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Impact of Building Maintenance Management on Occupant Satisfaction in the ESG Context

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Abstract

Building maintenance management is essential to ensuring the functionality, safety, and comfort of commercial buildings, which directly affects occupant satisfaction. With rapid urbanization and evolving building technologies, the connection between maintenance strategies and user experience is increasingly important, particularly in light of the Environmental, Social, and Governance (ESG) standards for long-term, steady economic expansion. In this study, academic research on the effect of maintenance management on occupant happiness in commercial buildings is identified, assessed, and synthesized using a systematic literature review (SLR). Using a structured methodology including database searches, inclusion criteria, keyword mapping, and quality assessment the review highlights key maintenance dimensions such as responsiveness, cleanliness, safety, facility performance, and environmental sustainability. Findings consistently show that well-managed and proactive maintenance practices significantly improve occupant comfort, productivity, and perceived service quality, while also supporting ESG-related sustainability goals. However, variations in evaluation methods and limited regional data indicate the need for further empirical research. This SLR serves as a foundation for advancing facility management practices and emphasizes the strategic role of ESG integration in achieving long-term occupant satisfaction and sustainable building operations.

Keywords

Management, Building Maintenance, Economic Growth, Commercial Buildings.

1. Introduction

The continued functionality and attractiveness of these property assets depend largely on the implementation of planned and ongoing maintenance practices. Regular maintenance is not merely a reactive measure to damage, but rather a strategic investment to ensure structural safety, environmental cleanliness, and operational efficiency of vital systems such as electrical, water supply and sanitation, and heating, ventilation, and air conditioning systems (Hauashdh et al., 2024). Optimal maintenance management goes beyond routine scheduling; it involves long-term strategic planning aimed at maximizing asset value, minimizing future operating costs, and most importantly, creating a conducive and comfortable environment for its occupants. Well-maintained building facilities inherently contribute to increased work productivity, psychological well-being, and ultimately, overall satisfaction for the individuals who work within them (Murtaza et al., 2024).

The relationship between tenant satisfaction levels and the caliber of building maintenance management is a significant causal relationship in the commercial property industry. Occupants, whether they are office space tenants, apartment unit owners, or shopping center visitors, directly feel the impact of the quality of the facilities and maintenance services provided. A well-maintained environment, with optimally functioning facilities, maintained cleanliness, and quick responsiveness to needs or complaints, is consistently reported to be positively correlated with higher levels of satisfaction (Sunarya & Jamaludin, 2022; Sulistio & Darmastuti, 2022). Conversely, poor maintenance conditions, such as unrepaired facility damage, dirty environments, or slow responses to problems, can cause discomfort, disrupt productivity, and even erode occupant loyalty (Hu et al., 2024). Therefore, effective maintenance management is not only an operational responsibility, but also a strategic element in building and maintaining positive relationships with occupants and maintaining the reputation of the building. The important aspect here is that effective maintenance is not only limited to the technical and physical aspects of the building, but also includes efficient resource management to ensure the sustainability of the facility's performance in the long term (Okoro, 2022).

Dziadosz et al. (2023) in his work emphasized that effective facility management must adopt a proactive approach to maintenance, which means anticipating potential problems before they occur and implementing appropriate preventive measures. Furthermore, Alexander highlighted the importance of integrating maintenance strategies with occupants' needs and expectations. A deep understanding of occupants' preferences and requirements allows building managers to tailor maintenance services to be more effective in enhancing their comfort and satisfaction. In addition to technical and strategic aspects, the service dimension also plays a crucial role in commercial building maintenance management. Prompt and efficient response to maintenance complaints or requests, transparency in communication regarding the schedule and type of maintenance work, and the quality of interaction between maintenance staff and occupants significantly contribute to higher levels of satisfaction (Doody et al., 2023). Occupants' perceptions of the reliability, responsiveness, assurance, empathy, and tangibles of maintenance services collectively shape their evaluation of the overall service quality.

