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EVALUATION OF MAINTENANCE PRACTICES ON STRUCTURAL INTEGRITY AND LIFE-CYCLE COST OF GOVERNMENT BUILDINGS IN ANAMBRA STATE, NIGERIA

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ABSTRACT

Government buildings are important public assets whose safety, functionality, service life and economic value depend largely on effective maintenance. The study adopted a quantitative research approach using a structured questionnaire to evaluate maintenance practices and their implications for the structural integrity and life-cycle cost of government buildings in Anambra State, Nigeria., involving a review of relevant literature and a survey of built-environment professionals. From a population of 508 professionals, a sample of 120 was determined using the Taro Yamane formula at an 8% precision level, with 109 valid responses analyzed using frequencies, percentages, mean scores and standard deviations. Findings revealed that corrective/reactive maintenance was the predominant strategy (56.0%), while preventive and predictive maintenance accounted for 11.0% and 5.5%, respectively. Regular inspection, condition assessment, scheduled maintenance and documentation were found to be inadequate. Respondents strongly agreed that maintenance was often triggered by failure or visible defects (mean = 4.08), while early maintenance preserves structural integrity (mean = 4.41), delayed maintenance accelerates deterioration (mean = 4.39), and preventive maintenance reduces life-cycle costs (mean = 4.35). Common defects included roof leakage, dampness, electrical problems, cracks, plumbing defects and damaged doors/windows. Major constraints included funding and approval delays, inadequate technical expertise, poor professional supervision and occupant misuse. The study concludes that reliance on reactive maintenance may accelerate deterioration and increase long-term maintenance costs. It recommends systematic preventive, predictive and condition-based maintenance supported by regular inspections, timely funding, competent personnel, professional supervision, proper documentation and life-cycle cost planning.

Keywords: Government Buildings, Maintenance Practices, Structural Integrity, Life-Cycle Cost, Preventive Maintenance; Predictive Maintenance.

1.0 INTRODUCTION

Government buildings constitute an important component of public infrastructure. Ministries, local government offices, schools, agencies and other public establishments depend on these facilities to provide administrative and social services. Their significance therefore extends beyond the physical structure itself: deterioration of a government building can affect safety, functionality, service delivery and the value obtained from public expenditure. Evidence from Nigerian public-building studies shows that inadequate maintenance can undermine the functionality and serviceability of public facilities, making maintenance management an important public-asset issue. Amusan, Aigbavboa, and Thwala, (2021).

Maintenance is central to preserving this value. A building that is properly maintained can continue to perform its intended functions for a longer period, whereas deferred or poorly organised maintenance may accelerate deterioration and increase the eventual cost of repair or replacement. Maintenance should consequently be viewed as a continuous management process involving inspection, condition assessment, planning, budgeting, repair, replacement and record keeping rather than as an activity that begins only after a failure has occurred. Ebekozien, Aigbavboa, and Thwala, (2021).

Recent evidence from Nigeria reinforces this position. Chima, Nkeleme, Amafili, Chukwuemeka and Nzeneri, (2021), in their study of public buildings in South-East Nigeria, identified maintenance problems affecting building condition and recommended proactive maintenance planning and regular condition surveys. Ogunbayo, Aigbavboa, Thwala, and Akinradewo, (2022b), also demonstrated the importance of organisational maintenance policy, funding, financial planning and prioritization in the management of public buildings. More recently, Nwankwo and Nwankwo (2025) examined building defects and maintenance methodologies in tertiary institutions in South-Eastern Nigeria and highlighted the importance of appropriate maintenance strategies for building longevity.

The present study is motivated by the need to examine how these issues manifest in government buildings in Anambra State. Rather than treating maintenance merely as a technical repair function, the study considers it as a management practice with direct implications for structural integrity and life-cycle cost. The study adopted a quantitative research approach using a structured questionnaire to evaluate maintenance practices and their implications for the structural integrity and life-cycle cost of government buildings in Anambra State, Nigeria.

Government buildings require continuous maintenance because their components are exposed to weathering, ageing, occupancy, wear and failures in building services. However, the effectiveness of maintenance depends on whether defects are identified early. whether maintenance work is planned, whether funds are released when required and whether competent personnel supervise the work. Where these elements are weak, maintenance tends to become reactive.

