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Evaluating the Practices of Building Maintenance Management in Higher Education Institutions in Kumasi.

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ABSTRACT

The importance of buildings in tertiary institutions cannot be underestimated, as they significantly impact the performance of the institution. However, when building amenities are inadequate, it not only diminishes the institution's value but also affects its users and stakeholders. To create an environment that fosters learning, teaching, creativity, and research, it is crucial to maintain institutional structures in good condition. This is because the physical setting plays a significant role in the learning process. A study was conducted to examine the maintenance management structures of tertiary institutions, focusing on traditional maintenance procedures and funding methods in universities. The research gathered data through standardized questionnaires and interviews with maintenance department workers. The data was then analysed using statistical procedures such as mean item score, percentage, and frequency. The study revealed that although institutions have maintenance systems in place, they lack a well-defined organogram outlining the hierarchy and flow of authority. Additionally, the maintenance section employs inexperienced workers. Despite sufficient funding, maintenance projects frequently experience cost overruns and underestimation. To address these issues, the paper suggests constructing a formal organogram to clarify power dynamics within the institution. It also recommends providing adequate training for maintenance staff, particularly for quantity surveyors responsible for generating maintenance budgets.

Keywords: Maintenance, Maintenance Department, Maintenance Practice, Tertiary Institutions Kumasi.

INTRODUCTION

Buildings serve various functions beyond mere structures, particularly in the context of public institutions. Maintenance plays a vital role in keeping these facilities in usable condition. However, there is a negative perception towards maintenance culture in public institutions, leading to a decline in the sustainable maintenance approach and deterioration of buildings.

To address this issue, a study will focus on specific buildings in Kumasi tertiary institutions to assess their current state and maintenance practices from both management and user perspectives. It is essential to maintain these facilities to alleviate the existing problems within Ghana's educational system.

Neglecting maintenance requirements has resulted in poor conditions of state buildings, reducing their lifespan. Continuous maintenance can significantly impact the condition of school buildings and prolong their lifespan. However, if maintenance is neglected, it can shorten the lifespan of these buildings.

Materials and components of buildings deteriorate over time, but wise decisions during the design stage can slow down this process. Proper maintenance can extend the longevity of buildings. As physical development, including public buildings, requires substantial financial investment, efficient maintenance is crucial for these structures to serve their intended purposes.

Despite significant financial investments, public organizations often lack a long-term maintenance strategy, leading to insufficient funding for maintenance compared to other operational costs. Delaying maintenance due to various factors like resource constraints and conflicting agendas further exacerbates the situation.

The lack of a proactive approach and passive relationship towards public structures contribute to the decline in professional building maintenance, negatively affecting the growth of public institutions and the nation as a whole.

This study aims to investigate the existing maintenance management systems in academic institutions, beginning with an assessment of the state's overall maintenance practices before focusing on higher education buildings.

The following goals would be the focus of the study:

- 1: To identify the maintenance management systems and policies of the institution.
- 2: To identify the challenges with the institution's maintenance management system and policy.

3: To identify the fundamental factors influencing the institution's maintenance management.

IDENTIFY THE MAINTENANCE MANAGEMENT OF BUILDINGS

Building maintenance is a crucial technique used to preserve the usability of a facility for its users or residents. It involves maintaining, protecting, improving, and caring for the structure and services of tertiary institution buildings according to established standards. The primary focus of maintenance is to ensure that buildings and services can fulfill their intended functions over their lifespan without significant deterioration.

Buildings are essential assets for postsecondary institutions, alongside cash, technology, personnel, and equipment. They are vital for the effective operation of the workforce, and up to its facilities. However, buildings naturally lose value and deteriorate over time due to wear and tear from use, inactivity, and external factors.

A building maintenance system is necessary to maintain the proper functioning and usability of facilities. The quality of life, tenant comfort, and productivity are all affected by the maintenance and condition of the structure. In educational institutions, the state of facilities significantly impacts learning, research, and work.

Building maintenance ensures the structural, functional, and aesthetic integrity of a building throughout its useful life, preventing unnecessary expenses. It is a crucial program for long-term profitability in infrastructure development.

Maintaining buildings in higher education institutions is essential to create an environment that supports instruction, learning, creativity, and research. The fundamental goal of maintenance is to sustain optimal performance throughout the building's useful life.