While the benefits of effective maintenance management are clear, its implementation in practice is often fraught with complex challenges. Budget constraints are a common constraint that can limit the frequency and quality of maintenance that can be performed. A lack of skilled personnel in the field of building maintenance, especially for sophisticated systems, can also be a significant barrier. In addition, poorly organized or inefficient maintenance management systems can result in work delays, duplication of effort, and increased overall operating costs.

These problems eventually cause building amenities to deteriorate in quality, an increase in the frequency and intensity of occupant complaints, and potentially even a decrease in the competitiveness of buildings in the increasingly competitive commercial property market (Poyyamozhi et al., 2024). Therefore, more in-depth and contextual research is needed to comprehensively understand the extent to which building maintenance management affects occupant satisfaction, as well as to identify the specific factors in maintenance practices that have the most significant impact on this relationship. The purpose of this study is to determine the impact of building maintenance management on occupant satisfaction in the ESG context.

2. Literature Review

Building maintenance management is a comprehensive discipline and practice, encompassing a series of planned and organized activities aimed at maintaining and restoring building facilities to optimal operational conditions in accordance with established standards (Dzulkifli et al., 2021). This concept goes beyond reactive repair actions to damage that occurs; it involves a proactive approach that includes damage prevention, routine maintenance, periodic inspections, and strategic planning to ensure the sustainability of the building's function throughout its life cycle (Sánchez-Garrido et al., 2024). The primary goal of building maintenance management is to optimize the functionality of tangible assets, ensure the safety of occupants, create a comfortable and productive environment, and control operational costs related to maintenance.

One of the most important factors in managing commercial buildings, particularly office buildings with several tenants and high operating requirements, is the caliber of building maintenance services. In addition to preserving the building's technical functionality, proper care directly affects the tenants' comfort, safety, and pleasure (Masengesho et al., 2021). Maintenance services include planned and reactive activities, such as periodic checks of the HVAC (air conditioning) system, elevator maintenance, lighting, sanitation, and inspection and testing of fire protection systems. In addition, maintenance of public facilities such as toilets, corridors, emergency stairs, and parking areas is also an important indicator of overall service quality. The success of maintenance is largely determined by the reliability of technicians, the speed of response to damage reports, and a transparent and well-scheduled work system (Wang et al., 2022).

Occupant satisfaction in commercial buildings is a multidimensional concept that reflects the degree of conformity between occupant expectations and the reality of the services and facilities they receive (Sorkhan et al., 2023). A thorough understanding of the factors that influence occupant satisfaction is crucial for building managers. Occupant satisfaction not only impacts tenant retention rates but also affects the overall reputation of the building in the commercial property market. The theory of customer satisfaction in facility management is rooted in the discipline of service marketing, where Parasuraman et al. (1988) developed the SERVQUAL model which is the main theoretical basis for evaluating service quality.

In commercial buildings, building maintenance management is a key factor in tenant satisfaction. The built environment's usability, security, and comfort are guaranteed by proper maintenance, which has a direct effect on the user experience. Occupants of well-maintained buildings report higher levels of overall satisfaction, productivity, and well-being (Kim & Kim, 2020). Key aspects of maintenance management that impact satisfaction include responsiveness of maintenance services, condition of building systems (e.g., HVAC, elevators, lighting), cleanliness, and quality of indoor environmental conditions such as temperature, air quality, and noise control (Mahdi & Altaie, 2023).

Preventive and responsive maintenance practices positively impact occupant perceptions of a building. Poorly maintained facilities can cause inconvenience,

operational disruptions, and even health-related complaints, negatively impacting tenant retention and building reputation. Furthermore, digital tools such as Computerized Maintenance Management Systems (CMMS) and Building Information Modeling (BIM) have improved building maintenance efficiency and enabled better communication between facility managers and occupants, thereby increasing satisfaction levels (Rodrigues et al., 2023).

