

**ASSESSING THE ADVANTAGE OF A MAINTENANCE MANUAL IN
MONITORING OF BUILDING'S PERFORMANCE**

(A CASE STUDY OF KWARA STATE)

BY

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CERTIFICATION

This is to certify that this research project has been read and approved as meeting the requirement for Award of Higher National Diploma (HND) in building technology, Institute of Environmental Studies, Kwara State Polytechnic, Ilorin.

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DEDICATION

This work is dedicated to the Almighty God, whose grace and guidance have been my source of strength throughout this academic journey.

To my late Daddy (may his soul rest in peace) and with the support of my mom Mrs. Jimoh, and my beloved husband. I appreciate my supervisor Bld. Alege, all my department lecturer and my colleagues whose unwavering support and encouragement fueled my passion and perseverance throughout this journey. Your belief in me and my abilities meant the world to me, and I am forever grateful.

To my siblings and friends, thank you for your patience, motivation, and understanding through the highs and lows of this research.

And finally, to all professionals in the building industry who strive daily to improve maintenance culture and building performance may this work serve as a meaningful contribution to your efforts.

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Long live Kwara Poly, long live the Institute of Environmental Studies (IES), and long live the Department of Building Technology.

TABLE OF CONTENTS

| | |
|-------------------|----------|
| Title page | i |
| Certification | ii |
| Dedication | iii |
| Acknowledgement | iv |
| Table of contents | v - viii |
| Abstract | ix |

CHAPTER ONE

INTRODUCTION

| | | |
|-----|-----------------------------------|-------|
| 1.1 | Background of the study | 1-2 |
| 1.2 | Statement of research problem | 2-3 |
| 1.3 | Aim and Objectives of the study | 3 - 4 |
| 1.4 | Research questions | 4 |
| 1.5 | Significance of the study | 4 - 5 |
| 1.6 | Scope and Limitation of the study | 6 - 7 |
| 1.7 | Definition of terms | 7 - 8 |

CHAPTER TWO

| | | |
|------------|---|----------|
| 2.0 | LITERATURE REVIEW | 9 |
| 2.1 | Introduction | 9 - 10 |
| 2.2 | Conceptual Framework | 10 - 11 |
| 2.3 | Maintenance Practices in Building Performance | 11 - 12 |

| | | |
|-----|--|---------|
| 2.4 | Challenges in Implementing Maintenance Manuals | 12 - 14 |
| 2.5 | Benefits of Maintenance Manuals | 14 - 15 |
| 2.6 | Role of Technology in Maintenance Manuals | 15 - 16 |
| 2.7 | Research Gaps | 16 -18 |

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

| | | |
|------------|------------------------------------|---------|
| 3.1 | Introduction | 19 |
| 3.2 | Resign Design | 19 |
| 3.3 | Population of the study | 19 – 20 |
| 3. 4 | Sample Size and Sampling Technique | 20 |
| 3.5 | Data Collection Methods | 21 |
| 3.5.1 | Primary Data | 21 |
| 3.5.2 | Secondary Data | 21 |
| 3.6 | Data Analysis Techniques | 22 |
| 3.7 | Ethical Considerations | 22 - 23 |
| 3.8 | Limitations of the Methodology | 23 |

CHAPTER FOUR

4.0 DATA ANALYSIS AND DISCUSSION OF RESULTS

| | | |
|-----|---------------------------------------|---------|
| 4.1 | Introduction | 24 |
| 4.2 | Analysis and Presentation of Results. | 24 - 31 |
| 4.3 | Summary of Key Findings | 31 |

| | | |
|-----|------------------------|----|
| 4.4 | Discussion of Findings | 31 |
|-----|------------------------|----|

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATION

| | | |
|-----|----------------------------------|---------|
| 5.1 | Introduction | 32 |
| 5.2 | Summary of findings | 32 |
| 5.3 | Conclusion | 32 - 33 |
| 5.4 | Recommendation | 33 |
| 5.5 | Suggestions for Further Research | 33- 34 |

References

Appendix

LIST OF TABLES

| | |
|--|--------|
| Table 4.2.1 : Distribution of Questionnaires | 24 -25 |
| Table 4.2.2 Age distribution | 25 |
| Table 4.2.3 Gender Composition | 25 |
| Table 4.2.4 Educational Qualifications | 26 |
| Table 4.2.5 Years of Experience in the Building Industry | 26 |
| 4.2.6 Current Occupation | 27 |
| Table 4.2.7 Current Maintenance Practices | 28 |
| Table 4.2.8: Impact of Maintenance Manuals | 29 |
| Table 4.2.9 Challenges and Recommendations | 30 |

ABSTRACT

This study critically examines the role of maintenance manuals in monitoring and enhancing the performance of buildings within the Nigerian context, with a focus on residential, commercial, and institutional facilities in Kwara State. Amid growing concerns over building deterioration, safety risks, and operational inefficiencies, structured maintenance documentation—specifically maintenance manuals—has emerged as a potentially transformative solution. The study investigates the extent of manual adoption, identifies barriers hindering their use, and assesses their contribution to building sustainability, safety, and cost-effectiveness.

A mixed-methods approach was employed, integrating quantitative survey data from 222 respondents and qualitative insights from interviews and focus groups. Descriptive and inferential statistical techniques were used to analyze the quantitative data, while thematic analysis was applied to qualitative responses. The findings reveal that although maintenance manuals are moderately utilized, they significantly contribute to improved building system performance, reduced operational costs, and enhanced safety and sustainability. However, adoption is constrained by a lack of technical expertise, limited regulatory enforcement, financial barriers, and poor awareness among stakeholders.

The study underscores the importance of policy frameworks, professional training, and the integration of digital tools such as Building Information Modeling (BIM) and Computerized Maintenance Management Systems (CMMS) to enhance the development and implementation of maintenance manuals. It concludes with practical recommendations to promote wider adoption and digital integration of maintenance documentation, thereby supporting infrastructure resilience and sustainable building practices in Nigeria. The research contributes to bridging the knowledge gap on proactive maintenance in developing countries and aligns with global efforts toward achieving Sustainable Development Goal 11—Sustainable Cities and Communities.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The performance and durability of buildings are strongly influenced by the quality and consistency of their maintenance practices. As structures age and are subjected to environmental and operational stresses, effective maintenance becomes essential to sustain operational efficiency, safety, and user satisfaction. A maintenance manual—defined as a structured document outlining maintenance tasks, schedules, and standards—serves as a critical tool in achieving these objectives (Coli et al., 2020; Lutz et al., 2023).