To preserve the desirable characteristics of safety and convenience as building systems deteriorate, proactive and reactive measures must be implemented.

The maintenance of the built environment has a broader impact on the entire nation as it reflects the overall well-being of the country.

EXAMINE THE FUNCTIONS OF THE MAINTENANCE DEPARTMENT

A number of units that make up the maintenance division maintain the institution's buildings in good shape. The administration is one of these divisions, and it oversees a number of other divisions. Support services, utilities, or capital projects are three possible organizational structures for the remaining ones.

The building's physical and structural condition, as well as the efficiency of the mechanical system, are routinely assessed, looked into, and inspected by the maintenance division. Evaluations of utility services, security issues, environmental concerns, and the effectiveness of the fire prevention installation are a few examples.

The maintenance division plans and assigns work for all building infrastructure, grounds, and equipment maintenance programs, including emergency, preventive, and routine maintenance.

The agency also requests quotes from project management companies and contractors for its institutional initiatives, which it carefully reviews. The final results include budgeting, record-keeping, and report generation.

The maintenance department works with the finance department since it often handles project funding. The department also works closely with the occupants and facility management of the property.

When managing the building, the department also ensures that the entire establishment complies with all applicable laws, legislation, and standards. In order to complete this action, the proper parties must typically be contacted in order to negotiate new standards and secure the required licenses.

Materials and Methods

Surveys and observation of construction employees at work in the maintenance department of selected higher education institutions were used to gather data for this study. Two universities, one technical university, and two university colleges, all of which are located in Kumasi, Ghana, are on the list of postsecondary institutions that were selected. Participants 50 in the study were employed at the aforementioned higher educational institutions in a variety of maintenance-related fields. Because this number is feasible, a census sample of 50 surveys was conducted. The results of a survey may be skewed and not very useful, according to Moser and Kalton (1999), if the return rate is less than 20%–30%. A total of 30 questionnaires, or around 60% of the population, were found. The investigation is assessed to require this amount. The gathered data were evaluated using basic statistical techniques such as mean item score, percentage, and frequency.

THE TYPE OF MAINTENANCE MANAGEMENT SYSTEM IN THE INSTITUTIONS

In order to do this, the type of maintenance management system that the institution used was determined through a survey of the literature. In order to gather data on the various types of maintenance management systems used by the institutions' administration, structured questionnaires were used in the study. Using descriptive statistics, the maintenance management system was located and described.

THE MAINTENANCE POLICY EMPLOYED BY THE MANAGEMENT OF THE INSTITUTIONS

In order to determine the maintenance strategy used by the institution's administration, a number of literature were examined to identify the critical influencing factors that contribute to forming the institutional mindset for the concept of building maintenance. Data on specific challenges or issues that building tenants and the institution's maintenance division are likely to experience or be aware of were gathered using structured questionnaires. Using descriptive data, an explanation for the discovered policies was offered.

MAJOR FACTORS INFLUENCING THE MAINTENANCE MANAGEMENT OF THE INSTITUTION

Through a review of the literature, the main factors that affect the choice to do building maintenance were determined. To gather information on the relative weights of various factors influencing building maintenance, structured questionnaires were used. Descriptive statistics were used to describe the issues that were found.

POPULATION OF THE STUDY

The total number of components from which the study's sample is drawn is known as the population. To accomplish the objective of the study, the personnel in charge of the maintenance department at the chosen higher institutions were included in the population.

Sampling Technique And Sampling Size

The respondents were chosen consciously using basic random sampling. The maintenance department staff at the chosen universities completed 50 surveys in total, with 30 responses being recorded.

Data Collection Techniques

The information type, information source, and data collection method are shown for each conceptual issue.

Data Gathering Instruments And Data Collection Procedure

The goals and areas of investigation for the study were taken into consideration when creating the questionnaires. The researcher merely disseminated the surveys to ensure that the questions were phrased consistently. In the selected tertiary institutions, we contacted respondents in their places of employment.

Data Management Methods

Post coding and editing are two of the methods used for data management.

