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(USBET) 2023**

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ENVIRONMENT**

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EXPLORING THE CONCEPTUAL FRAMEWORK: KEY INFLUENCES ON GREEN OFFICE BUILDING MAINTENANCE

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ABSTRACT

Green office buildings are popular due to their environmental benefits and cost savings. To ensure long-term effectiveness and efficiency, green office building maintenance must be understood as sustainable practises grow. This paper explores the conceptual framework of green office building maintenance, focusing on factors that affect operation and maintenance. Green building maintenance academic journals, reports, and case studies are reviewed for the research methodology. Design and construction, operations and maintenance, and human factors form the conceptual framework. Energy-efficient materials, green technologies, and sustainable building practises affect green office building maintenance in the design and construction dimension. Proper integration during design reduces maintenance costs and boosts energy efficiency. Operations and maintenance emphasises sustainable maintenance. Regular equipment inspections, proactive maintenance planning, and eco-friendly cleaning and waste management help sustain the building. Human Factors examines building occupants and facility management in green office building maintenance. Occupant behaviour, sustainability training, and stakeholder communication help green building maintenance protocols succeed. The findings show that these key influences on green office building maintenance are interconnected and require a holistic approach. The paper also discusses sustainable maintenance challenges and offers solutions. In conclusion, green office building maintenance requires understanding the conceptual framework. Facility managers and stakeholders can optimise green office building performance, longevity, and environmental impact by recognising and addressing this study's key influences. This research advances sustainable building practises and provides insights for greener, more resilient office spaces.

Keywords: *conceptual framework, green office, building maintenance*

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INTRODUCTION

Green office buildings, characterised by sustainable design and environmentally friendly features, have gained significant popularity in recent years, as organisations have sought to reduce their carbon footprint and create healthier workplaces (Liu et al., 2022). These structures are designed to minimise energy consumption, utilise renewable resources, and encourage occupants to live a sustainable lifestyle (Sijakovic and Peric, 2021). However, despite their eco-friendly characteristics, the long-term success and efficacy of green office buildings are highly dependent on efficient and strategic maintenance procedures (Nikseresht et al., 2023). Green office building maintenance is essential to ensuring that these structures continue to operate at peak efficiency, save energy, and uphold their environmental commitments (Dion and Evans, 2023). Maintenance procedures encompass a vast array of tasks, ranging from routine inspections and repairs to the implementation of eco-friendly cleaning and waste management protocols (Green and Papers, 2019). To optimise the performance and sustainability of green office building maintenance strategies, it is essential to identify the key influences that shape them (Kistelegdi et al., 2022).

Statement of the Problem

Green office buildings are widely recognised as an environmentally responsible and sustainable option for contemporary workplaces (Abdulai et al., 2021). To ensure the long-term effectiveness and efficiency of these eco-friendly structures, however, a well-defined and strategic approach to maintenance is required (Lundgren et al., 2021). Green office building maintenance encompasses a vast array of tasks, from ensuring the proper operation of energy-efficient technologies to implementing sustainable cleaning and waste management procedures (Rock and Martek, 2019). Despite the growing popularity of green office buildings, there is a dearth of research on the key factors that influence maintenance strategies and outcomes (Mushi et al., 2023). Understanding these key influences is essential for optimising building maintenance practises and ensuring the continued viability of these structures (Ochieng et al., 2023).

Research Objective

The main objective of this study is to explore the key influences on green office building maintenance and develop a conceptual framework to better understand the maintenance process.

