



# **Prospects for Improving Building Maintenance Management in Nigerian Public Universities: A Case Study of Nnamdi Azikiwe University**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. Author CIO designed the study and wrote the first draft of the manuscript. Author FOE managed the literature searches. Author NNA managed the analyses of the study. Author SCU performed the statistical analysis. Author KCO supervised the entire process and wrote the protocol. All authors read and approved the final manuscript.*

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## **ABSTRACT**

Buildings are highly resourceful in the effective operation of tertiary institutions. It is imperative that these assets should be given good maintenance attention for effective performance. Public institutions have always been faced with ineffective maintenance of buildings due to bureaucratic constraints and poor maintenance culture. This study is aimed at establishing prospects for improving maintenance management and performance of buildings in public universities in Nigeria, using Nnamdi Azikiwe University as a case study. The study adopted a survey research approach using a structured questionnaire. A total of 148 responses were gotten from the Works and Services Department and Heads of academic departments out of 203 distributed questionnaires, being a 72.9% response rate. The questionnaire was analyzed using descriptive statistics technique. The study variables were examined using mean, with an acceptance benchmark of 3 and above. This implies that any issue that has the mean of the responses to be 3.0 will be

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regarded as “agreed”, while those whose mean of their responses are less than 3.0 will be regarded as “disagreed”. Mean and standard deviation of each item were determined, and ranking were then assigned to them. From the research findings, it is evident that there are statistically significant prospects for improving on the poor state of building maintenance management in the study area. The study therefore recommends that adoption and deployment of computerized maintenance management system that would handle all aspects of users’ reporting and feedback, scheduling and coordination of activities; intensive training and retraining program for the maintenance personnel, orientation programs for building users on healthy maintenance culture and regular building condition survey should be incorporated as prospects for improving building maintenance management in the study area.

**Keywords:** *Building maintenance; building performance; CMMS; maintenance culture; public university buildings.*

## 1. INTRODUCTION

Buildings according to Olanrewaju and Abdul-Aziz [1] are the most significant resource of tertiary institutions apart from the faculty members. They offer much value to the general administration of the institutions, students, members of staff, parents and other users and stakeholders [2]. Buildings are just like every other living objects that may die if not well taken care of. Death in the case of buildings may be in the form of deterioration and decays. Buildings should be taken care of by way of proper maintenance and management. The process of deterioration in both the physical and functional conditions of a building is complex, and is indicated by wears, tears and aging due to usage, degradation of equipment and construction material due to the environment, and the interaction of these mechanisms. However, in order to create conducive environment that supports and stimulates innovative research, teaching and learning, tertiary institution buildings require maintenance [3]. In the same line of thought, [4] asserted that the maintenance levels of these buildings are very crucial to educational effectiveness.

In spite of the crucial role of these buildings in the education and construction sector of the economy, most educational buildings in Nigeria are in deplorable conditions as a result of lack of maintenance [4]. [5]. Ohaedeghasi, Ezeokoli and Agu [6], [7], [8] and Onyili, Okolie and Ezeokoli [9] revealed the ineffectiveness of building maintenance management in different public tertiary institutions in Nigeria. The practice adopted was generally traditional whereby official memo writing is the major channel of communication between the building maintenance department and building users. There is a wide range of building defects

observable on the building in the campuses studied. The prevalence of these defects depicts ineffectiveness in maintenance management [6]. This study is aimed at establishing prospects for improving building maintenance management in Nigerian public universities, using Nnamdi Azikiwe University, Awka, Nigeria as a case study.

