

# The management and maintenance of physical facilities for quality assurance in higher education in the 21<sup>st</sup> century with innovative technologies

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## ABSTRACT

Management and maintenance of physical facilities are ladders for climbing and achieving quality assurance in Higher Education in the 21<sup>st</sup> Century. This paper reviewed literature on the management and maintenance of physical facilities for quality assurance in Higher Education in the 21<sup>st</sup> century with the aim of accessing its implication for the academic growth and sustainability of institutions. Significantly, the administration and maintenance of physical facilities in higher education are very important to the economic and academic growth of the educational system. They are ranked among the determining factors of success in the school system. This study looked at maintenance culture in tertiary schools, innovative methods of plant maintenance and renewal in higher education as well as the benefits of maintaining school physical facilities. It is important that the habit of maintaining existing physical facilities be learned by school heads and transferred to the subordinates and students as a sustaining force and vehicle for retaining equipment and facilities in their original condition of completeness and aesthetics.

**Keywords:** Management, maintenance, physical facilities, quality higher education, innovative technologies.

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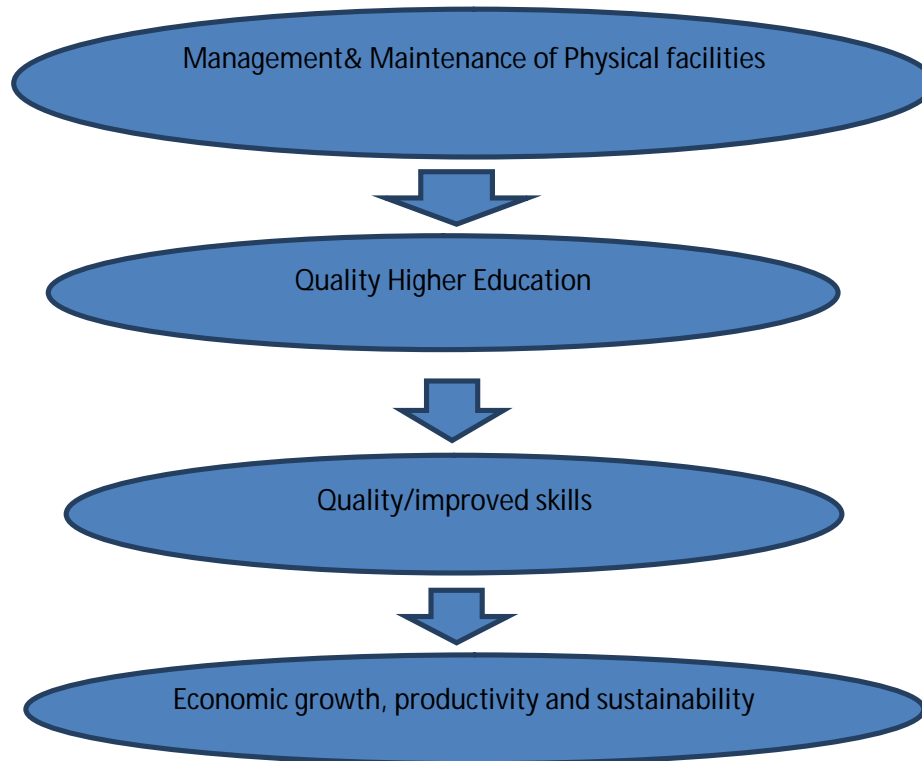
## INTRODUCTION

In any organization, there are individuals or groups of persons whose responsibility is to manage the organization. Excellent Management and maintenance of physical facilities for quality assurance in higher education in this 21<sup>st</sup> century are pivots for accelerated achievement of the millennium goal of education accessibility to all. Sapru (2009) maintained that Management is practiced; its essence is not knowing but doing. Its test is not logic but results. Its only authority is performance. The goal of maintaining quality higher education at a reasonable cost can only be achieved through the management and maintenance of available physical facilities for learning. Proper management and maintenance of physical facilities will lead to a quality higher education system which will in turn produce improved quality skills, that will accelerate economic growth and sustainability (Gbenga and Norhasni, 2013).

