existing programs, historical data and the agency asset plan
8. procurement of maintenance services in accordance with government policy
9. ongoing monitoring and periodic review of maintenance performance, including the development of performance measures and their integration with other asset management performance measures
10. establishment of processes for the collection and utilisation of maintenance information to facilitate maintenance management and meet minimum reporting requirements
11. establishment of processes for the retention of technical and asset information from handover and commissioning
12. arrangements for the establishment of feedback loops between maintenance service providers and building planners and designers (effective feedback loops can facilitate improvements in maintainability, thereby minimising the maintenance needs of future buildings).

When drafting their maintenance policy, departments should also consider their obligations with respect to: heritage and environmental legislation, health and safety regulations, building security, risk management, related government policies and strategies such as the:

1. Total Asset Management Plan (TAMP) Framework
2. Queensland Procurement Policy and Strategy (2017) (in particular the requirements aimed to enhance transparency and accountability of procurement processes and outcomes; integrate the practice of sustainability into the procurement of goods, services and construction; and support the local employment opportunities for participation by competitive local suppliers)

### **Methodology**

Considering the nature of the questionnaire of the study, the set of data needed for this study is qualitative in nature. Two survey techniques were used such as administration of questionnaire and interview. The techniques enable the researcher to collect qualitative data from the tertiary institution maintenance staffs and professionals in the build environment and is a survey design category. The survey design concentrates on the population of the study where data were collected for intensive study and analysis of the maintenance defects in the study area. The survey assists to evaluate the current conditions of tertiary institution student use buildings within the study area the population of this study constitutes maintenance staff and other professionals' in the build environment that comprises the four tertiary institution in Delta state such Petroleum Training Institute (PTI) located at Uwie L.G.A, Federal University of Petroleum Resources (FUPRE), also located at Uvwie L.G.A, Delta State University (DELSU) Abraka, located at Ethiope West L.G.A. and

Delta State University of Science and Technology, Ozoro (DSUST) at Isoko north L.G.A. in Delta State. The study covers student used building in the four tertiary institutions such as library, laboratory, workshops, ICT building, lectures buildings and student hostels as contain in the Table 2.

Since the population for this study is not that large, effort was made to administer the question to the 144 members on the sampling frame. The data set needed was quantitative data obtained through well-structured questionnaires.

**Table 2:** Questionnaire responses for institutions

Professionals	PTI	FUPRI	DELSU	DSUST	TOTAL
Architects	4	3	5	7	19
Builders	2	2	2	9	15
Civil Engineers	11	12	10	7	40
Electrical Engineer	11	10	8	4	33
Mechanical Engineer	5	5	3	3	16
Quantity Surveyors	2	3	3	2	10
Total	35	35	31	32	133

Source; Field Survey, 2023

### Current maintenance practice in tertiary institutional building in Delta State

The result in Table 3 shows that out of the (6) type of maintenance practice in the delta state tertiary institution, performs corrective maintenance like fixing of cracks wall, leaking of roofs plumbing leakages and other building component with RII with 0.86 ranked first. this indicated that most of the institutions in delta state are engaged in corrective maintenance for student used building, Performs Preventative maintenance exercises with RII 0.69 became second in the ranking which means preventive is the second most engaged practice in delta state institution. Routine monitoring or inspection of facilities for signs and faults with RII 0.53, Conduct Condition-based maintenance like fixing broken fittings etc. with RII of 0.52, Conducts periodic maintenance assessment like semesterly or yearly and implements new plan following assessment by involving maintenance manager and expert workers is one of the least ranked with RII 0.48 and 0.7 respectively. This is an indication that until when cases go bad, maintenance will not take place and therefore justify the reason for high deterioration level in the institution. To be in agreement with what was obtained from the building users. Most of the respondents perceived that some of the building components were falling apart, poor and very poor than those that said it was fair and good. This result also suggests why the respondents did not need to rely on users' complaints before carrying out corrective maintenance. It was observed that in most institution surveyed, the deterioration was usually on a high side and obvious to all before the maintenance staff would implement the claimed corrective maintenance measures. See Figure 1.

**Table 3:** Current maintenance practice

Maintenance practice	Never implemented	Rarely implemented	Sometimes implemented	Often implemented	Always implemented	N	Mean	RII
Routine monitoring or inspection of facilities for signs and faults	41	34	16	10	32	133	2.68	0.53
Conduct Condition-based maintenance like fixing broken fittings etc.	36	26	36	19	16	133	2.65	0.52

Performs Corrective maintenance like fixing wall cracks, open or leaking roofs etc	4	3	12	47	67	133	4.28	0.86
Conducts periodic maintenance assessment like semester or yearly	36	46	27	11	13	133	2.39	0.48
Performs Preventative maintenance exercises	12	12	43	39	27	133	3.43	0.69
Implements new plan following assessment by involving maintenance manager and expert workers	22	12	44	24	31	133	3.23	0.7

