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SUSTAINABLE GREEN BUILDING INITIATIVES IN MALAYSIA: ISSUES IN THE IMPLEMENTATION PRACTICES

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Abstract

In recent years, green building practices have received tremendous global attention for their ability to protect the environment and foster sustainable development, and Malaysia, one of the fastest-growing countries, is enthusiastically embracing the green building movement. However, throughout the construction period of this green building, many issues occurred that contributed to the deterioration of the performance of the building itself. This research aims to identify the main issues faced by green building projects in Malaysia to ensure the performance of the building can be maintained and improved, by using a questionnaire survey that collects the views of 72 experienced participants. The findings reveal that operation and maintenance are urgent issues that need to be addressed in Malaysian green building projects, underscoring the need for policy intervention. Overall, this study can support the regulation of green building maintenance, underlining the critical nature of recognizing and addressing these issues collectively to foster the growth and success of green building initiatives in the Malaysian construction industry, thereby contributing to a more sustainable construction environment throughout the country.

Keywords: Green Building, Green Building Issues, Operation and Maintenance

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INTRODUCTION

Green buildings, also known as environmentally sustainable buildings, aim to reduce environmental impacts from construction to operation. They maximize energy and material efficiency while minimizing negative effects on people and the ecosystem (Sulzakimin, 2019; Kamarulbaid, 2021; Karr, 2021). Malaysia promotes energy efficiency and green building construction, but these buildings face challenges that hinder their widespread adoption and efficient management (Ali et al., 2018; Darko, 2019; Wong et al., 2021; Kamarulbaid, 2021).

Key issues include team collaboration, inexperienced labour, high maintenance costs, regulatory challenges, and the availability of eco-friendly materials. Additionally, operational and maintenance problems increase costs and energy consumption (Islam, 2019; Ping & Chen, 2016). The lack of skilled professionals and awareness among building owners exacerbates these challenges (Shafii et al., 2006; Yee Sin et al., 2021). There are several categories of challenges have been discussed, namely. (Gou, 2016; Lee et al., 2020)

- i. Design and Maintenance Challenges: Addressing issues in early design stages and post-construction maintenance complexities.
- ii. Maintenance Concerns: Highlighting the importance of proper maintenance for the full implementation of green buildings in Malaysia.
- iii. Awareness and Implementation: Assessing knowledge and implementation levels among stakeholders and the impact of conventional construction approaches on costs, environmental concerns, and social aspects.
- iv. Public Demand for Sustainable Buildings: Analyzing the demand for energy-efficient buildings and financial obstacles to their adoption.

Addressing these challenges can advance green building practices in Malaysia, contributing to sustainable construction and the country's development goals. Despite the focus on sustainability, the industry still faces labor exploitation, cost overruns, waste generation, environmental degradation, and inefficient resource utilization.

RESEARCH METHODOLOGY

Literature Review:

A systematic review of existing scientific works on green buildings, covering the pre-construction, construction, and post-occupancy stages. This review identifies key issues affecting green building performance, examines barriers, and explores their impact on each construction phase. The goal is to improve sustainability and performance in green buildings by creating a symbiotic relationship between design, construction, and maintenance phases.

Survey Questionnaire:

A survey designed using Google Forms to collect data from experts in green building construction. Distributed via email and messaging, the survey uses random sampling for high generalizability (Sarfo et al., 2022). The data will be analyzed using mean analysis to identify factors contributing to the decline in Malaysian green building performance, focusing on operation and maintenance issues.

Questionnaire Structure:

Part A: Respondent Background (Demographic)

Collects demographic information such as age, nationality, education, job title, and years of experience in green building construction. This data helps tailor sustainable construction policies and initiatives.

Part B: Green Building Issues in Malaysia

Investigates critical aspects of green buildings in Malaysia using a five-point Likert scale to measure agreement on various issues. The study population includes 73 respondents from Selangor and Kuala Lumpur, consisting of facility managers, consultants, and operations managers, particularly those with non-residential project experience and registered with the Construction Industry Development Board (CIDB).

The survey combines quantitative data from a broad sample with qualitative insights from specific green building projects. The Mean Value and Rank method will analyze the data, helping to prioritize aspects based on their importance to respondents. The research aims to provide valuable insights into green building practices, contributing to better implementation and advancement in Malaysia.