The challenge is compounded by funding delays, bureaucratic approvals, shortages of technical personnel, inadequate training, insufficient professional supervision, management lapses and occupant misuse. If defects are not identified and addressed at an early stage, the resulting deterioration can compromise building performance and increase future expenditure. This creates the central problem addressed by the study: whether existing maintenance practices are adequate to protect structural integrity while also controlling the long-term cost of government building ownership.

The study focuses on government buildings in Anambra State and considers maintenance practice from the perspective of persons working in government establishments and persons familiar with building maintenance and management. It covers preventive, predictive and corrective maintenance, inspection, documentation, building defects, structural integrity, life cycle cost and maintenance challenges.

2.0 LITERATURE REVIEW

Concept of Building Maintenance

Building maintenance may be understood as the combination of technical, managerial and administrative actions required to keep a building and its components in a condition suitable for their intended use. The concept includes routine servicing, inspection, repairs, replacement and planned interventions. From a facilities-management perspective, maintenance is closely related to asset performance because the condition of components influences functionality, user satisfaction, safety, operational continuity and value.

The importance of maintenance becomes clearer when the building is viewed as a system. A building contains interconnected elements such as foundations, walls, floors, roofs, ceilings, doors, windows, finishes, drainage, plumbing, electrical installations and mechanical systems. Failure of one component may affect others. Roof leakage, for example, may create dampness and damage finishes and ceiling components. A plumbing leak may affect walls and floors. Electrical defects may create safety risks. Maintenance should therefore identify problems early and address their causes where possible.

Ogunbayo and Aigbavboa, (2019) examined maintenance requirements in student residential facilities in Nigeria and demonstrated the importance of understanding maintenance needs as part of facility management. Their work reinforces the principle that maintenance requirements should be identified and planned rather than left entirely to emergency response.

Types and Strategies of Maintenance

Preventive maintenance is planned intervention undertaken to reduce the likelihood of failure. It may be time-based, condition-based, predictive or reliability-centred. Corrective maintenance, by contrast, is carried out after a defect has been identified and may range from minor repair to major

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replacement. Reactive or breakdown maintenance represents a more extreme form of corrective intervention in which action is triggered by failure.

A sound maintenance system does not necessarily eliminate corrective maintenance. Unexpected failures will occur even in well-managed buildings. The concern is whether corrective work is an unavoidable exception or the normal operating pattern. If most maintenance is triggered only after visible failure, the organization may be operating reactively even if it formally describes its policy as preventive.

Nwankwo and Nwankwo (2025) provide strong regional evidence for this distinction. Their study of tertiary institutions in Southeastern Nigeria found that unplanned and corrective maintenance in public institutions was associated with critical defects, maintenance delays, higher maintenance costs and safety risks, while planned preventive strategies were associated with improved lifecycle, performance and cost outcomes.

The implication is that maintenance strategy should be selected according to component condition, risk, use, environmental exposure and cost. High-risk components may require frequent inspection, while less critical components may be maintained according to a longer schedule. A facilities manager therefore needs information about the building and its components before deciding how maintenance resources should be allocated.

Maintenance Culture and Organizational Behaviour

Maintenance culture refers broadly to the attitudes, values, practices and organizational behaviors that determine whether maintenance is treated as a continuous responsibility. It includes how management responds to defects, how occupants use facilities, whether staff report problems, whether budgets are protected and whether maintenance personnel are given the authority and resources needed to act.

Ogunbayo et al. (2022a) reviewed more than 100 recent publications and identified maintenance culture as a significant factor influencing public-building maintenance in developing countries. The authors linked poor maintenance culture with deterioration and abandonment and argued for behavioural change among stakeholders.

Maintenance culture is therefore wider than technical competence. An organization may employ competent technicians but still experience poor maintenance if inspections are not commissioned, funding is delayed, work orders are not followed up or occupants misuse facilities. Conversely, an organisation with limited resources can improve performance through prioritisation, documentation, prompt reporting and planned intervention.

Inspection and Condition Assessment

Inspection is the information-gathering foundation of preventive maintenance. It provides evidence about the current condition of building components and helps managers decide which defects require immediate attention, which can be scheduled and which require specialist investigation.

Inspection should be systematic rather than incidental. Routine inspections can identify visible deterioration, while detailed professional inspections may be required for structural cracks, major water ingress, electrical risks and other technically significant conditions. Records should be maintained so that recurring defects can be identified and trends monitored.