Source: Field Survey, 2023

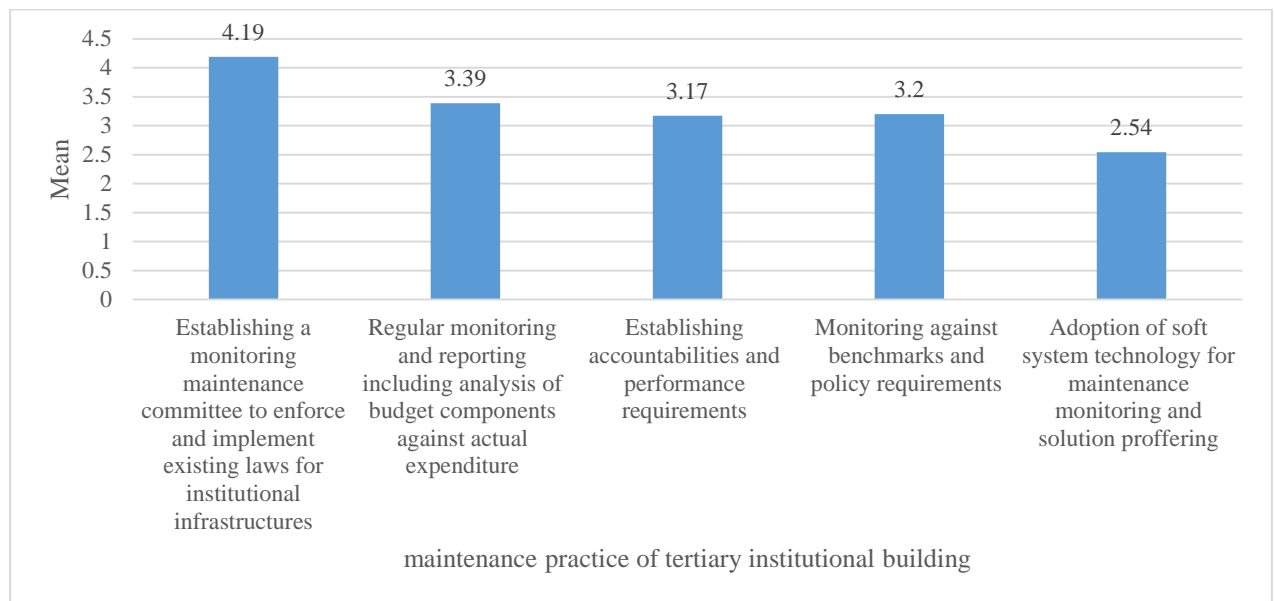


Figure 1: Current maintenance practices

H<sub>0</sub>: The current maintenance practice does not have significant relationship on the condition of tertiary institution buildings in the study area.

The current condition of the buildings was summarized into an ordinal variable with categories; very good, good, fair, poor, and very poor as adopted by Ofide and Jimoh (2016) while the maintenance practices were combined into one ordinal variable by calculating the median individual responses. Spearman’s rho correlation was conducted to determine the hypothesis

Table 4: Result and Interpretation (Hypothesis)

Relationship	N	Spearman Coefficient	p value
Practice * current condition	133	+ 0.305	0.000

P<0.01

The Table 4.26 shows that there is a very significant moderate correlation between maintenance practices and current conditions of the building. The positive coefficient shows that as maintenance practices tends to be always implemented, the condition of the buildings tends to become very good. The null hypothesis is thus rejected.

The deduction from Figure 1 and Table 4 is that there are six (6) identified maintenance practices in the student used tertiary institution building in the study area. corrective maintenance like fixing of cracks wall, leaking of roofs plumbing leakages and other building component are mostly used. this indicated that most of the institutions in delta state are engaged in corrective maintenance for student used building. Preventative maintenance exercises were the next most used maintenance practices which means preventive is the second most engaged practice in delta state institution. This is an indication that until when cases go bad, maintenance will not take place and therefore justify the reason for high deterioration level in the institution. To be in agreement with what was obtained from the building users. Most of the respondents perceived that some of the building components were falling apart, poor and very poor than those that said it was fair and good. This result also suggests why the respondents did not need to rely on users' complaints before carrying out corrective maintenance. It was observed that in most institution surveyed, the deterioration was usually on a high side and obvious to all before the maintenance staff would implement the claimed corrective maintenance measures. See Figure 1.

### **Discussion**

From the result in Table 2, having presented and analysed the data gathered from the questionnaire, personal survey and literature review, findings revealed a total of six (6) maintenance practice available in tertiary institution and of course affecting building maintenance in the study area. Among the six findings identified, based on the ranking are the top most used maintenance practiced for tertiary institution building: Corrective maintenance like fixing wall cracks, leaking roofs etc., Preventative maintenance exercises, Routine monitoring or inspection of facilities for signs and faults, Conduct Condition-based maintenance like fixing broken fittings etc., Conducts periodic maintenance assessment like semesterly or yearly and Implements new plan following assessment by involving maintenance manager and expert workers.

### **Conclusion**

The findings were done in the selected tertiary institution in Delta state, Nigeria and it clearly showed that maintenance of tertiary institution is very important. Maintaining the buildings of tertiary institution resuscitate the aesthetic of the institution. As academic performance influences the admission of the candidates, so also a well-maintained institution structures entice students. The study has shown that maintenance has direct influence on the buildings of tertiary institutions. It was observed that corrective maintenance is a very common technique employed in tertiary institution, roof leakage, plumbing leakage and toilet facility was discovered a major current problem that required immediate attention of maintenance department, and it is also the major defect on buildings facing the student used institution building.

### **Recommendations**

1. The public institutions to; clearly define, establish and integrate maintenance policy and strategies into business operations and critically analysed and execute maintenance tasks and adoption of corrective and preventive maintenance as the most practicable techniques.
2. Buildings should be well maintained to prevent cracks on the wall and leakage of roofs and Tertiary institution should maintain their buildings regardless the age of existence, to increase

the building life expectancy, types of occupancy, quality of repair and maintenance should be put into consideration.

3. All tertiary institution should regularly finance the maintenance unit to adequately carry out maintenance work and every poor attitude to maintenance work should be sanctioned. Training and development should be enhanced so as to improve available skills.

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