LITERATURE REVIEW

Green building maintenance studies, including sustainable design, energy-efficient technologies, and eco-friendly materials, are reviewed first (Dion et al., 2022). Understanding how these initial building components affect maintenance shows the importance of proactive design and construction planning (Ismail, 2018). The review also examines green office building operational and maintenance practises, including equipment inspections, maintenance schedules, and sustainable cleaning and waste management. Green office block maintenance requires understanding these operational factors. Human factors research on occupant behaviour, facility management, and sustainable maintenance training is also covered. To develop strategies that meet occupants' needs, green office building maintenance must consider human factors (Zou and Alam, 2020). The literature review analyses case studies and real-world examples of successful green office building maintenance (Komolafe et al., 2016). These studies reveal how key influences interact to achieve sustainable outcomes in various contexts. The literature review synthesises multiple sources to create a robust conceptual framework that captures the multifaceted nature of key influences on green office building maintenance (Adnan and Razali, 2016). This conceptual framework will help develop strategies for green office building sustainability and performance in later phases of the study.

Evolution of Green Office Building Maintenance

The upkeep of environmentally friendly office buildings has undergone a sea change over the past few decades, evolving in response to shifting environmental concerns and rapid advances in environmentally friendly technology. The increasing demand for environmentally responsible and resource-conserving business procedures in commercial settings led to the development of the idea of green maintenance (M Y L Chew et al., 2017). The beginning stages of environmentally friendly office building maintenance were characterised by a growing awareness of environmental problems and the necessity of sustainable design (Mishra et al., 2023). During the construction phase, building owners and facility managers started incorporating energy-efficient technologies and environmentally friendly materials into their buildings (Nikseresht et al., 2023). However, there was still some room for improvement in the way maintenance procedures were incorporated into sustainability strategies.

Factors Influence Office Green Building's Maintenance

Our community has taken the first step towards long-term sustainability with the idea of green buildings, also known as sustainable construction. Concern for future generations is at the heart of the concept of sustainability, which is defined as "the practise of using the Earth's resources in a way that ensures future generations can maintain their standard of living while also meeting their own needs (Assylbekov et al., 2021). The term "maintenance" refers to all of the administrative and technical

steps, such as supervision, that are taken to keep an item in good shape or move it to a place where it can do the job that it was designed for. The term "maintenance" refers to a collection of activities performed to keep something in good condition or to restore it to a good state (Hauashdh et al., 2023).

Technical Perspective

The initial building design is one of the most important factors that determines how simple and efficient the building's maintenance tasks will be. It is possible to simplify maintenance tasks and reduce downtime during repairs by strategically positioning mechanical and electrical systems in an optimal location and providing easy access to key components (Abruzzini and Abrishami, 2021). The integration of Internet of Things (IoT) devices and sensors allows for real-time monitoring of building systems. These data-driven insights enable predictive maintenance, identifying potential issues before they escalate and optimizing maintenance schedules (Rathore, 2022). Based on the findings from the case studies and stakeholders' walkthrough interviews, several major defects and issues related to green office building maintenance, particularly in the context of vertical green systems (VGS) and high-rise VGS facades, have been identified (Conejos et al., 2019). During the maintenance stages of infrastructure projects, technical factors are primary factors to the crucial and costly reworks that are required (Michael Y L Chew & Conejos, 2016). According to a review of the relevant literature, these issues do not belong to any phase of the project and might arise throughout the planning, design, building, or even maintenance stages of the projects (Edirisinghe et al., 2017).

Building Characteristics Defects

In the context of environmentally friendly office buildings, particular building characteristics and defects can have a significant impact on the process of maintaining the building as well as the building's overall sustainability (Jonsson & Gunnelin, 2019). It is imperative that these problems be identified and resolved if environmentally conscious office buildings are to continue to function effectively and preserve the environmental benefits that they provide. There is a correlation between the amount of time that has passed since a structure was built and the amount that it costs to maintain that structure (Ihsan & Alshibani, 2017). There are several aspects of a building, including its age, height, and construction, that should be taken into consideration (Ertemir, 2023). When consumers buy low-quality materials, they should prepare themselves to constantly be making repairs and performing scheduled maintenance (Hauashdh et al., 2022). The characteristics of the building have a continuous impact on the amount of money required for maintenance. In addition, older plumbing and drainage systems in buildings require higher levels of maintenance and repair costs due to the severity of the problems that they experience (Olanrewaju et al., 2022). It will need a substantial sum of money to check the building, maintain it, fix it, rehab it, and eventually replace it (Sedayu et al., 2022).