3. Research Methods

In the framework of ESG, a systematic assessment was carried out to assess how building maintenance management affected occupant satisfaction. The study design complied with PRISMA (Preferred Reporting Items for Systematic Reviews), which is a set of recognized principles for systematic reviews. A thorough search approach was developed and put into practice for electronic databases such as Sage, Google Scholar, and Pubmed. Using a mix of keywords and restricted vocabulary phrases associated with "Building Maintenance Management," "ESG Criteria", and "Sustainable Economic Growth", the search was conducted to find pertinent papers published up to 2025.

This review includes studies conducted between 2020 and 2025 that focus on occupants of commercial, institutional, or residential buildings impacted by building maintenance practices. Eligible studies must evaluate maintenance strategies—such as preventive, predictive, or routine maintenance—in relation to ESG (Environmental, Social, and Governance) frameworks. Comparative studies analyzing different maintenance approaches or ESG-integrated versus non-ESG practices are prioritized. Outcomes must center on occupant-related factors, such as satisfaction, comfort, safety, wellbeing, or perceptions of building quality. Accepted study types include peer-reviewed empirical research, case studies, comparative and evaluation studies, and systematic reviews. Only English-language studies are considered. Excluded are studies focusing solely on maintenance personnel or cost/energy metrics without occupant feedback, as well as non-empirical or non-peer-reviewed content such as opinion articles or blogs. Studies published before 2020 or in languages other than English are also excluded. This approach ensures a focused and rigorous analysis of ESG-aligned maintenance practices from the occupant's perspective.

Screening is carried out to screen titles and abstracts that are not related to the research focus, and also screening to exclude research in the form of full text as well as qualitative studies, case reports, opinion pieces, and non-systematic literature reviews. All papers that would fit the inclusion criteria were obtained in their entirety after a screening procedure for titles and abstracts was completed. Data from a few complete articles was extracted and put into an Excel sheet. The data gathered includes publication details, such as the author's title, year, journal, and abstract. Each included study's methodological and outcome characteristics were gathered using a standardized data extraction form.