Post Coding Method

This method converts open responses that the questionnaire was designed to record in that format into closed forms, a format capable of entry and analysis in the form of frequencies, in order to collect frequencies for all open-ended questions. For a coding sheet, which is needed for analysis, qualitative data must be converted into quantitative data. This accelerated data entering and made it possible to group survey data into similar concepts in order to gather information and establish frequency distributions for analysis.

The Method Of Editing

This strategy includes keeping track of the answer quality as well as the accuracy, dependability, and consistency of the data collected. The following are the steps for identifying and fixing questionnaire errors. The technique's coding was one of the steps that was altered. Numerous types of errors, such as omission, inversion, duplication, and numbers in the wrong column, were carefully examined during the coding process. One of the steps the researcher took to ensure the accuracy and dependability of this study was to do this.

Data Entry Technique

Data transmission into a coding sheet is required for this. The data entered on the coding page is meant to help with upcoming data analysis. Eventually, a template for data collection and response (information) codes were created.

As the main instrument, for data entry, SPSS, or the Statistical Package for Social Sciences, was used (The acquired data were evaluated using simple statistical techniques such as mean item score, percentage, and frequency). Microsoft Excel served as an additional input source for creating graphic and visual representations from the SPSS Frequencies.

Data Analysis Technique

For ensuring that the study data was complete, correct, and consistent, the researcher studied and examined the responses they had obtained from the field. The most popular statistical techniques were cross-tabulations, frequencies, and percentages. Graphs and charts were used to visually present the data analysis findings. The graphs and charts were made using the data that had been examined. Conclusions were drawn from the evaluated data and compared to other findings and data from secondary sources in order to distinguish or support the survey's findings.

RESULTS AND DISCUSSIONS

The study takes into account and examines the field data in this section in order to provide an interpretation. A questionnaire of 50 was purposefully distributed to the staff members of the chosen educational institutions. Out of the 50 sent surveys, 30 responses were collected.

The following are the clear objectives:

- 1: To identify the maintenance management systems and policies of the institution.
- 2: To identify the challenges with the institution's maintenance management system and policy.
- 3: To identify the fundamental factors influencing the institution's maintenance management.

TABLE 4.1 NATURE OF MAINTENANCE WORKS IN THE VARIOUS INSTITUTIONS.

Practice Codes	Maintenance Practices	Options	Frequency	Percent%
NATURE OF MAINTENANCE WORKS	What type of repairs have you mostly carried out in the past 5years?	Major	4	10%
		Minor	15	55%
		Both major and minor	11	35%
	What is the most occurred nature of maintenance work on building components affected within the higher institution?	Repairs	6	20%
		Renovations	16	50%
		Replacement	8	26%
		Extension	4	4%

The higher education institution's facilities have mostly undergone small- and large-scale modifications over the past five years.

At three of the institutions, the less sophisticated labour is outsourced while the easier chores are handled internally by maintenance staff.

At all of the higher education institutions the study looked at, renovations, replacements, and repairs were discovered to be the most often conducted types of maintenance work.

TABLE 4.2 THE QUALITY OF MAINTENANCE WORKS CARRIED OUT IN THE INSTITUTIONS.

Practice Codes	Maintenance Practices	Options	Frequency	Percent %
MAINTENANCE QUALITY ASSURANCE	Which of the users can make complaints to the maintenance dept?	School secretary	1	3%
		Faculty Officer	3	13%
		Hall officer	5	16%
		Students Staff	5	16%
		Head of department	15	50%
		Others	2	2%
	What is the frequency of complaints from users of the building facilities?	Very often	10	30%
		Regular	20	70%
	Which of the users do you receive the most maintenance complaints from?	Students	12	44%
		Staff	2	3%
		Both students and staff	16	53%

The study found that students, instructors, employees, the school secretary, and the hall officer are the users who can submit complaints to the maintenance departments. Only two of the five higher education institutions had their maintenance department complete a customer satisfaction survey. 76% of respondents confirmed that the maintenance department is consulted during the contract stage of new construction projects, while only 24% said they are not. Small and substantial repairs have been made to the buildings most frequently over the past five years, with minor repairs dominating (50%). In three of the institutions, internal maintenance employees handle the small tasks, while the larger work is outsourced.