Problems Caused by Construction

The construction and maintenance of green office buildings can present a wide variety of challenges and problems, which may have an effect on the overall effectiveness and sustainability of the buildings (Ohueri et al., 2020). The incorporation of various sustainable technologies and systems during construction can make the building more complex to maintain. Green buildings often utilize advanced HVAC systems, renewable energy sources, and vertical green systems, which may require specialized knowledge and training for maintenance personnel (Dion and Evans, 2023). The construction of green buildings can involve higher upfront costs due to the use of eco-friendly materials and energy-efficient technologies. While these investments may lead to long-term savings in operational costs, the initial financial burden can be a challenge for some organizations (Hopkins, 2016).

Lack of Skilled Maintenance Personnel

Green building maintenance often requires skilled and knowledgeable personnel to handle the advanced technologies and sustainable systems. A shortage of skilled maintenance professionals may lead to difficulties in implementing and maintaining green building features effectively (Mewomo and Ndlovu, 2022). Sustainable technologies and green building systems are constantly evolving. Over time, some components may become outdated, leading to challenges in finding compatible replacements or upgrading systems to maintain optimal performance (Kibert, 2016). Both improper maintenance and the lack of any maintenance at all throughout the building's useful life count as examples of poor maintenance. This issue is created by facilities managers or maintenance employees who do not run the facility as planned owing to ineffective building maintenance guidelines. According to Flores-Colen and Brito, buildings may collapse for a variety of reasons, one of which being poor maintenance.

METHODOLOGY

Managing the conceptual framework in a literature review involves creating a clear and consistent model for organizing and analysing the relevant literature to support your research objectives. This framework serves as the foundation for understanding the key concepts, theories, and variables that shape the research topic and guides the review's structure and focus. Here are the steps involved in managing the conceptual framework in a literature review. Table 1 shows some appropriate techniques for managing the mental model.

Table 1: Appropriate Techniques for Managing the Conceptual Framework

Methodology	Description
Define the Research Questions	Define your literature review's research goals and questions. This helps you find relevant literature and organise it around your research themes.
Identify Key Concepts and Variables	Find the key concepts and variables in your research topic. In the literature review, you'll examine these key points.
Conduct Systematic Literature Search	Find relevant academic papers, journals, books, reports, and other scholarly sources for your research topic. Use academic databases and search engines to find current, reliable literature.
Organizing Literature	Based on key concepts and variables, organise the literature into themes. This helps identify research gaps and trends by grouping similar studies.
Analyzing and Synthesizing Literature	Analyse each study's main findings, methodologies, and research contributions. To find patterns in literature, synthesise information from multiple sources.
Developing a Conceptual Framework	Based on the literature, create a clear and consistent conceptual framework that visually represents the relationships between key concepts and variables. This framework should guide your literature review's structure.
Integrating and Interpreting Findings	Use the conceptual framework to weave together study results. Interpret the results in light of your research objectives and identify discrepancies or areas for further investigation.
Highlighting Gaps and Recommendations	Discuss conceptual framework-identified literature gaps and recommendations. Recommend future research topics.
Revising and Refining the Framework	Through the literature review, keep reviewing, revising, and improving the conceptual framework. Make sure it accurately reflects the synthesised data and adheres to your research's goals.
Writing the Literature Review	Use the conceptual framework that has been developed as a framework for organising your literature review. The findings should be presented in a manner that is consistent with the major themes and ideas mentioned in the framework.