LITERATURE REVIEW

Green Building

According to the Green Building Index website, a green building focuses on increasing the efficiency of resource use – energy, water, and materials – while reducing building impact on human health and the environment during the building's lifecycle, through better siting, design, construction, operation, maintenance, and removal. Green Buildings should be designed and operated to reduce the overall impact of the built environment on its surroundings (Farahin Ahmad et al., 2019; Mat Yaman & Ariff Abd Ghadas, 2020). Green buildings, which are defined as environmentally sustainable buildings, are intended to reduce their environmental impact over their entire existence, from design to operation to eventual demolition (Sulzakimin, 2019; Kamarulbaid, 2021; Karr, 2021). A green building is an eco-conscious construction methodically designed, erected, and maintained to reduce its environmental impact and maximize

sustainability (Kriss, 2014; Liphadzi et al., 2023; Wani & Mushtaq, 2018). This prioritizes energy efficiency, water conservation, appropriate resource utilization, and indoor air quality enhancements. Darko (2019) and Wong et al. (2021) emphasize that green buildings achieve their goals by utilizing renewable energy sources such as solar panels, optimizing insulation and ventilation systems, and employing recycled or locally sourced materials, all of which contribute to reduced carbon footprint through innovative technological and design practices. However, Sharif et al. (2018) contends that the commitment to sustainability extends beyond the original construction stage, with long-term performance, maintenance, and adaptation being crucial factors. Furthermore, Yacob et al. (2019) emphasizes the overarching objective of green building: to integrate structures with their natural surroundings, save resources, reduce greenhouse gas emissions, and improve the quality of life for present and future generations. It is a comprehensive strategy that integrates environmental, economic, and social factors to establish a balance that benefits the world and its inhabitants.

The green building movement is not restricted to environmental considerations alone; it also promotes occupant health. Natural lighting, green spaces, and the use of non-toxic materials, as suggested by several authors, including Darko (2019), add to the health and comfort of those who live and work in these sustainable structures. Yacob et al. (2019) assert that the United States LEED (Leadership in Energy and Environmental Design) standards and certifications serve as guiding lights and benchmarks for the industry as part of a more significant trend toward environmentally responsible practices in construction and architecture. The collective knowledge of these experts highlights the significance of green building principles in creating a more sustainable and resilient built environment for the greater welfare of our planet and its inhabitants.

Issues in Green Building Practice

The construction sector in Malaysia is moving towards greener practices due to increased awareness of the environmental impact of construction. Industry players acknowledge the need for greener practices (Abd Hamid et al., 2017; Pramanik et al., 2019), but significant obstacles arise from the earliest design stages (Dipta et al., 2022). Post-construction issues such as maintenance difficulties, cost overruns and environmental impacts hinder further progress (Saleh et al., 2021).

Successful green buildings in Malaysia require smart design and durable maintenance solutions (Sharif et al., 2018; Reza Esa & Arif Marhani, 2011). However, the lack of knowledge and training in this field means that experts are sometimes unprepared for the unique needs of green buildings (Hauashdh et al., 2020; Reza Esa & Arif Marhani, 2011).

Despite the growing demand for energy efficient buildings, low awareness and expertise among construction professionals limits the transition to sustainable development (Mohd Nordin et al., 2018; Sabar et al., 2018; Khalid et al., 2019). The high cost of environmentally friendly products is often mistakenly considered a barrier. The Green Building Index (GBI), developed by the Association of Architects Malaysia (PAM) and the Association of Consulting Engineers Malaysia, reflects progress in green assessment methodology and government support (Kamil et al., 2017; Lee et al., 2020; Ming et al. , 2021).

However, bureaucratic inefficiency, licensing issues and policy contradictions often hinder progress despite the National Green Technology Policy (NGTP 2009) (Gündes & Yildirim, 2015). A comprehensive approach involving expertise development, incentives for sustainable practices, legislative support, and collaboration between government entities and the building sector is needed for sustainable and ecologically responsible construction.

Budget 2024 shows Malaysia's commitment to renewable energy, with RM2 billion allocated to the National Energy Transition Fund and RM200 billion to promote a low-carbon economy. Emphasizing energy efficiency, along with proper operation and maintenance practices, is essential to advancing sustainable practices in the Malaysian construction industry, which benefit both current and future generations.