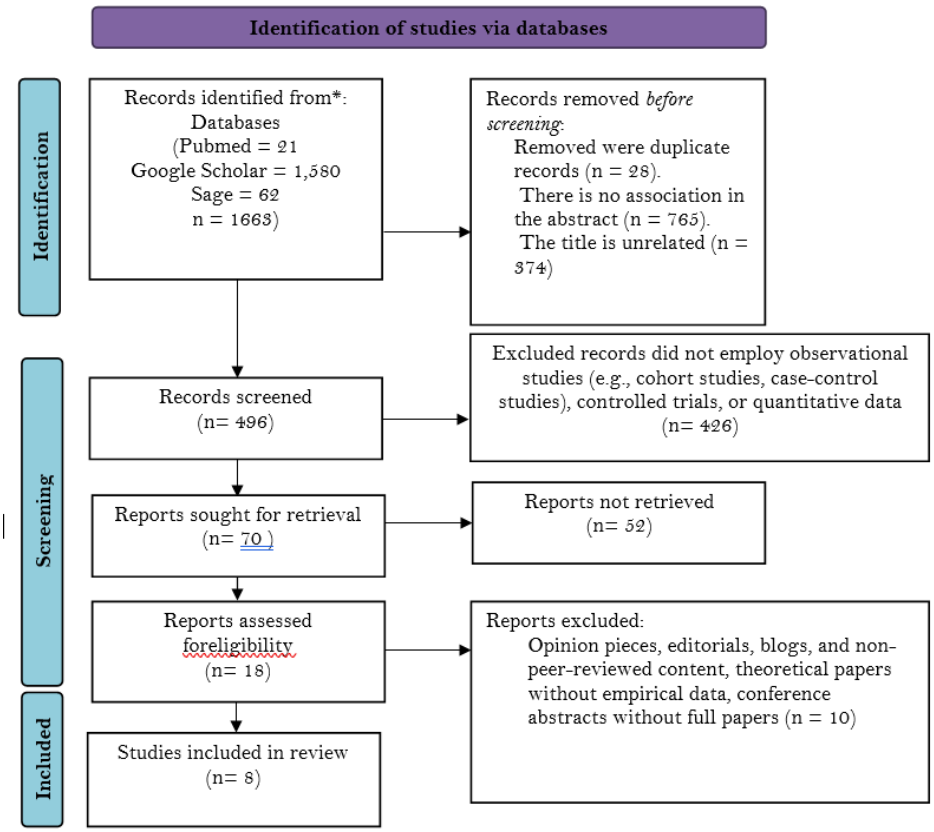

Figure 1. Literature Screening Results

4. Result

The study's findings offer a better understanding of how good maintenance procedures can support sustainable development goals within the ESG framework and enhance occupant comfort, productivity, and satisfaction by highlighting important themes like cleanliness, safety, facility performance, and environmental sustainability. A summary of the studies examined in this study is shown in Table 1.

Table 1. Result of Study

Author	Result/Finding
Kempeneer et al. (2020)	In order to increase buildings' investment value and environmental (E) and social (S) sustainability, the essay argues that a shift to user-centered smart real estate is the answer. Consequently, it is recommended that practitioners and scholars critically assess and contextualize the ESG framework they are utilizing, as well as the degree to which smart technology is used and users are taken into account.
Bungau et al. (2021)	The idea of sustainable design incorporates particular features that are sought for to meet the most exacting demands and specifications of customers. In the meantime, they are assessing the time required to raise a building as well as the natural resources required from the very beginning of the project. They are entering the context using a natural-centered approach, and as a result, they are planning and designing to solve the space and use reusable materials.
Liu (2024)	Better environmental, social, and governance (ESG) performance boosts property values and rents, but it also increases lease renewal rates and tenant satisfaction, which makes the real estate market more competitive. As a result, investors benefit from improved ESG performance. Nevertheless, there are still certain restrictions with regard to the real energy efficiency evaluation and LEED's assessment criteria in the current leadership in energy and environmental design (LEED) certification for green building certification, which need to be further improved.
Zhang et al. (2024)	Corporate GI is increased by 2.72% and 3.20%, respectively, as a result of ESG performance. Across three ESG sub-ratings and a number of robustness tests, including the instrumental variable (IV) test based on the intensity of Confucian culture, these noteworthy positive impacts hold true. The resource, governance, and innovation effects of ESG performance all have a beneficial impact on company GI, according to mechanism analysis.
Chen & Wang (2024)	ESG performance is favorably impacted by digital transformation. Furthermore, the link between digital transformation and ESG performance is somewhat mediated by innovation capabilities and servitization degree. providing policymakers and SME managers with practical advice on how to improve ESG results through smart digital initiatives. Notably, the findings of the fsQCA show three different arrangements of the elements of digital transformation that result in excellent ESG performance, offering SMEs complex alternatives to attain sustainable growth.
Ildiri et al. (2022)	Increases in means from pre- to post-occupancy were highly statistically significant, and moving from non-WELL certified workplaces to WELL certified offices had a favorable effect on occupant contentment with the workplace as well as occupant perceptions of health, well-being, and productivity. Large impact sizes were found for most of the examined occupant satisfaction metrics and occupant perceptions of mental health.
Lee & Lee (2022)	Top management plays a crucial role in ensuring that green healthcare initiatives are implemented successfully by encouraging staff members to actively participate in the program, offering ongoing education and training on the value of environmental sustainability, and closely monitoring organizational progress.
Kulkarni et al. (2024)	The results highlight the necessity of frequent reevaluations and adjustments. With estimations showing savings of between 50 and 100 kWh/day per building and the ensuing environmental effect, the suggested solution is inexpensive, simple to implement, and has the potential to provide large savings through a reduction in energy use. Stakeholders that are eager to increase energy efficiency, lower operating costs, and lessen their environmental impact in such climates might find these findings appealing.