CONCEPTUAL FRAMEWORK: KEY INFLUENCES ON GREEN OFFICE BUILDING MAINTENANCE

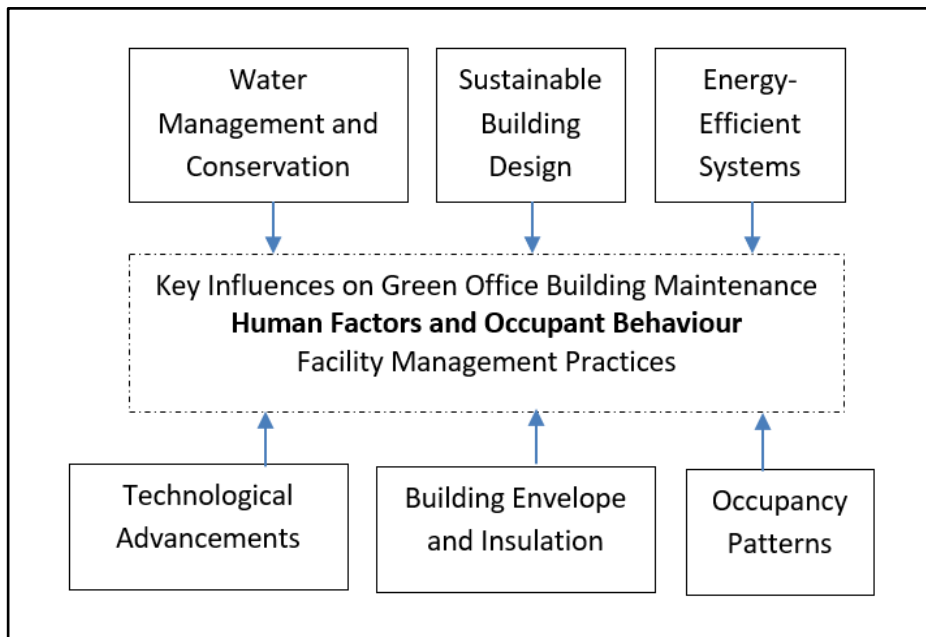


Figure 1: Conceptual Framework: Key Influences on Green Office Building Maintenance

The conceptual framework of "Key Influences on Green Office Building Maintenance" offers a structured and thorough model that identifies and analyses the elements and factors that have a significant impact on the maintenance procedures and results of green office buildings. It provides a framework for understanding the intricate interactions between the many factors that contribute to the long-term viability, efficiency, and upkeep of environmentally friendly office spaces. The maintenance of sustainable and energy-efficient building components, including routine maintenance, repairs, and management, is the main focus of this conceptual framework. In order to gain a better understanding of the opportunities and challenges associated with maintaining environmentally friendly workspaces, the framework aims to shed light on the complex nature of the factors that influence maintenance strategies and outcomes of green office buildings.

Stakeholders can create proactive and strategic maintenance plans that support the sustainability goals of green office buildings by taking into account and analysing these important influences within the conceptual framework. Decision-makers are better equipped to make wise decisions, allocate resources efficiently, and support

the ongoing success and favourable environmental impact of green office building maintenance when they are aware of the connections between these influences. The conceptual framework provides a thorough road map for improving maintenance procedures in environmentally friendly office buildings, thereby promoting a more sustainable built environment and healthier workplaces for future generations.

CONCLUSION

In conclusion, "Key Influences on Green Office Building Maintenance" illuminates the complex factors that affect green office building maintenance practises and outcomes. This framework explains the key factors that affect eco-friendly office space sustainability, performance, and effectiveness. Stakeholders can create proactive and strategic maintenance plans for green office buildings by understanding how these key influences interact. The conceptual framework guides resource allocation, decision-making, and green office building maintenance's environmental impact. In the future, the conceptual framework will incorporate new research, technologies, and practises to improve eco-friendly office space maintenance. This knowledge and improved maintenance strategies can create healthier, more sustainable, and resilient green office buildings that benefit occupants and the environment. The conceptual framework inspires a generation-long commitment to green building maintenance.

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