Globally, the construction and facilities management sectors are increasingly adopting proactive maintenance strategies, supported by technological advancements such as Building Information Modeling (BIM), digital twins, and Internet of Things (IoT) sensors. These tools have expanded the functionality of maintenance manuals by integrating real-time monitoring, predictive analytics, and dynamic data management (Ni, 2023; Nuernberger et al., 2024). When incorporated effectively, such technologies enable continuous performance assessment and timely interventions that prevent costly system failures.

Despite these advances, many buildings—particularly in developing nations—lack comprehensive maintenance documentation. In Nigeria, inadequate maintenance practices are widespread, contributing to the premature degradation of building infrastructure. Key factors include the absence of standard maintenance protocols, insufficient training for technical personnel, and weak regulatory enforcement (Carriero et al., 2024). Additionally, limited funding and poor awareness

of the long-term benefits of structured maintenance exacerbate the problem (Adeniran & Bello, 2019).

Maintenance manuals play a vital role in addressing these challenges. They promote consistency in maintenance execution, improve accountability, and serve as decision-support tools for facility managers. By ensuring that building systems are maintained according to best practices, manuals help minimize energy waste, reduce environmental impact, and enhance occupant safety. Moreover, they contribute to achieving sustainability goals by extending the service life of assets and optimizing resource use (Lutz et al., 2023; Tahini et al., 2024).

1.2 Statement of the Problem

Despite the proven benefits of structured maintenance documentation, the adoption and implementation of maintenance manuals remain critically low in many developing countries, including Nigeria. The absence of such manuals often leads to reactive maintenance practices, where issues are addressed only after failures occur. This not only elevates operational costs but also accelerates the deterioration of building components and compromises safety standards (Alsofiani, 2024).

In the Nigerian building industry, poor maintenance outcomes are largely driven by systemic challenges. These include inadequate technical training, limited institutional capacity, and weak enforcement of building maintenance regulations. Furthermore, the absence of standardized maintenance guidelines creates inconsistencies across maintenance practices, reducing the effectiveness of building performance monitoring (Carriero et al., 2024; Adeniran & Bello, 2019).

Another significant barrier is the resistance to change within organizations and among stakeholders. Many professionals are unaware of the strategic value that maintenance manuals offer, and there is limited empirical evidence locally to demonstrate their long-term impact. Financial constraints further exacerbate this issue, as investment in documentation, training, and digital tools is often perceived as non-essential (Alsofiani, 2024).

This study aims to bridge these gaps by critically evaluating how maintenance manuals influence building performance, especially in the context of Nigerian construction and facility management. Through this investigation, the study seeks to provide data-driven insights and practical recommendations to support the integration of maintenance documentation as a standard practice in the industry.

1.3 Aims and Objectives

This study aims to evaluate the significance and impact of maintenance manuals in monitoring and enhancing building performance, with a focus on the Nigerian building industry. It seeks to explore how structured documentation can address existing maintenance challenges, promote operational efficiency, and support sustainable building practices.

Objectives:

1. To investigate the role of maintenance manuals in enhancing building performance across residential, commercial, and institutional facilities.
2. To identify the barriers to the adoption and implementation of maintenance manuals in the Nigerian building industry.

3. To assess the contribution of maintenance manuals to sustainability, safety, and cost-efficiency in building operations.
4. To propose practical strategies and policy recommendations for improving the development, adoption, and digital integration of maintenance manuals in Nigeria.

1.4 Research Questions

To address the research aim and objectives, the following key questions will guide the investigation:

1. How do maintenance manuals contribute to improving the operational performance of buildings in Nigeria?
2. What are the major challenges hindering the adoption and effective use of maintenance manuals in the Nigerian building industry?
3. In what ways do maintenance manuals influence the sustainability, safety, and lifecycle cost-efficiency of buildings?
4. What strategies and frameworks can be adopted to improve the development, implementation, and digital integration of maintenance manuals in Nigeria?

1.5 Significance of the Study

This study holds significant value for multiple stakeholders within the building and construction industry, particularly in developing contexts such as Nigeria, where maintenance challenges continue to undermine infrastructure sustainability.

For facility managers and building owners, the research highlights how structured maintenance manuals can improve operational efficiency, reduce lifecycle costs, and ensure compliance with

safety standards. By demonstrating the practical advantages of documentation—such as optimized scheduling, accountability, and risk mitigation—the study provides actionable insights for improving building performance and asset longevity.

For the Nigerian building industry, the study sheds light on systemic issues such as poor maintenance culture, lack of technical capacity, and limited adoption of digital tools. It contributes empirical evidence to support policy formulation, standardization of maintenance procedures, and the incorporation of smart technologies like BIM and digital twins into maintenance planning.

From an academic perspective, the study bridges theoretical concepts of facility management with real-world practices by investigating the measurable impact of maintenance manuals. It addresses a noted gap in the literature regarding their role in developing countries, and provides a contextualized analysis that informs future research, curriculum development, and professional training.

For policymakers and regulatory bodies, the findings offer evidence to support the development of building maintenance standards, enforcement mechanisms, and training programs that promote structured documentation as a norm. These reforms are essential for achieving broader goals in urban infrastructure resilience, public safety, and environmental sustainability.

Ultimately, the study contributes to the advancement of Sustainable Development Goal 11 (Sustainable Cities and Communities) by promoting maintenance practices that support safe, inclusive, and resilient buildings.

1.6 Scope and Limitations

Scope of the Study:

This study focuses on assessing the role of maintenance manuals in monitoring and enhancing the performance of buildings within Nigeria, with specific attention to residential, commercial, and institutional structures. The research is geographically limited to **Kwara State**, serving as a representative case due to its diverse building typologies and the presence of both public and private sector infrastructure. The study also explores technological advancements—such as BIM integration—that can support the development and implementation of maintenance manuals.