(Figure 1)

A quality school physical facility invariably affects students, teachers and the learning environment in varying ways (Kivisto and Pekkola, 2017). Teachers are positively impacted and can do their job of teaching more effectively if the facilities are in good condition and up to date. This will automatically rub off positively on students' learning experiences. These assertions are in line with Abdullahi and Wan Yusoff (2018) research findings on facilities management, that the physical facility is the most significant factor that determines facility performance.

Abraham (2003) states that "maintenance of school facilities is concerned with keeping grounds, buildings and equipment in their original condition of completeness or efficiency". The degree to which a facility or equipment loses its aesthetic value and worth will depend on the materials it is made of, its usage, and its maintenance



**Figure 1.** Conceptual clarification of management and maintenance of facilities.

rate, this means that poorly kept educational facilities quickly lose their functionality, beauty and value, thereby inhibiting the teaching/learning process. Educational facilities in our tertiary schools will take a positive giant leap for longevity or life expectancy of the facility, aesthetic beauty, and operational use when the principle of "a stitch in time saves nine" is adequately applied and enforced in the care of school physical facilities. Nigeria as a developing nation is experiencing a population explosion with the consequent increment in enrolment figures in schools each year. This increment in enrolment demands the provision of more educational facilities such as school buildings in form of classrooms, staff offices, libraries, laboratories, and recreational facilities such as football fields, tracks, and other equipment. Dilapidated educational facilities have to be renovated, while new ones have to be provided to accommodate the growing population. The resources made available for the procurement of educational facilities are not expanding in the same proportion.

This situation requires greater efficiency in the management and maintenance of available educational facilities by devising means of instilling the maintenance culture for the optimum use of these facilities so that limited educational resources can be maximally utilized, and the facilities used for a considerable length of time. To achieve this task, there has to be an exploration of

ways to create the knowledge and awareness maintaining the facilities we have. This, in short, is the maintenance culture, which is the act of imparting the habit of the learned behaviour of taking care of things early enough lives, it is one thing to procure educational facilities and another thing to use them properly to achieve desired set goals. There are cases where facilities and equipment ting huge sums of money to procure for public schools are left uncared for. They are consequently destroyed by weather or may be vandalized by unpatriotic citizens. It, therefore, calls for all hands in the school community especially that of the school head and those delegated for school facilities management and students themselves to see to it that these facilities are properly used and maintained as well as getting others to comply with maintenance rules for maximum productivity.

#### **MAINTENANCE CULTURE IN HIGHER EDUCATION**

Maintenance means getting involved in those activities designed to repair and rejuvenate the school's physical facilities to their original condition. The main principle of maintenance is to reduce depreciation caused by usage, obsolescence, physical decay as a result of weather conditions, etc. while maintenance culture means the

habit, values and traditions of getting involved in those activities designed to repair and handle facilities appropriately. Culture is entirely dependent on what is learnt from the social group whose component elements are shared and transmitted by the members of a particular society. It is sad to note that maintenance culture is gradually diminishing in higher education in Nigeria due to the nonchalant attitudes of users and the economic meltdown.

There are numerous definitions of school plant maintenance or school physical facilities maintenance. According to Adesina (1981, 1990), school physical facilities maintenance refers to keeping the school site, buildings and equipment as near their original state of utility as possible. There will be a loss of aesthetic beauty, value and worth when the best physical facilities are neglected in terms of maintenance and usage. Abraham (2003) in agreement with this affirms that school plant maintenance is concerned with keeping grounds, buildings and equipment in their original condition completeness, or efficiency. This will depend to a large extent on the material or quality of the product the facilities are made of as well as the utility rate. The maintenance of school physical facilities is as crucial as the acquisition. We must maintain the safety, convenience, benefits and durability of the facility and its user (Gbenga and Norhasni, 2013; Abdullahi and Yusoff, 2018; Warshaw, 2021).