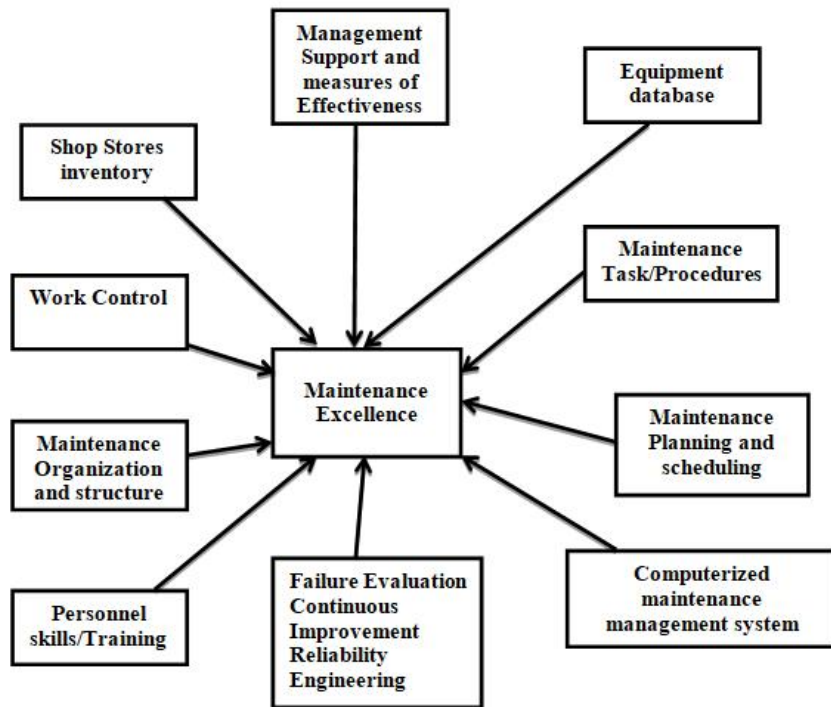
### 1.1 Literature Review

#### 1.1.1 Maintenance management practices

Maintenance management practices are coordinated strategies adopted by an organization to ensure that their buildings continue to perform optimally without experiencing any form of downtime or degeneration due to defects. Adenuga in Ohaedeghasi [10] maintained that for an organization to achieve maintenance excellence, the following practices should be in place as seen in Fig. 1:

- i. Management Support and measures of Effectiveness
- ii. Shop Stores inventory
- iii. Equipment database
- iv. Maintenance Task/Procedures
- v. Work Control
- vi. Maintenance Organization and structure
- vii. Maintenance Planning and scheduling
- viii. Personnel skills/Training
- ix. Computerized maintenance management system
- x. Failure Evaluation, Continuous Improvement, Reliability Engineering

Ofide *et al.* [5], in their assessment of building maintenance management practices of higher education institutions in Niger state, Nigeria outlined the following practices:



**Fig. 1. Integrated maintenance management approach**

Source: Adenuga (2008) in Ohaedeghasi (2021)

- a. Maintenance practices, such as preventive maintenance plan, work schedules and standardization of activities – acceptable standard to which the building and its services are to be maintained.
- b. A formal organizational plan chart with their maintenance records.
- c. Response time required and acceptable in executing maintenance works – prioritization of buildings e.g. between core and auxiliary functions.
- d. The life (functional) requirements of the buildings and their fittings and services.
- e. Maintenance funding system.
- f. Training programme and staffing
- g. A method of approval of work
- h. Material requisition techniques
- i. Quality assurance and
- j. Maintenance strategies

conduct user satisfaction surveys; 83.3% do not follow maintenance standards in carrying out maintenance works; 33.3% combine both the use of telephone and memo writing as media for complaints and maintenance calls, and that most of the institutions do not have maintenance manuals for their buildings. Over 80% of the institutions studied by Ofide *et al.* [5] adopted reactive and corrective approaches to maintenance.

On the other hand [11], in his study of building maintenance practices in Nnamdi Azikiwe University, Awka, revealed that the university has an established maintenance department. These departments according to him lacked competent craftsmen with gross insufficiency in tools and equipment. He also pointed out that delay in releasing funds from government for maintenance of buildings hinders maintenance activities in the university and that these funds are inadequate for the volume of maintenance works emanating from the university due to high intensity of use of the buildings on campus. This is in line with the inference by [7] that lack of maintenance policy and funding is the major cause of public building deterioration in University of Nigeria, Nsukka.