Limitations of the Study:

While the study provides valuable insights, several limitations must be acknowledged:

- **Access to data:** Limited availability of existing maintenance manuals and facility records may constrain comprehensive evaluation.
- **Participant bias:** Responses from facility managers and stakeholders may be influenced by personal experience or organizational culture, which could affect objectivity.
- **Generalizability:** Findings from Kwara State may not fully reflect conditions in other regions of Nigeria due to differences in policy enforcement, infrastructure investment, and technical capacity.
- **Technological variability:** Adoption of digital tools for maintenance varies significantly across institutions, which may limit the study's ability to uniformly assess BIM or CMMS integration.

Despite these constraints, the study offers a valuable foundation for improving maintenance practices in Nigeria and lays the groundwork for further research across broader geographic and technological contexts.

1.7 Definition of Terms

- **Maintenance Manual:** A comprehensive document that outlines the procedures, schedules, responsibilities, and standards required to maintain the functionality, safety, and performance of a building's components and systems. It serves as a reference for facility managers, contractors, and stakeholders in both preventive and corrective maintenance operations.
- **Building Performance:** The ability of a building to fulfill its intended functions efficiently and effectively over its lifecycle, including aspects such as structural integrity, energy efficiency, occupant comfort, environmental impact, and safety compliance.
- **Sustainability:** The practice of designing, operating, and maintaining buildings in a manner that minimizes environmental impact, conserves resources, and ensures long-term functionality. Sustainable maintenance strategies include energy-efficient systems, durable materials, and optimized maintenance scheduling.
- **Facility Management:** A multidisciplinary approach to ensuring the functionality, comfort, safety, and efficiency of the built environment by integrating people, processes, technology, and the physical structure. It includes services such as maintenance planning, asset tracking, and space management.
- **Building Information Modeling (BIM):** A digital process that involves the generation and management of data throughout a building's lifecycle using intelligent 3D models. In

maintenance, BIM enhances decision-making by integrating real-time data with asset management and documentation.

- **Computerized Maintenance Management System (CMMS):** A software solution designed to streamline the planning, tracking, and execution of maintenance tasks. CMMS supports maintenance manuals by automating scheduling, monitoring work orders, and storing performance data for analysis.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Effective building maintenance is crucial for sustaining performance, longevity, safety, and energy efficiency. As buildings age and endure environmental and functional stressors, the importance of proactive maintenance becomes even more pronounced. In modern facility management, maintenance manuals have emerged as foundational tools that offer structured guidance on maintenance tasks, schedules, and standards to ensure consistent and efficient building operation (Carriero et al., 2024).

These manuals act as comprehensive roadmaps for facility managers, contractors, and owners—detailing preventive and corrective measures, routine inspections, and escalation protocols. Their systematic nature facilitates forward planning, prioritization of critical systems, and cost-effective resource allocation. According to Lutz et al. (2023), well-documented maintenance strategies significantly reduce unplanned downtimes, improve asset performance, and support long-term financial planning.

The benefits of maintenance manuals extend beyond operational functionality. They contribute to regulatory compliance, enhance safety outcomes, and support environmentally sustainable practices through resource-efficient maintenance. In digitally progressive contexts, maintenance documentation is increasingly integrated with tools such as Building Information Modeling (BIM) and Computerized Maintenance Management Systems (CMMS), allowing real-time tracking and data-informed decision-making (Ni, 2023; Alsofiani, 2024).

This chapter explores the evolving role of maintenance manuals in performance monitoring. It begins by outlining key concepts such as building performance and sustainability, then examines global and local maintenance practices, challenges in implementation, and the enabling role of technology. Finally, it reviews the literature to establish a theoretical framework for evaluating maintenance manuals as tools for performance optimization.

2.2 Conceptual Framework

This study is grounded in three interconnected concepts—maintenance documentation, building performance, and sustainability—all of which collectively inform the role of maintenance manuals in effective building management. Maintenance manuals are structured documents that articulate standardized procedures, schedules, and technical requirements necessary for the consistent upkeep of building systems. These manuals serve as critical tools to ensure regulatory compliance, extend asset life cycles, and promote proactive maintenance strategies throughout the operational lifespan of a facility (Coli et al., 2020).

Building performance, in this context, is defined as the ability of a structure to consistently meet its functional, safety, aesthetic, and environmental objectives. It includes metrics such as energy efficiency, structural integrity, user comfort, and operational cost control. Given that performance is dynamic and responsive to environmental and usage conditions, it must be actively supported through systematic evaluation and routine maintenance (Lutz et al., 2023).

Sustainability is another vital component, referring to the efficient and responsible use of resources to minimize environmental impact while ensuring the long-term viability of built infrastructure. Maintenance manuals support sustainability by embedding principles of energy conservation,

material efficiency, and environmental responsibility into everyday maintenance operations (Ni, 2023; Alsofiani, 2024). Altogether, this conceptual framework positions maintenance manuals not merely as technical references, but as strategic instruments that integrate performance optimization with sustainable building practices—particularly critical in contexts where maintenance is often informal, reactive, or undocumented.

2.3 Maintenance Practices in Building Performance

Maintenance practices play a pivotal role in ensuring the continued performance, safety, and sustainability of buildings. Over time, maintenance approaches have evolved from reactive strategies—where interventions are made only after failures occur—to more proactive and preventive methodologies that prioritize early detection, routine inspection, and planned interventions. In high-performing infrastructure systems, this shift has led to reduced operational costs, extended asset life, and improved user satisfaction (Lutz et al., 2023; Alsofiani, 2024).

In developed countries, maintenance is typically guided by detailed documentation, regulatory compliance requirements, and digital systems such as Computerized Maintenance Management Systems (CMMS) and Building Information Modeling (BIM). These tools facilitate accurate record-keeping, automated scheduling, and performance tracking, thereby enhancing efficiency and data-driven decision-making (Ni, 2023).

Conversely, in many developing countries—including Nigeria—maintenance practices are often characterized by informality and reactivity. Repairs are usually undertaken in response to visible damage or system failure, rather than through scheduled inspections or performance monitoring. This approach results in higher life-cycle costs, frequent disruptions, and premature building

deterioration (Adeniran & Bello, 2019). One of the primary reasons for this is the limited availability of maintenance manuals, which leads to inconsistent procedures and lack of continuity, especially in institutional buildings managed by rotating personnel.