Routine maintenance is categorized into emergency and non-emergency maintenance. Emergency maintenance falls under the repairs that need urgent attention without which harm can be caused both to the users and the facility itself. Examples of such emergency repairs fall into the category of electrical faults, plumbing work, the collapse of the school fence, classrooms, offices, etc which if not taken care of will disrupt the teaching and learning process. Non-emergency class or category refers to maintenance that if ignored for a short while will not hamper the school programmes. Standard procedures should be adopted throughout the system for preparing and carrying out routine maintenance of school physical facilities. These procedures are:

1. There must be management guidelines on the use of physical facilities.
2. There must be a maintenance department that takes care of minor repairs of furniture, machinery, electrical appliances, electronics, lighting system, air conditioning, automobiles, etc.
3. Plumbing works, fire service for prevention of fire outbreaks, and security units must be put in place.

There is a need for reviewing and remodeling of existing obsolete physical facility facilities and these should be planned and designed to keep the cost of maintenance at the barest minimum level.

### **Strategies for innovative physical facilities management, maintenance and renewal for quality assurance in higher education**

Effective innovative instructional management and delivery requires that ICT be integrated and managed in lecture delivery, course examination, micro-teaching, and computer-based testing (CBT) amongst others. Innovation is a positive, planned and specific change that is initiated to facilitate the achievement of some defined goals (Agabi and Okorie, 1999). Innovative activities may at times be in stages of fragments. They are rapid but hardly sustainable, whereas strategy can be defined as a plan. School plant facilities are suffering much decadence and obsolescence due to little or no attention being paid to them by way of maintenance. This view is supported by Abraham (2003) when he stated that the best-planned plant that is not maintained soon becomes defaced and loses its aesthetic value and worth. The challenges of marketing new service product in a growing economy reveal that maintenance is the biggest problem facing the property industry in Nigeria. He also lamented the high degree of levity with which the economic development of the nation is being treated by developed economies, adding that they have aggravated the situation by allowing few existing facilities to decay without maintenance and rehabilitation. To protect school plants from damage and theft, Campbell (2002) has outlined these various measures to employ:

1. Engrave/inscribe the school name or log on all non-consumable and physical plants to scare thieves and make it difficult for them to dispose of.
2. Students responsible for damages should be made to repair them and there should be a forfeiture of caution fee by the students.
3. Pedestrian crossing on fields, lawns and flower beds should be punished, and warning signposts provided.
4. Professional thieves when caught should be handed over to the police.
5. School plants should be insured, and regular premiums paid so that the company can come to the aid of the school in the case of theft or damages.
6. Professionally trained security man should be employed.
7. Wooden doors and windows are preferred to glass doors and windows.
8. Science and Introductory Technology teachers should be in the science laboratory and workshop respectively to monitor students.

The maintenance of the school plant is as important as its acquisition. Maintenance of facilities in a tertiary institution will be less problematic where the school staff and students have the procedures for maintenance clearly spelt out and enforced. It will also increase the morale of the staff and students when respect for school

property is created and imbibed by all. The work schedule must be posted in the works supervisor's office specifying the work to be done and those to do it. It should be split into daily tasks and periodic tasks. The work schedule should be formulated through the cooperative effort of the delegated worker and the plant supervisor with the approval of the provost. There is a need for constant plant improvement and renewal to meet the present needs of the user. The maintenance of the entire school compound, the buildings, machines games facilities and equipment as well as the school farm cannot be done successfully unless they are constant plant improvements and renewals being carried out. To do this successfully, Enaohwo (2000) has suggested the government at all levels should carry out maintenance audits in all schools to identify weaknesses for rectification by the school management. This he said is a better option instead of budgeting millions of naira every year, supposedly for school development, without actual release to schools to cushion enrolment explosion in school. He further outlined the clear-cut stages, a maintenance audit can be carried out and these are:

1. Evaluation of existing building to identify needs for maintenance
2. Obtaining feedback from users on wear and tear
3. Audit survey by professional (renewal) staff
4. Reconciliation of evaluation differences from steps (i) to (iii) and
5. Identification of maintenance priorities

Enaowho (2000) also stressed the need for establishing central maintenance facilities for schools in development areas for the pooling of resources, since schools cannot afford to install comprehensive maintenance facilities on an individual basis. There should also be a maintenance department like the introductory technology workshop where students are taught to make new and mend old chairs, tables, electrical appliances minor plumbing works, painting, etc. To this, Adesina (1981) advocated that a rudimentary approach to plant maintenance should begin with the inculcation of respect for school property and that effort should be made by planners and administrators to create the condition to make them effective before embarking on such a campaign. Students should be taught the dignity of labour by working with their hands and brains to maintain the school compound. There must also be the attitude of studying the operational instructions of manufacturers before using equipment, appliances and gadgets as well as management guidelines for the use of those facilities.