The importance of inspection is particularly clear where a building is exposed to heavy rainfall and humidity. Roofs, gutters, drainage, external walls, waterproofing and other components can deteriorate when water is not controlled. Early inspection allows defects to be addressed before secondary damage occurs.

Structural Integrity and Building Condition

Structural integrity refers to the ability of a building's structural system to perform safely and satisfactorily under the conditions for which it was designed. In a maintenance study, structural integrity should be distinguished from general building conditions. Not every defect is structural. Damaged doors, electrical faults and peeling finishes affect functionality but do not necessarily indicate structural instability.

Nevertheless, inadequate maintenance can contribute indirectly to conditions that affect structural performance. Persistent water penetration can accelerate material deterioration. Uncontrolled defects can also affect adjoining components. Cracks may indicate harmless shrinkage or movement, but they may also indicate settlement or other conditions requiring professional investigation.

The present study therefore treats reported cracks, dampness and roof leakage as indicators of building-condition concerns rather than as proof of structural failure. This is methodologically important because an interview cannot substitute for engineering inspection. The interview evidence can show what occupants and workers observe and how they perceive maintenance effects; it cannot determine structural capacity without physical assessment.

Life-Cycle Cost of Buildings

Life-cycle cost is concerned with the economic consequences of an asset over a defined period of analysis. In building management, it may include acquisition or construction, operation, maintenance, repair, replacement, refurbishment and other relevant costs. The concept encourages decision-makers to look beyond the immediate cost of a repair or construction decision.

Opawole, Babatunde, Kajimo-Shakantu, and Ateji (2020) examined barriers to the application of life cycle costing in Nigerian building projects and found important barriers relating to professional competence, cost implications, administrative factors and procurement options. These findings are

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important to government buildings because public-sector maintenance decisions often involve administrative approvals, procurement procedures and professional inputs.

Preventive maintenance has a potential life-cycle cost advantage because early intervention can reduce the likelihood of expensive failure. However, preventive maintenance itself has a cost. The appropriate objective is therefore not to maintain everything as frequently as possible, but to determine a rational maintenance interval and intervention strategy that balances maintenance cost, failure risk, service continuity and expected component life.

Maintenance Budgeting and Funding

Maintenance cannot be implemented without financial resources. The challenge in public organizations may involve both the adequacy of budgets and the timing of fund release. The maintenance need that is identified today may become more expensive if funds are not approved until several months later.

Ogunbayo et al. (2022b) examined maintenance budget elements for building maintenance management in the Nigerian built environment and emphasised maintenance budgeting and financial planning. Their findings reinforce the view that financial management is an integral part of maintenance management rather than a separate administrative concern.

A facilities-management approach therefore requires maintenance budgets to be linked to condition assessments and maintenance plans. Resources should be prioritised according to risk and consequence rather than allocated only after failure.

Maintenance Challenges in Nigerian Public Buildings

Maintenance of public buildings in Nigeria is affected by interconnected financial, technical, administrative and behavioural challenges. Studies have identified inadequate maintenance funding, delayed release of funds, limited technical capacity, weak maintenance planning and inadequate professional supervision as major factors affecting effective maintenance. Ebekozien et al. (2021) identified inadequate funding and personnel-related challenges, while Opawole et al. (2020) highlighted the importance of effective maintenance management and organisational practices in sustaining public infrastructure. These challenges can limit the ability of public institutions to undertake timely and planned maintenance.

Maintenance culture and organisational policies also influence the effectiveness of maintenance activities. Ogunbayo et al. (2022c) emphasised the role of organisational maintenance policy and management practices in supporting effective maintenance. Similarly, Nwankwo and Nwankwo (2025) identified inadequate funding, insufficient skills, weak maintenance structures and poor maintenance practices as challenges affecting building maintenance. These findings suggest that maintenance problems are not caused by a single factor but arise from the interaction of financial constraints, organisational weaknesses and limited technical capacity.

The reviewed literature further indicates that delayed funding may cause maintenance to be postponed until defects become serious, thereby increasing the extent and potential cost of repairs. Inadequate inspection, poor record keeping, weak supervision and insufficient follow-up can also reduce the effectiveness of maintenance interventions. Therefore, effective maintenance of public buildings requires adequate and timely funding, regular inspection and condition assessment, competent personnel, proper supervision, effective maintenance policies and adequate documentation. These issues provide the basis for examining maintenance practices and their implications for structural integrity and life-cycle cost in government buildings in Anambra State.