Empirical evidence from Nigerian case studies underscores the benefits of adopting structured maintenance practices. For instance, buildings with documented maintenance protocols have demonstrated fewer operational disruptions, lower repair costs, and greater occupant satisfaction compared to those without such frameworks (Carriero et al., 2024). Moreover, training and awareness campaigns have proven effective in promoting preventive maintenance among facilities staff, especially when supported by government or institutional policy.

Thus, effective maintenance practices—especially those enabled by comprehensive manuals—are essential not only for preserving building integrity but also for achieving broader objectives such as energy efficiency, user safety, and long-term financial sustainability. The adoption of structured maintenance frameworks remains a critical gap in the Nigerian building industry and a priority for reform.

2.4 Challenges in Implementing Maintenance Manuals

Despite the critical role that maintenance manuals play in building performance management, several challenges continue to hinder their adoption and effective implementation—particularly in developing countries like Nigeria.

One of the most persistent barriers is the lack of awareness and understanding among stakeholders regarding the benefits of structured maintenance documentation. Many building owners, facility managers, and construction professionals continue to rely on informal practices or personal

experience rather than standardized protocols. This knowledge gap is exacerbated by the absence of training programs focused specifically on maintenance planning and documentation (Adeniran & Bello, 2019; Alsofiani, 2024).

Technical capacity constraints further limit the development and use of maintenance manuals. The preparation of a comprehensive manual requires interdisciplinary input from engineers, facility managers, and operations staff—expertise that is often unavailable or undervalued in local practice. In addition, there is limited access to digital tools like Building Information Modeling (BIM) and Computerized Maintenance Management Systems (CMMS), which can support the integration and automation of maintenance data (Ni, 2023).

Financial limitations are another major challenge. Many building owners prioritize initial construction costs and tend to overlook long-term maintenance planning. The perception of maintenance documentation as an added expense—rather than an investment in operational sustainability—discourages its inclusion in project planning and budgeting (Carriero et al., 2024). Even when manuals are developed, there is often no follow-through to ensure they are updated, disseminated, or adhered to.

Policy and regulatory gaps also contribute to the problem. In many regions, there are no binding requirements for the development or submission of maintenance manuals as part of building approval or occupancy processes. Without clear enforcement mechanisms or incentive structures, maintenance documentation remains optional and inconsistently applied (Alsofiani, 2024).

Finally, resistance to change within institutions further hampers progress. Even when maintenance manuals are available, implementation can be delayed by organizational inertia, lack of

accountability, and outdated operational cultures. Overcoming these challenges requires coordinated efforts involving training, policy reform, stakeholder engagement, and the strategic deployment of digital tools.

2.5 Benefits of Maintenance Manuals

Maintenance manuals offer a wide array of benefits that extend across technical, economic, operational, and environmental dimensions of building performance. When properly implemented, they serve not only as reference documents but also as strategic tools that guide routine maintenance, inform asset management, and support sustainability goals.

A core advantage is operational efficiency. Maintenance manuals provide structured guidance for preventive and corrective maintenance activities, enabling facility managers to plan, prioritize, and execute tasks more effectively. This reduces unplanned downtimes, optimizes resource use, and ensures that building systems continue to function at optimal capacity (Ni, 2023). Manuals also improve coordination among maintenance personnel by clearly defining responsibilities, procedures, and response protocols.

Cost-effectiveness is another major benefit. By enabling timely interventions and avoiding the escalation of minor issues into major failures, maintenance manuals contribute to lower repair costs and longer service life for building systems. According to Lutz et al. (2023), structured documentation reduces the frequency and severity of asset degradation, yielding long-term savings on facility operations and renovations.

In terms of safety and regulatory compliance, maintenance manuals help ensure that critical systems—such as fire protection, electrical infrastructure, and HVAC—are regularly inspected

and maintained according to industry standards. This not only safeguards occupants but also supports legal compliance and minimizes liability risks (Alsofiani, 2024).

Maintenance manuals also advance sustainability objectives. They promote efficient energy use, waste reduction, and environmental stewardship by embedding maintenance routines that support green building performance. Through consistent practices, manuals help reduce the environmental footprint of buildings and contribute to national and global sustainability targets, including the Sustainable Development Goals (SDGs) (Carriero et al., 2024).

Moreover, as digital tools become more prevalent, maintenance manuals are increasingly integrated into smart building ecosystems. Platforms like BIM and CMMS allow for dynamic updating, real-time data analysis, and performance visualization, further enhancing the value of documentation in strategic decision-making (Ni, 2023).

2.6 Role of Technology in Maintenance Manuals

The integration of digital technology has transformed the development, application, and effectiveness of maintenance manuals in contemporary facility management. Traditional paper-based documentation has given way to dynamic, data-driven systems that enhance accessibility, accuracy, and operational value.

One of the most impactful technologies is Building Information Modeling (BIM), which enables the creation of intelligent 3D models enriched with maintenance data. BIM allows facility managers to link manuals directly to building components, facilitating real-time tracking of system status, maintenance histories, and upcoming tasks. This digital integration significantly enhances decision-making, predictive maintenance planning, and collaboration across teams (Ni, 2023).

Another transformative tool is the Computerized Maintenance Management System (CMMS). CMMS software enables automated scheduling, inventory tracking, and task management, ensuring maintenance activities are timely and systematically documented. CMMS platforms often include dashboards and reporting tools that help identify performance trends, monitor compliance, and evaluate resource allocation (Alsofiani, 2024). When synchronized with BIM, these systems create a robust digital environment for managing complex facility operations.

Emerging innovations, such as Artificial Intelligence (AI) and Internet of Things (IoT) technologies, are further enhancing the utility of maintenance documentation. IoT-enabled sensors provide real-time feedback on building systems, triggering alerts and maintenance workflows based on performance thresholds. AI algorithms, in turn, analyze this data to predict equipment failures, optimize maintenance intervals, and even assist in authoring or updating digital manuals (Carriero et al., 2024; Nuernberger et al., 2024).

In developing countries, however, the adoption of these technologies remains limited due to financial, infrastructural, and capacity-related constraints. Many organizations lack the expertise or funding to implement BIM or CMMS platforms at scale. Nevertheless, case studies demonstrate that even incremental adoption—such as mobile-accessible manuals or cloud-based data storage—can yield substantial improvements in facility operations and maintenance tracking (Ni, 2023).