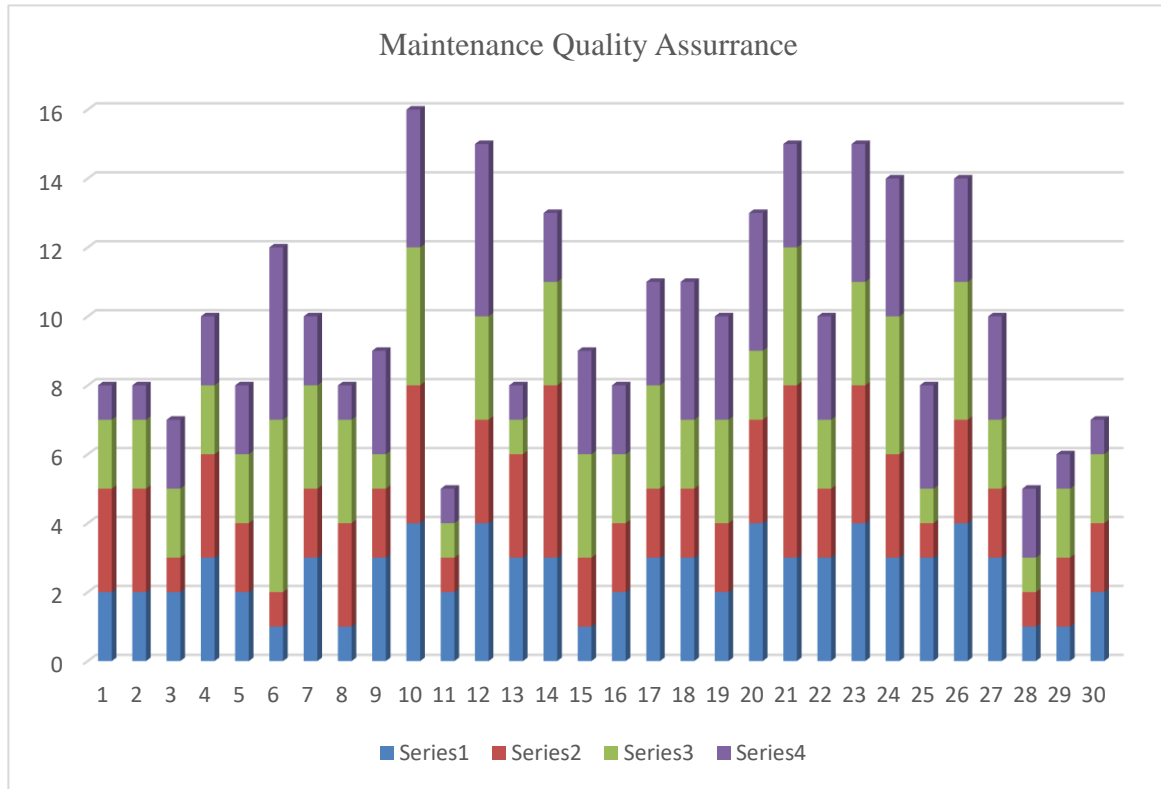


Figure 14.2: Maintenance Quality Assurance (Source: Author's Computation)

Series 1= What is the ranking of the Maintenance Works Department in carrying out maintenance problems?

Series 2= Do you follow a quality assurance program that includes the use of inspecting and evaluating completed work?

Series 3= Is the maintenance department consulted during the contract stage of new building projects within the higher education institution.

Series 4= How often do you carry out maintenance on buildings in your higher education institution?

TABLE 4.3 VARIOUS STRATEGIES USED IN CARRYING-OUT MAINTENANCE WORKS.

Practice Codes	Maintenance Practices	Options	Frequency	Percent %
MAINTENANCE STRATEGIES	How often do you carry out maintenance on buildings in your higher education institution?	When the need arises	16	55%
		1-2years	8	20%
		3-4years	6	13%
		5years and above	1	2%
	What type of maintenance system does the works and maintenance department adopt for maintenance works?	Corrective	7	20%
		Routine	12	40%
		Both corrective &routine	12	40%
	Why do you adopt this system of maintenance?	Availability of funds	3	33.3%
		Maintenance is carried out when users make complaints	3	33.3%
		Maintenance staff cannot meet the volume of work	3	33.3%
	What necessitates you to carry out maintenance works on the buildings?	Based on request from users	20	70%
		Based on building inspection	10	30%
	How do you check defects in the buildings of your	Users report defects then maintenance staff rectify it	15	50%

higher education institution?	Maintenance staff inspects regularly and report defects for rectification	15	50%
How is the maintenance works carried out?	In-house	10	30%
	Outsourced	5	20%
	Both (Inhouse and Outsourced)	15	50%