3.0 RESEARCH METHODOLOGY

This research employed a quantitative method to examine maintenance practices and their implications for the structural integrity and life cycle cost of government buildings in Anambra State, Nigeria. The approach was considered appropriate because the study required measurable responses from built-environment professionals and information concerning maintenance practices, building defects, structural condition, and maintenance-related cost implications, it involved the administration of structured questionnaire to selected built-environment professionals.

The study was carried out in Anambra State, Nigeria. Anambra State is in the South-Eastern part of Nigeria and has a considerable concentration of government buildings and public administrative facilities. The state has a growing urban population and several government institutions whose buildings require continuous maintenance to remain functional and serviceable.

The study covered government buildings and relevant built-environment professionals practicing within Anambra State. The selection of Anambra State was considered appropriate because of the presence of numerous government offices and public buildings, as well as the activities of professionals involved in the planning, construction, valuation, management, maintenance, and operation of buildings.

The study population comprised 508 built-environment professionals involved in the management, maintenance and assessment of buildings. Data was collected through a structured questionnaire administered to selected respondents using proportionate sampling.

A total of 120 questionnaires were administered, out of which 109 were properly completed and found suitable for analysis. The questionnaire employed a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The collected data were analysed using descriptive statistical techniques, including frequencies, percentages, mean and standard deviation. A mean score of 3.00 and above was considered indicative of agreement with the respective statements.

The population of Architects was obtained from the professional records of the Nigerian Institute of Architects (NIA), Anambra State. The Nigerian Institute of Architects is the professional institution representing architects and promoting professional practice in architecture in Nigeria.

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The population of Builders was obtained from the professional records of the Nigerian Institute of Building (NIOB), Anambra State. The Nigerian Institute of Building is the professional institution representing builders and promoting professional standards and practice in the building profession.

The population of Engineers was obtained from the professional records of the Nigerian Society of Engineers (NSE), Anambra State. The Nigerian Society of Engineers is the professional society representing engineers and promoting the advancement and professional practice of engineering in Nigeria.

The population of Quantity Surveyors was obtained from the professional records of the Nigerian Institute of Quantity Surveyors (NIQS), Anambra State. The Nigerian Institute of Quantity Surveyors is the professional institution representing quantity surveyors and promoting professional practice in quantity surveying.

The population of Estate Surveyors and Valuers was obtained from the professional records of the Nigerian Institute of Estate Surveyors and Valuers (NIESV), Anambra State Branch. NIESV is a professional institution representing Estate Surveyors and Valuers and promoting professional practice in estate surveying and valuation.

For Facility Managers, the population was compiled from relevant professional records associated with the Nigerian Institute of Estate Surveyors and Valuers (NIESV), Anambra State Branch, and related facilities-management practice within the estate surveying and property management profession. This was considered appropriate because facilities management is closely related to the management, operation, maintenance, and effective performance of buildings and facilities.

Based on the compiled professional records, the population frame consisted of 508 professionals, distributed as follows:

Table 1: Population Frame of the Respondents

S/N	Professional Category	Population	Institutional Source
1	Architects	81	Nigerian Institute of Architects (NIA), Anambra State (2024)
2	Builders	106	Nigerian Institute of Building (NIOB), Anambra State (2024)
3	Engineers	95	Nigerian Society of Engineers (NSE), Anambra State (2024)
4	Quantity Surveyors	74	Nigerian Institute of Quantity Surveyors (NIQS), Anambra State (2024)

5	Estate Surveyors and Valuers	121	Nigerian Institute of Estate Surveyors and Valuers (NIESV), Anambra State Branch (2024)
6	Facility Managers	31	NIESV, Anambra State Branch / relevant professional records (2024)
Total		508	

3.1 Sample Size Determination

The sample size for the study was determined using the Taro Yamane formula for finite populations. The formula is stated as:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

n= sample size
N= population size
e= level of precision

For this study, the total population (N) was 508 professionals, while a precision level (e) of 8% (0.08) was adopted. Substituting the values into the formula:

$$n = \frac{508}{1 + 508(0.08)^2}$$
$$n = \frac{508}{1 + 508(0.0064)}$$
$$n = \frac{508}{1 + 3.2512}$$
$$n = \frac{508}{4.2512}$$
$$n = 119.50$$

Therefore, the calculated sample size was approximately 120 respondents.