[5] found out that funds are not always sufficient for maintenance works. Maintenance is only carried out subject to availability of funds which automatically puts off cyclical maintenance until when funds are available to perform the tasks. Furthermore, they found out that most of the maintenance departments in the higher education institutions in Niger state do not

## 1.2 Threats to Effective Maintenance of University Buildings

According to Ohaedeghasi, Ezeokoli and Agu [6], most of the buildings in Nnamdi Azikiwe University, Awka campus are not well maintained as evidenced by the defective condition of some building components. This ineffectiveness in the maintenance management of buildings in the study area is caused by a number of significant threats. Some of the threats emanate right from the construction stage, while others were traced to the building users, the University management and the maintenance department. Some building components begin to fail immediately after construction as a result of construction errors and the use of substandard building materials during construction. Some building users lack the right orientation towards healthy maintenance culture; hence they seem to be reckless with the use of buildings and would not want to report building defects on time. The maintenance department on the other hand fails to carry out regular building condition survey to identify the defects at their infancy stage. There is also a problem with the communication channel between the building users and maintenance department. The use of only official memo writing as a means of maintenance calls or reporting is too rigorous and delays the response to issues that demands immediate attention. There is a serious need for regular trainings for the maintenance personnel for updated capacity development. These threats impede the effectiveness of the maintenance management of buildings in the study area, which in turn militates against the core interest of a university (innovative research, quality teaching and learning). The study further recommended a study to establish the prospects for effective maintenance of buildings in the study area.

## 1.3 Prospects for Effective Maintenance of University Buildings

The challenges to effective maintenance of tertiary institution buildings are not without measures for ameliorating them. [5] established some prospects to effective maintenance management of tertiary institution buildings in Niger state, Nigeria. According to them, the issue of maintenance backlogs and operating from defective buildings and their consequent implications could be minimized through: prompt availability/improved funding system; employment of qualified maintenance personnel; improved communication between maintenance

department and users; maintenance awareness to management and users; reduce overcrowding of buildings; incentives to motivate maintenance staffs for effective maintenance delivery; research and training of maintenance staff; and in the case of student hostels, payment of fee to hold accountable any user that violates maintenance policy/rules.

On the other hand, [7] opined that there is need for purpose-driven preventive maintenance culture and underpinning plans/policies as part of a holistic integrated infrastructure delivery process. They also suggested that maintenance of infrastructure systems could also be outsourced.

## 2. METHODOLOGY

This study adopted a survey research method in which group of people or items are studied by collecting and analyzing data from only few people or items considered being representative of the entire group. The study was quantitative and was aimed at establishing the prospects for effective maintenance management of buildings in Nigerian public universities using Nnamdi Azikiwe University, Awka as a case study. Structured questionnaire used for data collection were sent to a random sample of 203 personnel of the Works and Services Department of the case Institution on professional cadre and to the heads of academic departments with 148 successfully filled and returned, being a response rate of 72.9%.

The questionnaires were analyzed using descriptive statistics technique such as percentages and tables. The issues in the questionnaire used in this research were structured on a 5-point Likert scale: Strongly agree (SA=1), Agree (A=2), Undecided (UN=3), Disagree (D=4) and strongly disagree (SD=5). The analysis here was done using mean, with an acceptance benchmark of 3 and above. This implies that any issue that has the mean of the responses to be 3.0 will be regarded as "agreed", while those whose mean of their responses are less than 3.0 will be regarded as "disagreed". Mean and standard deviation of each item were determined, and ranking were then assigned to them. The prospects studied were generated from the review of related literature.