The maintenance strategy of higher education institutions shows that the majority of maintenance is done when it is required (53.3%), with the remaining amounts occurring every 1-2 years, 3-4 years, 5 years, and above all (26.7%), (20%), and (3.3%) accordingly. Nearly every one of the five institutions employed both corrective and routine maintenance procedures for their maintenance work, but only one higher education institution did. The maintenance departments are required to complete maintenance tasks that are mostly driven by requests from building users (70.0%), with building inspections and requests from users of the buildings accounting for the remaining 30.0%. Building flaws are inspected most often when users report them and then maintenance staff fixes them (83.3%), whereas 16.7% is based on users reporting flaws and then maintenance staff fixing them and maintenance staff inspecting routinely and reporting flaws for correction. In all five of the selected higher education institutions, maintenance work is mostly done both internally and outside, consistent with findings by Lateef et al. (2011) indicating the majority of small repairs are handled internally while major maintenance tasks are contracted out.

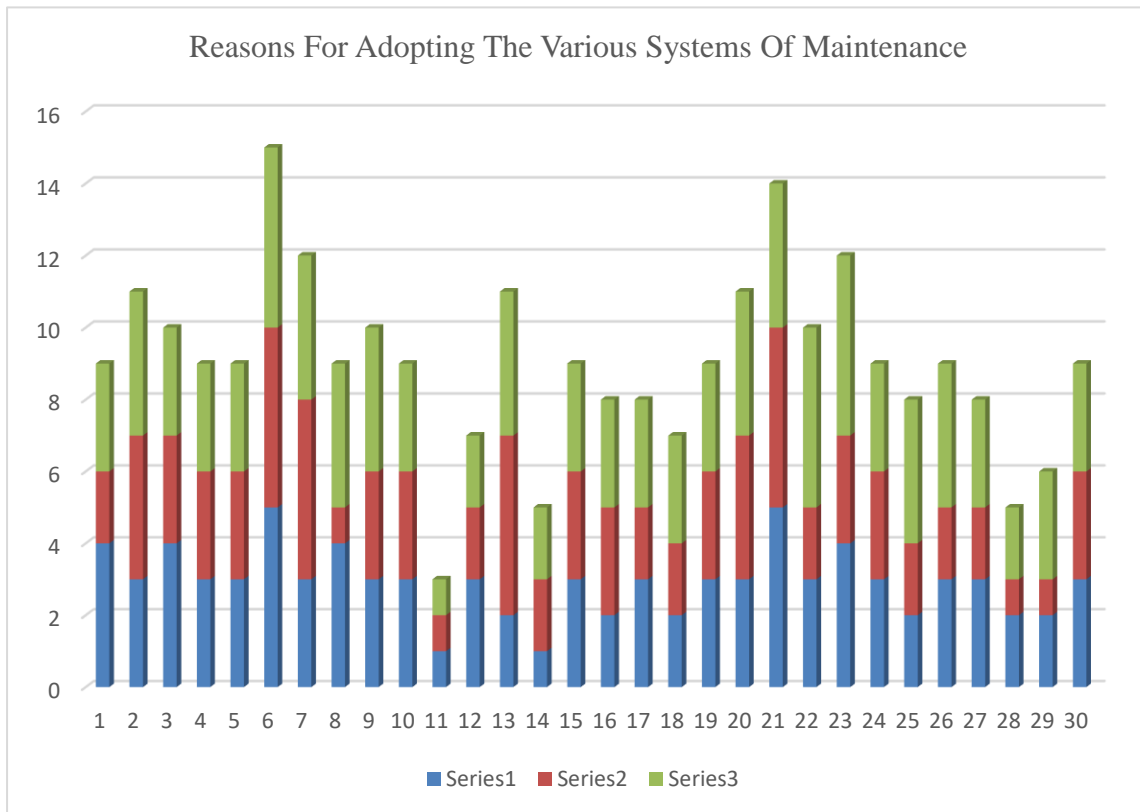


Fig.4.3 Source: Author's Computation

- Series 1= Availability of funds.
- Series 2=Maintenance is carried out when users make complaints.
- Series 3=Maintenance staff cannot meet the volume of work.