Proportionate Sampling Formula

The sample size for each professional group is then determined using:

$$n_i = \frac{N_i}{N} \times n$$

Where:

- n_i= sample size allocated to each professional group

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- N_i= population of the particular professional group
- N= total population (508)
- n= total sample size (120)

Calculations for Each Professional Group

1. Estate Surveyors and Valuers

$$n_i = \frac{121}{508} \times 120 = 28.58 \approx 29$$

2. Builders

$$n_i = \frac{106}{508} \times 120 = 25.04 \approx 25$$

3. Architects

$$n_i = \frac{81}{508} \times 120 = 19.13 \approx 19$$

4. Engineers

$$n_i = \frac{95}{508} \times 120 = 22.44 \approx 22$$

5. Facility Managers

$$n_i = \frac{31}{508} \times 120 = 7.32 \approx 7$$

6. Quantity Surveyors

$$n_i = \frac{74}{508} \times 120 = 17.48 \approx 18$$

Because ordinary rounding would produce 119 instead of the required 120, one additional respondent is allocated to Quantity Surveyors, giving a final total of 120.

Table 2: Proportionate Allocation of Sample

S/N	Professional Group	Population	Proportionate Sample Size
1	Estate Surveyors and Valuers	121	29
2	Builders	106	25
3	Architects	81	19

4	Engineers	95	22
5	Facility Managers	31	7
6	Quantity Surveyors	74	18
Total		**508**	**120**

Consequently, 120 respondents were selected for the study from the six professional categories represented in the population frame.

4.0 RESULTS AND DISCUSSION

Questionnaire Response Rate

A total of 120 copies of questionnaire were administered to the selected respondents. Of these, 109 questionnaires were returned and found usable, representing a response rate of 90.8%. The analysis is therefore based on 109 usable responses, with qualitative interview evidence providing contextual support where relevant.

Table 3: Distribution of Respondents by Practice Area

Category	Distributed	Returned	Percentage
Facility Management	7	7	6.4
Estate Surveyors & Valuers	29	26	23.9
Architects	19	17	15.6
Quantity Surveyors	18	16	14.7
Builders	25	23	21.1
Engineers	22	20	18.3

The respondents were drawn from six relevant professional categories. Estate Surveyors and Valuers constituted the largest proportion (23.9%), followed by Builders (21.1%), Engineers (18.3%), Architects (15.6%), Quantity Surveyors (14.7%), and Facility Managers (6.4%). This distribution provides a range of professional perspectives relevant to the maintenance and management of government buildings.

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Table 4: Distribution of Respondents by City of Practice

Category	Frequency	Percentage
Awka	49	45.0
Onitsha	34	31.2
Nnewi	26	23.8

Awka accounts for the largest share of respondents (45.0%), followed by Onitsha (31.2%) and Nnewi (23.8%). The distribution provides representation from the three selected study locations.

Table 5: Distribution of Respondents by Age Group

Category	Frequency	Percentage
Below 31	29	26.6
31–40	43	39.4
41–50	27	24.8
Above 50	10	9.2

The age distribution shows that respondents were drawn from different career stages. The 31–40 age group formed the largest category, while respondents below 31, those aged 41–50 and those above 50 were also represented.

Table 6: Distribution of Respondents by Educational Qualification

Category	Frequency	Percentage
OND	9	8.3
HND	9	8.3
BSc	52	47.7
MSc	33	30.3
PhD	2	1.8
Others	4	3.7

Most respondents possessed tertiary professional qualifications, with BSc and MSc holders forming the largest groups. This indicates that the questionnaire responses were largely obtained from respondents with formal educational backgrounds relevant to professional practice.

Table 7: Distribution of Respondents by Years of Experience

Category	Frequency	Percentage
1–5 years	30	27.5
6–10 years	36	33.0
11–20 years	23	21.1
Above 20 years	20	18.3

The experience distribution indicates that the survey included both relatively younger practitioners and respondents with substantial professional experience, thereby providing views from different levels of exposure to building maintenance practice.