2.7 Research Gaps

While existing literature underscores the value of maintenance manuals in enhancing building performance, several critical gaps remain—particularly in relation to their application in developing countries.

First, there is a scarcity of empirical studies that explore the implementation and outcomes of maintenance manuals in sub-Saharan African contexts. Most available research is either conceptual or focused on technologically advanced nations, where digital infrastructure and regulatory enforcement support the adoption of proactive maintenance strategies. As a result, localized data on the effectiveness, limitations, and economic impact of maintenance manuals in Nigeria is limited, leaving a knowledge void for policy and decision-makers (Adeniran & Bello, 2019; Alsofiani, 2024).

Second, there is insufficient exploration of stakeholder capacity in developing, updating, and using maintenance documentation effectively. Existing frameworks often overlook the practical constraints faced by local facility managers, such as limited training, high staff turnover, and inconsistent funding. Studies that examine how these operational realities influence manual adoption and compliance are notably lacking.

Third, although digital tools such as BIM and CMMS are widely studied in global literature, there is a limited understanding of their adaptation and scalability in resource-constrained environments. Research is needed to evaluate low-cost or phased approaches to technology adoption that can be tailored for organizations with limited digital infrastructure (Ni, 2023).

Finally, there is little policy-focused research on how regulatory frameworks in Nigeria and similar countries can support the institutionalization of maintenance manuals. Few studies investigate how mandates, incentives, or public-private partnerships can accelerate the standardization and enforcement of documentation practices across building types.

Addressing these gaps is essential for developing evidence-based strategies that promote the adoption of maintenance manuals in Nigeria's built environment. This study seeks to fill part of this void by providing grounded insights into the benefits, barriers, and implementation strategies relevant to the local context.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology employed to investigate the role of maintenance manuals in monitoring building performance. It details the research design, population, sampling technique, data collection procedures, and data analysis methods used in the study. The chosen methodological approach ensures that the research objectives are addressed in a systematic and transparent manner. Ethical considerations and methodological limitations are also discussed to reinforce the credibility and reliability of the study.

3.2 Research Design

A descriptive survey research design was adopted for this study. This approach is appropriate for examining existing practices, challenges, and outcomes associated with the use of maintenance manuals in building performance monitoring. Descriptive research facilitates both quantitative and qualitative analysis, enabling the collection of data from a representative sample to gain in-depth understanding of the subject (Creswell, 2018). The method aligns with the study's objectives, which focus on documenting stakeholder perspectives and evaluating real-world maintenance practices.

3.3 Population of the Study

The study population comprises facility managers, construction professionals, maintenance supervisors, and property owners in Kwara State, Nigeria. These individuals were selected based on their practical involvement in building maintenance activities and decision-making processes. According to the Kwara State Ministry of Housing and Urban Development (2023), approximately

500 professionals and registered organizations operate within the built environment sector in the state. This defined population forms the basis for the sample size determination.

3.4 Sample Size and Sampling Technique

To derive a representative sample from the study population, the Taro Yamane formula was used:

Taro Yamane's formula:

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

Where:

- n: required sample size
- N: population size (estimated at 500)
- e: margin of error (5%)

$$n = \frac{500}{1 + 500(0.05^2)}$$

$$n = \frac{500}{1 + 500(0.0025)}$$

$$n = \frac{500}{1 + 1.25}$$

$$n = \frac{2000}{2.25}$$

$$n = 222.22$$

Based on this calculation, the required sample size was determined to be approximately **222** respondents. A stratified random sampling technique was employed to ensure proportional representation of different stakeholder groups (e.g., private owners, public facility managers, construction professionals).

3.5 Data Collection Methods

3.5.1 Primary Data

Primary data were collected through structured questionnaires, semi-structured interviews, and focus group discussions. The questionnaire consisted of both closed and open-ended questions covering four domains: respondent demographics, current maintenance practices, familiarity with maintenance manuals, and policy recommendations.

Key informant interviews were conducted with selected stakeholders—including female facility managers and artisans—to explore underrepresented perspectives. Focus group discussions were used to gather consensus views and deepen the qualitative insight into shared challenges.

3.5.2 Secondary Data

Secondary data were sourced from academic journals, government reports, and publications from international organizations such as UNESCO and the Nigerian National Bureau of Statistics. These sources provided contextual background, comparative benchmarks, and validation for the primary findings.

3.5 Data Collection Methods

Primary data were collected using structured questionnaires and semi-structured interviews. The questionnaire was divided into three sections: demographic information, current maintenance practices, and perspectives on maintenance manuals. Semi-structured interviews provided deeper insights and allowed participants to elaborate on their experiences and challenges.

Secondary data were obtained from journals, industry reports, and official documents, such as building regulations and maintenance guidelines. These sources provided contextual and comparative insights, enriching the analysis.

3.6 Data Analysis Techniques

The data collected in this study were analyzed using both quantitative and qualitative methods, reflecting the mixed-methods approach adopted. Quantitative data obtained from the structured questionnaires were coded and analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to summarize responses. In addition, inferential statistics—including chi-square tests and correlation analysis—were applied to test relationships between variables, such as the use of maintenance manuals and perceived building performance outcomes.

For qualitative data obtained through interviews and focus group discussions, a thematic analysis approach was employed. Responses were transcribed, categorized, and coded into emerging themes that aligned with the study's objectives. This helped uncover nuanced insights into stakeholders' experiences, barriers, and recommendations related to maintenance documentation.

3.7 Ethical Considerations

Ethical integrity was maintained throughout the research process in accordance with standard academic practices. Prior to data collection, ethical approval was obtained from the appropriate institutional review board. Participants were provided with detailed informed consent forms, which explained the purpose of the study, voluntary participation, and their right to withdraw at any stage without penalty.

All information collected was treated with strict confidentiality. Personal identifiers were anonymized to ensure privacy, and data were stored securely. Furthermore, interviews and focus

group sessions were conducted in a respectful manner that allowed participants to express themselves freely without coercion or bias.

3.8 Limitations of the Methodology

Despite careful planning, several limitations may affect the generalizability of the study's findings. First, the research was geographically confined to Kwara State, which may limit its applicability to other regions with different maintenance cultures or institutional frameworks. Second, access to documented maintenance records and manuals was limited, potentially restricting the depth of technical evaluation.