TABLE 4.4 MAINTENANCE CHALLENGES THE INSTITUTIONS FACE IN CARRYING-OUT THEIR MAINTENANCE WORKS.

Practice Codes	Maintenance Practices	Options	Frequency	Percent %
MAINTENANCE CHALLENGES / MEASURES	What is the attitude of students to the building facilities provided in the higher education institution?	Poor	18	60%
		Fair	12	40%
	Which defect is most observed on the buildings?	Electrical	3	20%
		Plumbing	3	35%
		Roof & Ceiling	3	25%
		Windows & doors	3	15%
		Structural Elements	1	5%
	What are the challenges being faced by the maintenance department in effective maintenance management delivery in the higher education institution?	Inadequate funds	3	18%
		Lack of Materials for maintenance works	1	10%
		Shortage of staff		
		User delay in reporting maintenance problems		
		Electrical power fluctuation	3	18%
		Lack of maintenance culture	3	18%
		3	18%	
		3	18%	

The table lists the upkeep procedures used by various higher education institutions in relation to upkeep issues or solutions. The main issues that the maintenance department in higher education institutions has with providing effective maintenance management are insufficient funding, a lack of staff (professional and tradesmen), and a lack of materials for maintenance work. Other higher education institutions had significant issues with inadequate funding, a lack of staff (professional and tradespeople), a lack of maintenance culture, user misuse of building amenities, user delay in reporting maintenance issues, electrical power fluctuations, and bottlenecks/management loopholes. These difficulties could be reduced through quick availability/improved funding systems, the hiring of qualified maintenance staff, enhanced communication between maintenance departments and users, maintenance awareness of management and users, and the construction of additional hostels/reduction of office and hostel room overcrowding. Maintenance awareness, research and training of the maintenance staff, hiring of qualified personnel, incentives to motivate the maintenance staff for effective maintenance delivery, and payment of a fee to hold accountable any user who violates maintenance policy or rules.

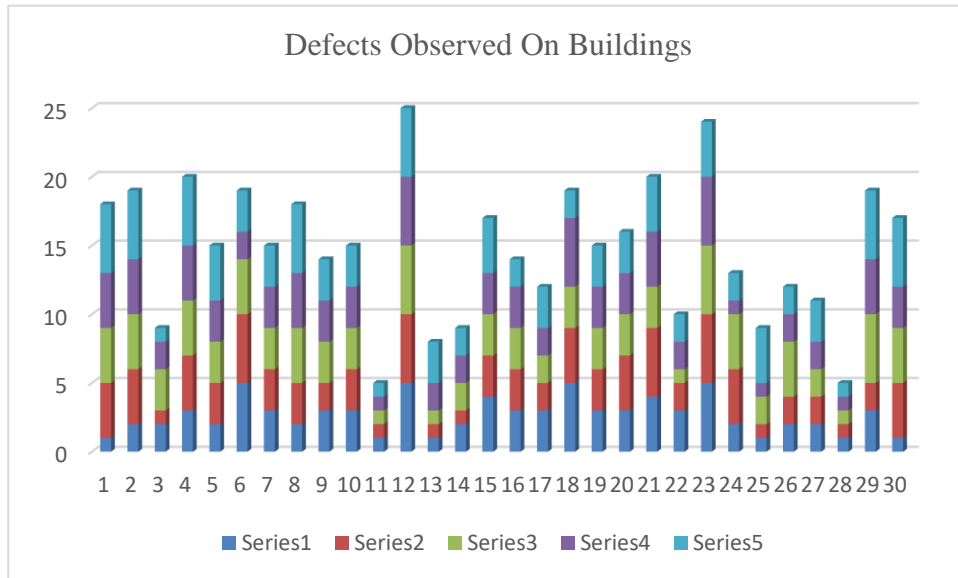


Figure 24.4.1 Defects observed on building (Source: Author's Computation)

Series 1= Structural Elements, Series 2=Windows and Doors, Series 3= Roof And Ceiling, Series 4= Electricals, Series 5= Plumbing