## 3. RESULTS AND DISCUSSION

Table 1 shows the distribution of responses from respondents (HODs and Works Department) on

**Table 1. Respondents perceptions on prospects for improving building maintenance management in nigerian public universities**

S/N	Prospects	SA	A	UN	D	SD	Mean	Ranks	Remarks
1	Improved funding system for building maintenance	110	38	-	-	-	4.74	2 <sup>nd</sup>	Accept
2	Employment of more qualified maintenance personnel	56	92	-	-	-	4.38	10 <sup>th</sup>	Accept
3	Improved communication between maintenance department and building users	103	45	-	-	-	4.70	3 <sup>rd</sup>	Accept
4	Maintenance awareness and education for building users	94	54	-	-	-	4.64	5 <sup>th</sup>	Accept
5	Reducing the intensity of use of existing buildings by procuring new ones	56	36	38	18	-	3.88	12 <sup>th</sup>	Accept
6	Development of robust organizational chart for the maintenance department	83	65	-	-	-	4.56	6 <sup>th</sup>	Accept
7	Proper planning and scheduling of maintenance works	81	67	-	-	-	4.55	7 <sup>th</sup>	Accept
8	Development of robust maintenance policy, standards and guidelines	83	65	-	-	-	4.56	6 <sup>th</sup>	Accept
9	Creation and adoption of computer aided facilities management system	66	83	-	-	-	4.45	8 <sup>th</sup>	Accept
10	Conduct regular buildings condition survey	101	47	-	-	-	4.68	4 <sup>th</sup>	Accept
11	Carry out regular users' satisfaction survey	36	112	-	-	-	4.92	1 <sup>st</sup>	Accept
12	Development of online channel for user report and maintenance calls	65	83	-	-	-	4.44	9 <sup>th</sup>	Accept
13	Improved financial and resources management system	54	94	-	-	-	4.36	11 <sup>th</sup>	Accept

prospects for improving the condition of buildings. The technique used in analysis here is mean, with a threshold of acceptance of 3. Table 1 indicates that all the questionnaire items presents prospect for improving the condition of buildings. The study established significant prospects/measures for effective building maintenance management in the study area, with carrying out regular user satisfaction survey being the most occurring (4.92) followed by improved funding for building maintenance (4.74), improved communication channel (4.70), carrying out regular building condition survey (4.68), maintenance awareness and education for building users (4.64), creation and adoption of CAFM/CMMS (4.45) The least prospect is reducing the intensity of use of existing buildings by procuring new ones. These results are in agreement with the findings of Ofide *et al.*[5] which established that the issue of maintenance backlogs and operating from defective buildings and their consequent implications could be minimized through: prompt availability/improved funding system; employment of qualified maintenance personnel; improved communication between maintenance department and users; maintenance awareness to management and users; reduce overcrowding of buildings; incentives to motivate maintenance staffs for effective maintenance delivery; research and training of maintenance staff; and in the case of student hostels, payment of fee to hold accountable any user that violates maintenance policy/rules.

#### 4. CONCLUSIONS

From the findings of the study, it is therefore imperative to conclude that there to be a commensurate level of effectiveness in the maintenance management of public university buildings, the following prospects should be fully engaged:

- ❖ Regular users satisfaction survey
- ❖ Improved funding for maintenance
- ❖ Regular building condition survey
- ❖ Maintenance awareness and education for building users on healthy maintenance culture.
- ❖ Creation deployment of computerized maintenance management system for effective communication, reporting, feedbacks and scheduling of maintenance activities.

It is there recommended that public universities management in Nigeria should adopt the

prospects from this study for effective maintenance management of their buildings on campuses. This will result in improvement in the core operations of higher education institutions (Teaching, learning and research). Effective maintenance of university buildings has a great way of upgrading the image of such institutions by giving a facelift to the physical environment and outlook of university campuses.

This study should be extended to other public institutions in the country for proper generalizability and as well to other sectors like healthcare, hospitality and sporting facilities. A further study could be targeted at developing a web-based application for maintenance management in the study area. For proper condition survey of inaccessible areas of buildings like roof tops, the study recommends a study to establish the adoption of unmanned aerial vehicle technology

#### CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the authors.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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