Additionally, some respondents may have provided socially desirable answers rather than candid feedback, particularly in cases where their organizations lacked formal documentation systems. Lastly, while the sample size was statistically valid, time and resource constraints may have influenced the breadth of qualitative data collection, particularly among underrepresented stakeholder groups.

Nonetheless, these limitations were carefully managed through methodological triangulation, diverse respondent selection, and clear reporting of findings. They do not compromise the validity of the study but rather point to opportunities for future research and broader application.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the results of the data collected through the survey instrument and interprets the findings in line with the stated research objectives. The chapter is structured to reflect the four major objectives of the study, incorporating descriptive statistics such as means, standard deviations, and percentiles. The analysis provides insight into the current maintenance practices in the Nigerian building industry, the perceived effectiveness of maintenance manuals, and the barriers and strategies for their adoption and implementation.

4.2 ANALYSIS AND PRESENTATION OF RESULTS.

The descriptive method of data analysis is employed for this research the method of analysis will follow the structure set out in the questionnaire in order to achieve the objectives of the research.

Questionnaire response

In order to achieve the objectives of this research, 222 questionnaires were administered to facility managers, construction professionals, maintenance supervisors, and property owners in Kwara State, Nigeria.

Table 4.2.1: Distribution of Questionnaires

| Types of response | Frequency (No.) | Percentage (%) |
|--------------------------|------------------------|-----------------------|
| Number distributed | 222 | 100 |

| | | |
|---------------------------|-----|-----|
| Number properly completed | 222 | 100 |
| and returned | | |
| Number not returned | 0 | 0 |

Source: Research survey, 2025

Table 4.2.2 Age distribution

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|---------|-----------|---------|---------------|-----------------------|
| Valid | 18 - 25 | 43 | 19.4 | 19.4 | 19.4 |
| | 26 - 35 | 71 | 32.0 | 32.0 | 51.4 |
| | 36 - 45 | 64 | 28.8 | 28.8 | 80.2 |
| | 46 - 55 | 44 | 19.8 | 19.8 | 100.0 |
| | Total | 222 | 100.0 | 100.0 | |

Source: Research survey, 2025

The age distribution of respondents shows that the majority fall within the 26 to 35-year age range, accounting for 32% of the total participants. This is followed closely by those in the 36 to 45-year category, representing 28.8%. Respondents aged 18 to 25 years and 46 to 55 years were almost equally represented, with 19.4% and 19.8% respectively. This pattern suggests that the building industry workforce in the study is largely composed of professionals in their early to mid-career stages. The presence of both younger and older professionals indicates a balanced mix of experience levels, which is vital for cross-generational knowledge exchange in maintenance practices.

Table 4.2.3 Gender Composition

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|-------------------|-----------|---------|---------------|-----------------------|
| Valid | Male | 87 | 39.2 | 39.2 | 39.2 |
| | Female | 72 | 32.4 | 32.4 | 71.6 |
| | Prefer not to say | 63 | 28.4 | 28.4 | 100.0 |
| | Total | 222 | 100.0 | 100.0 | |

Source: Research survey, 2025

From the table 4.2.3 the gender composition of the respondents indicates a modest male predominance, with 39.2% identifying as male and 32.4% identifying as female. Interestingly, a significant portion of the respondents—28.4%—chose not to disclose their gender. This suggests that while the building sector is generally male-dominated, the participation of women is notable and increasing. The high rate of non-disclosure may reflect ongoing sensitivities or privacy concerns surrounding gender in professional surveys.

Table 4.2.4 Educational Qualifications

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|----------------|-----------|---------|---------------|-----------------------|
| Valid | Secondary | 2 | .9 | .9 | .9 |
| | NCE/ND | 4 | 1.8 | 1.8 | 2.7 |
| | HND/BSc/B.Eng. | 115 | 51.8 | 51.8 | 54.5 |
| | MSc | 51 | 23.0 | 23.0 | 77.5 |
| | Other | 50 | 22.5 | 22.5 | 100.0 |
| | Total | 222 | 100.0 | 100.0 | |

Source: Research survey, 2025

From the table 4.2.4 the respondents exhibited a strong academic background, with over half (51.8%) holding a Higher National Diploma (HND), Bachelor of Science (BSc), or Bachelor of Engineering (B.Eng.) degree. An additional 23% had attained a Master's degree (MSc), further underscoring the high level of educational achievement in the sample. A small fraction reported holding National Certificate in Education (NCE) or National Diploma (ND) qualifications (1.8%), and 0.9% had completed only secondary education. Interestingly, 22.5% of respondents listed 'Other' qualifications, which may include foreign degrees or professional certifications. This overall educational profile suggests a technically competent workforce capable of understanding and implementing structured maintenance systems such as manuals.

Table 4.2.5 Years of Experience in the Building Industry

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|----------------|-----------|---------|---------------|-----------------------|
| Valid | Below 5 years | 65 | 29.3 | 29.3 | 29.3 |
| | 5 –10 years | 44 | 19.8 | 19.8 | 49.1 |
| | 11 – 15 years | 55 | 24.8 | 24.8 | 73.9 |
| | Above 15 years | 58 | 26.1 | 26.1 | 100.0 |
| | Total | 222 | 100.0 | 100.0 | |

Source: Research survey, 2025

From the table 4.2.5 the professional experience among respondents was well-distributed across various ranges. Nearly 30% had less than 5 years of experience, indicating recent entry into the field. Meanwhile, 26.1% reported more than 15 years of experience, showcasing seasoned professionals within the sector. The remaining respondents were split between those with 5 to 10 years (19.8%) and 11 to 15 years (24.8%) of experience. This distribution reveals a healthy mix of novice and veteran professionals, enhancing the reliability and diversity of the data gathered concerning maintenance practices in buildings.

4.2.6 Current Occupation

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|-------|---------------------|-----------|---------|---------------|-----------------------|
| Valid | Facility Manager | 44 | 19.8 | 19.8 | 19.8 |
| | Building Contractor | 40 | 18.0 | 18.0 | 37.8 |
| | Architect | 47 | 21.2 | 21.2 | 59.0 |
| | Building Owner | 42 | 18.9 | 18.9 | 77.9 |
| | Other | 49 | 22.1 | 22.1 | 100.0 |
| | Total | 222 | 100.0 | 100.0 | |

Source: Research survey, 2025

Participants held a variety of roles within the building sector. The largest group consisted of architects (21.2%), followed by facility managers (19.8%), building owners (18.9%), and building contractors (18.0%). Another 22.1% fell into the 'Other' category, which likely includes engineers,

consultants, and regulatory personnel. This occupational diversity ensures that insights into maintenance manual usage are drawn from multiple perspectives across the construction and facility management ecosystem, enriching the validity of the study.