Existing Maintenance Practices

Table 8: Most Common Maintenance Strategy Reported

Maintenance strategy	Frequency	Percentage
Corrective/Reactive	61	56.0
Preventive	12	11.0
Predictive	6	5.5
Combination	30	27.5

Corrective/reactive maintenance was reported as the most common strategy, accounting for 56.0% of the responses. A further 27.5% reported a combination of strategies, while only 11.0% and 5.5% identified preventive and predictive maintenance respectively as the most common strategy. The result indicates a substantial dependence on corrective intervention and is consistent with the qualitative field inquiry, which pointed to maintenance being undertaken in response to apparent problems in some establishments.

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Table 9: Typical Timing of Maintenance Intervention

Typical timing	Frequency	Percentage
When failure occurs	37	33.9
When defect is noticed	33	30.3
Six-monthly	15	13.8
Annually	13	11.9
As scheduled/condition-based	11	10.1

The timing results reinforce the predominance of reactive maintenance. A combined 64.2% of respondents reported that maintenance commonly occurs when failure occurs or when a defect is noticed. Only smaller proportions reported six-monthly, annual or scheduled/condition-based intervention. This suggests that maintenance expenditure may often be driven by visible deterioration rather than by a predetermined programme.

Inspection, Documentation and Maintenance Management

Table 10: Respondents' Assessment of Inspection, Timing and Documentation

Statement	Mean	Std. Dev.	Agree/Strongly Agree (%)
Regular inspection of government buildings is practiced.	2.81	1.21	30.28
Condition assessment is systematic.	2.54	1.29	24.77
Maintenance is carried out on a scheduled basis.	2.78	1.23	34.86
Maintenance is commonly triggered by failure or visible defects.	4.08	0.94	77.06
Maintenance records are properly	2.63	1.09	26.61

documented and maintained.			

The results indicate weaknesses in inspection and maintenance management. Regular inspection recorded a mean of 2.81, systematic condition assessment 2.54, scheduled maintenance 2.78 and proper maintenance documentation 2.63. Each fell below the 3.00 agreement threshold. In contrast, the statement that maintenance is triggered by failure recorded a high mean of 4.08, indicating broad agreement with a reactive pattern. The qualitative field inquiry similarly highlighted inconsistencies in inspection, follow-up and maintenance documentation.

Maintenance Practices and Structural Integrity

Table 11: Maintenance and Structural Integrity

Statement	Mean	Std. Dev.	Agree/Strongly Agree (%)
Early maintenance helps preserve structural integrity.	4.41	0.72	88.07
Delayed maintenance accelerates building deterioration.	4.39	0.65	92.66
Preventive maintenance reduces life-cycle maintenance cost.	4.35	0.80	90.83

Respondents strongly recognized the relationship between maintenance and building conditions. Early maintenance preserving structural integrity recorded a mean of 4.41, while delayed maintenance accelerating deterioration recorded a mean of 4.39. Preventive maintenance reducing life-cycle maintenance cost also recorded a high mean of 4.35. The findings suggest that timely and preventive maintenance are important for limiting deterioration, preserving structural integrity, and reducing long-term maintenance costs. However, these perception results do not by themselves establish structural failure; suspected structural defects still require appropriate professional inspection and engineering assessment.

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Common Building Defects

Table 12: Common Building Defects Reported

Rank	Defect	Frequency	Percentage
1	Roof leakage	79	72.5
2	Dampness/water penetration	72	66.1
3	Electrical problems	68	62.4
4	Wall/floor cracks	65	59.6
5	Plumbing problems	65	59.6
6	Damaged doors/windows	51	46.8

Roof leakage, dampness/water penetration and wall/floor cracking were among the most frequently reported defects, followed by electrical and plumbing problems and damaged doors/windows. These defects are important because some can cause secondary deterioration when their causes are not addressed promptly. Water penetration may affect ceilings, finishes and susceptible building materials, while cracks require appropriate assessment to determine whether they are cosmetic or indicative of a more significant condition. These reported defects also correspond with issues identified during the qualitative field inquiry.