These eight modern, innovative ideas for Facility Management as stipulated by Revoy (2021) should be adopted by institutions for quality high education; i. Embracing eco-friendly practices; elevating self-care; making health and wellness part of work; Digitizing the

workplace; Automating every day; Decentralizing the workplace; Integrated facilities management and value creation over cost savings. In addition, there should be standards and inspections by a maintenance department that takes care of minor repairs of furniture, machinery, electrical appliances electronic, lighting system, plumbing works, and security unit should be put in place to ease the work of the maintenance team.

There are innovative technologies that can help enhance manage and maintain physical facilities for quality in higher education which may or may not have been put into put utilization in schools. Building Information management (BIM) according to Hamil (2021) is the process for creating and managing information on a construction project throughout its whole life cycle. These information gathered on construction projects throughout its construction and commencement of use are very vital in its overall efficiency.

- BIM for Facility Managers: Building Information Modelling (BIM) is a tool for developing and scaling virtual models of building projects.
- Facilities maintenance software.
- Drones for Facility Condition Assessments: This tool can be used to access/inspect the top of a high roof without spending so much money and time on climbing or scaffolding. It reduces the risk of falling off high structures. It can also serve as aerial surveillance of buildings and other facilities.
- Data Gets Even More Mobile: This enables managers to oversee multiple locations from a single place using mobile technology with a browser-based facility management system (FMS).
- Facility Optimization with Machine Learning and IoT. This is having to do with innovative tech and software platforms that enhance asset performance, connected buildings and preventive maintenance management.
- Blockchain Buzz is ledger technology used to track activities and actions within a system. This innovative technology can be used to improve contract management, work order processing, payment process, tracking of facilities management and maintenance needs. It has the capacity to provide accurate data analysis.
- Internet-connected devices can be used to generate a dataset for buildings which can be leveraged through machine learning which will help to unlock insights into market trends and building performance optimization.

### **Benefits of maintaining school physical facilities in Higher education**

As earlier discussed, maintaining educational facilities or physical facilities in school means taking care of all facilities and equipment, that facilitate teaching and

learning activities within the school. These facilities are also used by members of the community where it is situated. The fact that the school plant to a large extent determines the effectiveness of teaching and learning cannot be over-emphasized. In discussing this subsection, we shall outline the functions or usefulness of maintaining the facilities in tertiary institutions.

The benefits of maintaining the facilities in tertiary institutions are the following:

- i. Maintenance of school facilities will lead to more efficient and effective teaching classroom control while students will learn in a more conducive environment,
- ii. Maintenance enables us to pay less now for the maintenance of facilities, instead of waiting to pay more at a delayed point in the future when the facility is beyond repair or badly damaged.
- iii. Maintenance forestalls deterioration and reduces outlays in form of replacement costs for neglected school buildings and facilities.
- iv. Maintenance of facilities is for the safety of the users, durability, or long-life span of the plant.
- v. Because of population growth and the need for adequate provision of facilities, the few existing ones should be properly handled to meet the rising demand for its use.
- vi. We maintain control and evaluate facilities within a set standard.

## CONCLUSION

Various views have been expressed in the study of Management and maintenance of school facilities which is getting involved in those activities designed to repair and restore facilities to their original state of completeness. Maintenance culture was also viewed as the habit, values and traditions of getting involved in those activities designed to repair these facilities. The management and maintenance of facilities in schools will go a long way in transforming the behavior of students towards facilities in schools as well as enhancing the general well-being of the school environment (Archieval, 2019). It is the submission of this write-up that the habit of management and maintenance of physical facilities be imbibed in our tertiary institutions by both staff and students to enhance and promote all-round growth.

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