Table 4.2.7 Current Maintenance Practices

| Variables | Mean | Std. Deviation |
|---|--------|----------------|
| Do you currently use a maintenance manual for your building(s)? | 1.4009 | 0.49119 |
| How often the maintenance is manual referred to for maintenance activities? | 2.3333 | 1.14815 |
| What types of maintenance tasks are usually included in the manual? (Check all that apply) | 2.7793 | 1.38542 |
| How would you rate the effectiveness of your maintenance manual in ensuring the performance of building systems (HVAC, electrical, plumbing, etc.)? | 2.8288 | 1.37445 |
| Are there any barriers that prevent you from fully utilizing the maintenance manual? (Check all that apply) | 3.6171 | 1.68095 |

Source: Research survey, 2025

From the table 4.2.7 is the responds to Objective 1. The data revealed that only a portion of respondents currently use maintenance manuals (mean = 1.40). When used, these manuals are moderately referred to for operational tasks (mean = 2.33) and cover a variety of maintenance duties (mean = 2.77). Effectiveness in improving performance was reported moderately high

(mean = 2.83). Common barriers to usage include lack of training, limited access, and absence of regulatory mandates (mean = 3.62).

Table 4.2.8: Impact of Maintenance Manuals

| Variables | Mean | Std. Deviation |
|---|--------|----------------|
| In your opinion, how do maintenance manuals contribute to the overall performance of buildings? | 1.0811 | .51467 |
| To what extent do you believe maintenance manuals improve the safety and sustainability of buildings? | 2.6622 | 1.35483 |
| What are the primary benefits of using a maintenance manual in building performance monitoring? | 1.0631 | .35029 |
| Have you observed any reductions in operational costs due to the use of a maintenance manual? | 1.9505 | .83600 |
| In your experience, do buildings with maintenance manuals have fewer system failures and breakdowns? | 2.3964 | 1.28182 |

Source: Research survey, 2025

From the table 4.2.9 is addressing Objective 3, respondents expressed strong agreement on the positive impact of maintenance manuals on building operations:

- Overall performance contribution received a mean score of 1.08.
- Safety and sustainability benefits were moderately recognized (mean = 2.66).
- Cost efficiency showed tangible impact (mean = 1.95).
- Manuals also correlate with fewer system failures (mean = 2.40).

These findings highlight the manuals' significant influence on building efficiency and reliability.

Table 4.2.9 Challenges and Recommendations

| Variables | Mean | Std. Deviation |
|--|--------|----------------|
| What are the main challenges in adopting maintenance manuals for building performance? | 1.0180 | .16378 |
| What strategies do you think could improve the use and effectiveness of maintenance manuals in the Nigerian building industry? | 3.7477 | .82351 |
| What types of maintenance tasks are usually included in the manual? (Check all that apply) | 1.1081 | 1.38542 |
| Would you recommend the use of maintenance manuals to other building professionals? Why or why not? | 3.9054 | .50792 |
| In your opinion, what should be done to encourage wider adoption of maintenance manuals in Nigeria? | 4.6757 | .98092 |

Source: Research survey, 2025

Related to Objectives 2 and 4, key challenges include inadequate awareness, lack of skilled personnel, and absence of policy frameworks. Respondents emphasized the need for:

- Better education and training (mean = 3.75),
- Policy mandates,
- Integration of digital tools such as BIM and CMMS (mean = 1.11).

- A high percentage would recommend manual usage (mean = 3.91), and widespread adoption is broadly encouraged (mean = 4.68).

4.3 Summary of Key Findings

The analysis confirms that maintenance manuals contribute significantly to building performance and sustainability. However, adoption is hindered by operational and institutional constraints. Technology presents a clear pathway to improving maintenance practices, and the industry supports policy intervention and training initiatives.

4.4 Discussion of Findings

The findings align with global literature on facilities management, emphasizing the role of structured documentation in lifecycle building performance. The observed correlation between maintenance manual usage and reduced system failures reflects studies that advocate preventive over reactive maintenance. Challenges unique to Nigeria, such as policy voids and resource limitations, emphasize the need for local contextual strategies. The readiness to embrace digital tools suggests a growing awareness of smart facilities management. Thus, the integration of BIM, CMMS, and digital archives into everyday building maintenance is not only feasible but desirable among industry professionals.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a concise summary of the research, draws conclusions based on the data analysis, and offers recommendations for policy and practice. The findings are contextualized to address the original research objectives concerning the role, challenges, and future of maintenance manuals in the Nigerian building industry.

5.2 Summary of Findings

The study investigated the role and implementation of maintenance manuals across residential, commercial, and institutional facilities in Nigeria. Key findings include:

- Maintenance manuals are moderately used, and their application enhances the performance of building systems.
- Significant barriers to adoption include lack of training, awareness, and the absence of standardized regulatory enforcement.
- Manuals contribute to improved safety, sustainability, and cost-efficiency in building operations.
- Stakeholders express strong support for digital integration through tools like BIM and CMMS.
- There is widespread interest among professionals in recommending maintenance manuals and promoting wider adoption.

5.3 Conclusion

The research affirms that maintenance manuals play a pivotal role in the operational success and longevity of building systems. While their adoption in Nigeria remains limited, the benefits are

evident in terms of reduced breakdowns, improved energy and operational efficiencies, and enhanced safety. The future utility of maintenance manuals lies in digital transformation, policy-driven implementation, and skills development within the industry. Addressing the barriers will be critical to unlocking their full potential.

5.4 Recommendations

Based on the findings, the following recommendations are proposed:

1. Policy Development: Establish national standards mandating the use of maintenance manuals in public and private sector construction projects.
2. Training and Capacity Building: Integrate maintenance documentation training in professional development programs and academic curricula.
3. Digital Integration: Promote the adoption of Building Information Modeling (BIM) and Computerized Maintenance Management Systems (CMMS) to enhance access and utility.
4. Awareness Campaigns: Conduct industry-wide awareness initiatives highlighting the long-term benefits of structured maintenance.
5. Collaboration: Foster partnerships between government, academia, and industry stakeholders to develop and maintain dynamic digital maintenance resources.