Kempeneer et al. (2020), through a systematic literature review approach, emphasized the importance of shifting to user-centered smart real estate to enhance building investment value as well as environmental and social sustainability. In contrast, Bungau et al. (2021) highlighted a nature-oriented sustainable design approach and the use of recycled materials in building construction to meet high consumer demands.

Liu (2024) showed that better ESG performance not only increases property values and rental rates but also positively impacts tenant satisfaction and lease renewal rates. However, Liu also criticized the current limitations in the actual energy efficiency evaluation system and the assessment criteria of the LEED certification. Similarly, Zhang et al. (2024), using a panel dataset of companies in China, found that ESG performance significantly enhances corporate green innovation (GI), with positive effects from the resource, governance, and innovation dimensions.

The study by Chen and Wang (2024), using PLS-SEM and fsQCA from survey data of 215 SME executives, revealed that digital transformation positively affects ESG performance, partially mediated by innovation capabilities and the degree of servitization. Their findings provide practical implications for SME managers to improve ESG outcomes through digital initiatives.

Research by Ildiri et al. (2022) showed that moving from non-WELL to WELL-certified offices significantly increases occupant satisfaction, perceptions of health, and work productivity, with large effect sizes on mental well-being indicators. Meanwhile, Lee and Lee (2022) found that top management plays a critical role in implementing green hospital initiatives, including providing continuous training and monitoring organizational progress. Kulkarni et al. (2024) introduced an energy-saving solution based on IoT and an Android app, which demonstrated energy savings of 50 to 100 kWh per building per day. This solution was considered cost-effective, easy to implement, and relevant for stakeholders aiming to improve energy efficiency and reduce environmental impact.

5. Discussion

Building maintenance management has changed from being only an operational issue to being a strategic component that affects sustainability, user experience, and organizational value in the contemporary built environment. The importance of facilities management in raising occupant happiness has received increasing attention as a result of the incorporation of Environmental, Social, and Governance (ESG) standards into building maintenance plans. The relationship between maintenance performance and occupant well-being is becoming more and more important as businesses and property owners deal with the rising expectations for energy efficiency, health and safety, and environmental responsibilities (Sleiman et al., 2024).

The quality of the indoor environment, cleanliness, safety, system responsiveness, and the perceived dependability of facilities all have a significant impact on occupant happiness, especially in commercial buildings. In addition to addressing wear and tear, a proactive and methodical approach to maintenance guarantees that building systems operate at their best to satisfy users' changing demands (Márquez et al., 2025). This systematic literature review (SLR) contains studies that consistently show how well-managed maintenance methods improve building occupants' comfort, productivity, and overall experience. The relationship between environmental design, maintenance standards, and user satisfaction is further supported by empirical evidence presented by Ildiri et al. (2022) showing that WELL-certified offices, which prioritize occupant health, well-being, and performance, produce noticeably higher satisfaction scores after certification.

All three pillars are intertwined with maintenance management from an ESG standpoint. By making sure energy systems, HVAC units, and lighting are running well, maintenance helps the environment by reducing emissions and using resources more efficiently. IoT-based maintenance solutions in hot climates may maximize indoor comfort while also saving 50–100 kWh of energy per building per day, according to research by Kulkarni et al. (2024). These developments demonstrate how inexpensive technology may assist energy objectives and occupant comfort when integrated into maintenance frameworks, which is consistent with the environmental aspect of ESG.

Socially, maintenance procedures affect building occupants' psychological and emotional well-being in addition to health and safety results. The effective implementation of green healthcare initiatives, which reflect larger maintenance duties in guaranteeing cleanliness, hygiene, and wellbeing, depends on top management support and ongoing education (Lee & Lee, 2022). Happiness and productivity are immediately impacted by a well-maintained facility because it fosters a healthy company culture and a sense of trust in management. Similar to this, Bungau et al. (2021) contend that user-centric design and natural resource management must be taken into account from the outset of sustainable architecture, implying that social satisfaction is ingrained in the building operations lifecycle.