Challenges Affecting Effective Maintenance

Table 13: Respondents' Assessment of Major Maintenance Challenges

Statement	Mean	Std. Dev.	Agree/Strongly Agree (%)
Funding and approval delays negatively affect maintenance delivery.	4.34	0.92	86.24
Lack of technical expertise/training affects maintenance delivery.	3.96	1.01	72.48
Professional supervision of maintenance works is adequate.	2.80	1.13	33.94

Occupant misuse contributes to building deterioration.	4.16	0.84	85.32

Funding and approval delays were strongly identified as a constraint, with a mean score of 4.34. Lack of technical expertise/training also received a high mean of 3.96. The low mean of 2.80 for adequacy of professional supervision indicates that respondents generally did not consider supervision adequate. Occupant misuse recorded a mean of 4.16, indicating that respondents regarded user behaviour as another important source of deterioration. The pattern suggests that maintenance problems are not purely technical; they also involve funding, administration, supervision, staffing and occupant behaviour, themes also reflected in the qualitative field inquiry.

4.1 Discussion of Results

The findings indicate that maintenance of government buildings in Anambra State is predominantly reactive, with corrective maintenance being more widely practiced than preventive and predictive approaches. The low ratings for regular inspection, systematic condition assessment, scheduled maintenance and proper documentation, together with the high rating for maintenance being triggered by failure or visible defects, suggest that maintenance is often undertaken after problems have occurred rather than through planned intervention.

The study further established a strong perceived relationship between timely maintenance and building condition. Respondents agreed that early maintenance helps preserve structural integrity, while delayed maintenance accelerates deterioration. The major defects identified included roof leakage, dampness and water penetration, electrical problems, wall and floor cracks, plumbing defects, and damaged doors and windows. These defects, if not promptly addressed, may worsen and increase the extent and cost of subsequent repairs. However, reported defects should not be regarded as proof of structural failure without appropriate professional assessment.

From the life-cycle-cost perspective, respondents strongly agreed that preventive maintenance can reduce long-term maintenance expenditure. This suggests that timely intervention can prevent minor defects from developing into more extensive and costly repairs. However, funding and approval delays, inadequate technical expertise and training, insufficient professional supervision, and occupant misuse were identified as major constraints affecting effective maintenance.

Overall, the findings demonstrate the need for a more systematic preventive and condition-based maintenance approach, supported by regular inspection, proper documentation, timely funding and stronger professional supervision to preserve building integrity and control life-cycle maintenance costs.

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5.0 CONCLUSION AND RECOMMENDATIONS

The study concludes that effective maintenance practice is essential to preserving the structural integrity, functional performance and useful life of government buildings in Anambra State. The condition of a building is influenced not only by its original construction but also by how consistently and professionally maintenance activities are planned, implemented and monitored throughout its service life.

The study further establishes that inadequate preventive maintenance, delayed attention to defects, insufficient funding and poor maintenance planning can contribute to the deterioration of building components. When defects such as cracks, roof leakage, dampness, plumbing and electrical faults are not promptly addressed, they may worsen over time, resulting in more extensive repairs and increased maintenance expenditure.

It is therefore concluded that maintenance should be approached as a continuous and planned management activity rather than as a response only to major defects. Regular inspection, early defect identification, timely intervention, proper documentation and adequate funding are necessary for maintaining government buildings in satisfactory condition.

Furthermore, effective maintenance can contribute to the control of life-cycle costs by reducing the escalation of defects and avoiding unnecessary premature replacement of building components. A well-planned maintenance system will therefore not only improve the condition and serviceability of government buildings but also help to protect public investment and ensure better value for money over the life of the buildings.

Based on the conclusion of the study, the following recommendations are made:

1. Government should adopt planned preventive maintenance programmes for government buildings rather than relying mainly on corrective maintenance after defects have become severe.

2. Regular inspection of government buildings should be institutionalized. Periodic inspections should be carried out by competent professionals to identify defects early and determine appropriate maintenance interventions.

3. Adequate and timely funding should be provided for maintenance activities. Maintenance budgets should be properly planned and funds released when required to prevent minor defects from developing into costly major repairs.

4. Maintenance work should be handled by competent professionals. Relevant professionals, including estate surveyors, facility managers, architects, engineers, builders and quantity surveyors, should be appropriately involved in inspection, planning, assessment and maintenance decisions.

5. Proper maintenance records should be maintained for all government buildings. Records should include inspection reports, identified defects, maintenance carried out, costs incurred and dates of intervention. This will improve future maintenance planning and decision-making.

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