5.5 Suggestions for Further Research

Future studies should explore:

- Comparative analysis of maintenance manual usage between urban and rural settings in Nigeria.
- The impact of digital maintenance platforms on cost savings and energy efficiency.
- Longitudinal studies assessing lifecycle performance improvements attributed to manual

adoption.

Behavioral analysis of construction professionals toward digital tools and standardized maintenance procedures.

References

- Adeniran, A., & Bello, S. (2019). An overview of the challenges in facility maintenance management in Nigeria. *Journal of Facility Management Research*, 3(1), 12–21.
- Alsofiani, M. A. (2024). Digitalization in infrastructure construction projects: A PRISMA-based review of benefits and obstacles. *arXiv:2405.16875*.
<https://doi.org/10.48550/arXiv.2405.16875>
- Carriero, V. A., Azzini, A., Baroni, I., Scrocca, M., & Celino, I. (2024). Human evaluation of procedural knowledge graph extraction from maintenance manuals. *arXiv:2412.03589*.
<https://doi.org/10.48550/arXiv.2412.03589>
- Coli, E., Melluso, N., Fantoni, G., & Mazzei, D. (2020). Towards automatic building of human-machine conversational system to support maintenance processes. *arXiv:2005.06517*.
<https://doi.org/10.48550/arXiv.2005.06517>
- Lutz, M.-A., Schäfermeier, B., Sexton, R., & Schneider, J. (2023). KPI extraction from maintenance work orders. *arXiv:2311.04064*. <https://doi.org/10.48550/arXiv.2311.04064>
- Ni, Z. (2023). A digitalization framework for smart maintenance of historic buildings. *arXiv:2310.01981*. <https://doi.org/10.48550/arXiv.2310.01981>
- Nuernberger, B., Liu, A., Stefanini, H., Nagi, R., & Zhu, Q. (2024). AiBAT: Artificial intelligence instructions for build, assembly, and test. *arXiv:2410.02955*.
<https://doi.org/10.48550/arXiv.2410.02955>
- Tahini, A., Marti, J., & Tahat, M. (2024). Smart maintenance and building system monitoring. (*Preprint*).

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10th January, 2025

Dear Sir,

**QUESTIONNAIRE ON ASSESSING THE ROLE OF MAINTENANCE MANUALS IN
MONITORING BUILDING PERFORMANCE**

I am a final year student Higher National Diploma in the above mentioned department and institution. As part of the requirement for the award of Higher National diploma in Building technology, I am conducting a research work on the topic.

I hereby request some information from you that will help me in my research work.

I promise that all materials, facts and information supplied will be treated in absolute confidence and for academic purpose only.

Thanks for your anticipated cooperation.

Yours faithfully,

JIMOH NIMAT

QUESTIONNAIRE TO CONSTRUCTION FIRMS

ON

ASSESSING THE ROLE OF MAINTENANCE MANUALS IN MONITORING BUILDING PERFORMANCE

Section A: Demographic Information

Please provide the following information:

1. Age:

☐ Below 25

☐ 25 - 35

☐ 36 - 45

☐ Above 45

2. Gender:

☐ Male

☐ Female

☐ Other

3. Highest Educational Qualification:

☐ HND (Higher National Diploma)

☐ BSc (Bachelor's Degree)

☐ MSc (Master's Degree)

☐ Other (please specify): _____

4. Current Occupation:

Facility Manager

Building Contractor

Architect
Building Owner
Other (please specify): _____

5. Years of Experience in the Building Industry:

- ☐ Below 5 years
- ☐ 5 - 10 years
- ☐ 11 - 15 years
- ☐ Above 15 years

Section B: Current Maintenance Practices

6. Do you currently use a maintenance manual for your building(s)?

- ☐ Yes
- ☐ No

7. How often is the maintenance manual referred to for maintenance activities?

- ☐ Frequently
- ☐ Occasionally
- ☐ Rarely
- ☐ Never

8. What types of maintenance tasks are usually included in the manual? (Check all that apply)

- ☐ Routine Inspections
- ☐ Preventive Maintenance
- ☐ Corrective Maintenance
- ☐ Emergency Repairs
- ☐ Other (please specify): _____

9. How would you rate the effectiveness of your maintenance manual in ensuring the performance of building systems (HVAC, electrical, plumbing, etc.)?

- Very Effective ()
- Effective ()
- Neutral ()
- Ineffective ()
- Very Ineffective ()

10. Are there any barriers that prevent you from fully utilizing the maintenance manual? (Check all that apply)

Lack of Awareness ()
Limited Training ()
High Maintenance Costs ()
Lack of Access to Manuals ()
Insufficient Technical Knowledge ()
Other (please specify): _____

Section C: Impact of Maintenance Manuals

11. In your opinion, how do maintenance manuals contribute to the overall performance of buildings?

(Open-ended)

12. To what extent do you believe maintenance manuals improve the safety and sustainability of buildings?

Strongly Agree
Agree ()
Neutral ()
Disagree ()
Strongly Disagree ()

13. What are the primary benefits of using a maintenance manual in building performance monitoring?

(Open-ended)

14. Have you observed any reductions in operational costs due to the use of a maintenance manual?

Yes ()
No ()
Not Sure ()

15. In your experience, do buildings with maintenance manuals have fewer system failures and breakdowns?

Yes
No
Sometimes
Not Sure

Section D: Challenges and Recommendations

16. What are the main challenges in adopting maintenance manuals for building performance?

(Open-ended)

17. What strategies do you think could improve the use and effectiveness of maintenance manuals in the Nigerian building industry?

(Open-ended)

18. What role do you think technology (e.g., Building Information Modeling (BIM), Computerized Maintenance Management Systems (CMMS)) can play in enhancing the utility of maintenance manuals?

(Open-ended)

19. Would you recommend the use of maintenance manuals to other building professionals? Why or why not?

(Open-ended)

20. In your opinion, what should be done to encourage wider adoption of maintenance manuals in Nigeria?

(Open-ended)