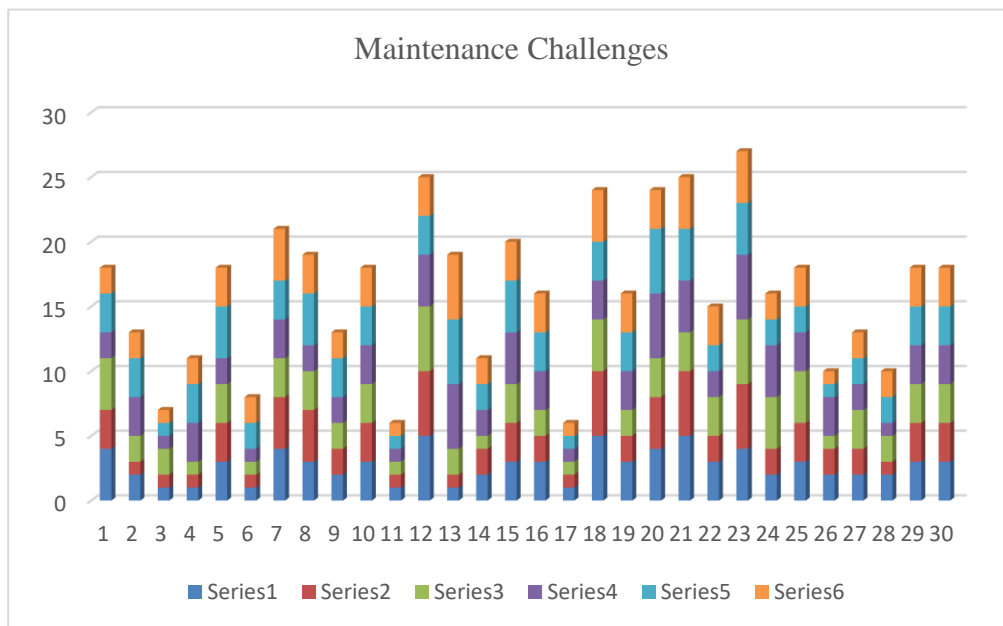


Fig.4.4.2 Source: Author's Computation

Series 1= Lack of Materials for maintenance works

Series 2= Electrical power fluctuation

Series 3= User delay in reporting maintenance problems

Series 4= Shortage of staff

Series 5= Lack of maintenance culture

Series 6= Inadequate funds Lack of Materials for maintenance works

CONCLUSIONS

It is necessary to develop a cautious plan for sustaining the few due to a lack of suitable facilities. To address the inadequate maintenance practices that plague Ghanaian housing, an efficient maintenance culture is required. Because there is no connection between training and practice, the absence of such a maintenance culture begs for investigation.

Poor infrastructure and financial flow problems are problems that many developing nations share with Ghana. This has a tremendous impact on the infrastructure of the underdeveloped educational system. Furthermore, there are not enough resources to start performing building upkeep, therefore amenities are also inadequate.

The way people live is influenced by their surroundings. In addition to enhancing a building's appearance, maintenance also influences its functionality and the aesthetics of the surroundings. The more beautiful buildings there are, the more prosperous the local economy is.

The weather, how it is used, how it is maintained, and how well its owners and tenants care for it can all affect how long a structure lasts. Buildings' lifespans will be shortened by poor maintenance.

A building's emergency readiness is the responsibility of its occupant, custodian, and owner. A successful catastrophe mitigation strategy may include the highest safety standards for maintenance tasks.

Another element that affects the maintenance culture is the situation in which users and stakeholders develop passive attachments to public properties because of egregious neglect. Because their primary users—the customers or occupants—failed to take good care of them and permitted damaged facilities to stay unrepaired, these state assets are in a clear state.

The classification of maintenance was taken into consideration in order to comprehend the issue of the type of maintenance management system used by tertiary institutions in Kumasi. Once more, the elements that lead to usability concerns with the maintenance management system were examined and ranked by degree of difficulty.

In the investigation, both primary and secondary data sources were taken into account. The provided data were examined using straightforward descriptive statistics. These elements of the maintenance management system were taken into account.

The study's findings demonstrate that while higher education institutions require maintenance, some of it has already been completed. The poll discovered that a lack of resources, a skill gap, crowded facilities, and a lack of a maintenance culture are all issues with an institution's maintenance management system.

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