The third ESG component, governance, is intimately tied to openness, accountability, and methodical supervision. A systematic governance framework that includes maintenance schedules, performance indicators, compliance monitoring, and stakeholder involvement is necessary for effective building maintenance. Liu (2024) highlights that strong facility management procedures and green building certification not only improve tenant happiness but also increase lease renewals and investment returns, which raises the governance legitimacy of real estate companies. Property managers may cultivate a culture of continuous improvement and stakeholder confidence by prioritizing ESG indicators and using data-driven decision-making.

Although there are many potential advantages to ESG-aligned maintenance practices, the assessment also identifies a number of research gaps and difficulties. The absence of defined techniques for assessing tenant satisfaction with regard to maintenance operations is one of the most notable problems. The majority of research concur that maintenance has a favorable effect, however the measures employed to measure satisfaction differ greatly, making it difficult to compare studies and extrapolate results. Additionally, a large portion of the data that is currently accessible is geographically biased, with a preponderance of studies from industrialized economies. This drawback emphasizes the necessity of doing empirical research in developing markets and in a variety of climatic and cultural contexts in order to comprehend regional issues and preferences (Akin & Akin, 2025).

Furthermore, although it is currently underutilized in many commercial buildings, the incorporation of smart technology into maintenance management is picking up steam. According to Kempeneer et al. (2020), there is a need to move toward user-centered smart real estate, where ESG objectives are met through responsive, real-time user involvement as well as infrastructure. In order to develop adaptive systems that change in response to occupant demands and environmental changes, this move entails integrating sensors, AI-driven analytics, and user feedback mechanisms into maintenance procedures.

The potential for ESG-aligned maintenance practices to provide a competitive edge in the real estate market is another important finding from the SLR. Higher property prices, rental rates, and tenant loyalty have all been demonstrated to be correlated with ESG performance. Buildings with excellent maintenance records and environmental credentials are becoming more and more desirable to both tenants and investors. Liu (2024), for instance, contends that although green certifications

such as LEED increase ESG exposure, they need to change to better represent actual energy efficiency and user-centered results. Therefore, maintenance plans should strive for the comprehensive integration of ESG goals with quantifiable occupant satisfaction results rather than just certification.

Furthermore, Zhang et al. (2024) show that through processes including resource allocation, governance enhancement, and innovation stimulation, ESG performance strongly increases corporate green innovation. This implies that investments in ESG-driven maintenance might encourage more extensive organizational innovation, which has ramifications for maintenance procedures as well. When given digital tools and directed by ESG objectives, maintenance staff may transform from reactive operators into proactive innovators. This change in perspective can also have an impact on workforce development, opening up new positions and chances for upskilling in the operations of sustainable buildings (Akhtar et al., 2025).

6. Conclusion

Building maintenance management is a strategic tool for raising tenant happiness and accomplishing ESG goals, not merely a technical one. In addition to enhancing comfort, health, and productivity, responsive and sustainable maintenance promotes social justice, energy conservation, and open government. Stakeholder trust and long-term building performance hence depend on maintenance procedures being in line with ESG principles. The influence of maintenance on occupant satisfaction is further enhanced by the integration of smart technology, green certifications like as LEED and WELL, and data-driven facility management, which facilitates continuous improvement and real-time reaction. Furthermore, by making sure that tenant requirements and experiences are given priority, user-centered techniques that incorporate frequent feedback loops and performance reviews enhance the social component of ESG. However, resolving methodological flaws, regional data shortages, and obstacles to technology adoption are necessary to realize these advantages.

Facility managers and building owners should give priority to incorporating ESG principles into maintenance planning and execution by using green technology and making sure that pertinent certifications are followed. In order to match services with user expectations, a more occupant-centric strategy should be used, integrating frequent feedback mechanisms into maintenance systems. To develop a more thorough knowledge of the factors influencing occupant happiness, future research should concentrate on empirical studies conducted in a variety of building types and geographical locations. By providing rewards for buildings that attain high levels of sustainability and occupant happiness, policymakers may promote the adoption of ESG-aligned maintenance requirements.

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