Table 1: List of review articles on the issues in green building practices

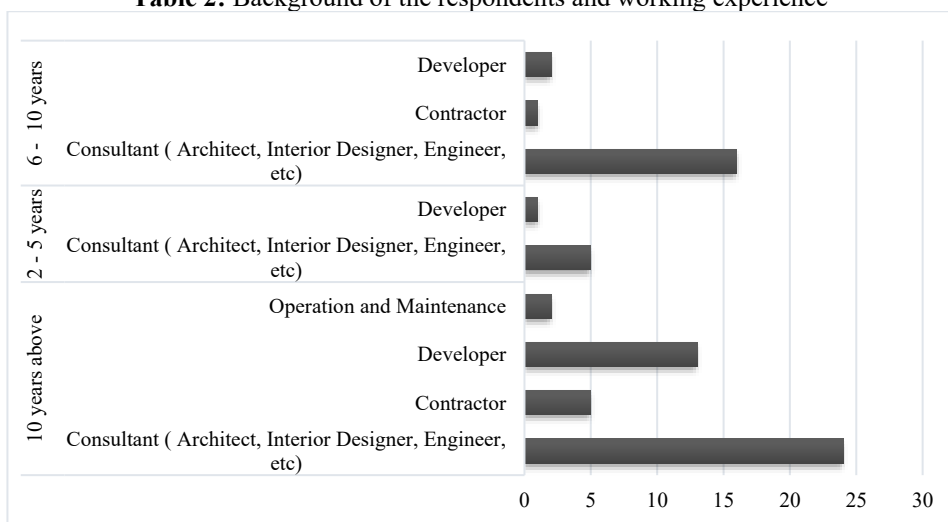
No.	Author	Title	Operational & Maintenance	High Cost / Financial Related	Lack of Coordination	Legislation Challenge	Lack of Knowledge and Expert	Assessment Tools (GBI)
1.	(Hussin et al., 2013)	The Way Forward in Sustainable Construction: Issues and Challenges	✓	✓	✓		✓	
2.	(Mohammad et al., 2014)	Critical Factors that Lead to green building operations and maintenance problems in Malaysia	✓	✓	✓	✓	✓	✓
3.	(Ali et al., 2016)	Issues and Challenges Faced by Government Office Building in Performing Maintenance Work	✓	✓	✓	✓	✓	✓
4.	(Pramanik et al., 2019)	Green Smart Building	✓		✓	✓	✓	
5.	(S. Y. Wong et al., 2021)	Barriers to Green Building Implementation in Malaysia's Construction Industry	✓		✓	✓		✓
6.	(Yee Sin et al., 2021)	Challenges of green office implementation: A case study in Penang, Malaysia	✓	✓		✓	✓	
7.	(Kalyana Chakravarthy et al., 2022)	Barriers to Green Building Implementation in Malaysia	✓	✓		✓	✓	✓
8.	(Samari et al., 2013)	The investigation of the barriers to developing green buildings in Malaysia	✓			✓		✓
9.	(Kalyana Chakravarthy et al., 2022)	Barriers and project management practices in green buildings	✓	✓				
10.	(S. Y. Wong et al., 2021)	Barriers to green building implementation in the Malaysian construction industry	✓	✓		✓	✓	
11.	Carlander et al. 2023	Barriers to implementation of energy-efficient technologies in building construction projects	✓	✓		✓	✓	

Table 1 presents an overview of articles focused on issues faced in green building practices. Proving common challenges such as operational difficulties, high costs, and issues with certification and legislation across various studies in the Malaysian context. Notably, the difficulty of "Operation & Maintenance" was consistently recognized as a significant barrier in ten studies, underlining the urgent need for refined management and maintenance protocols in the domain of sustainable construction. Financial concerns were also prominent, with the issue of "High Costs and Finance Related" cited in eight articles, pointing to the large economic investment and fiscal challenges inherent in adopting green building practices. Additionally, a similar number of studies draw attention to "Legislative Challenges," which indicate potential deficiencies in the regulatory landscape governing green building standards. Additionally, "Lack of Coordination" and "Lack of Knowledge and Expertise" were cited as significant barriers in six and five studies, respectively, reflecting communication gaps and deficits in industry-specific expertise. Finally, although rarely reported, the need for standardized assessment metrics, such as those provided by the Green Building Index (GBI), was recognized by two studies as critical to advancing the field.

ANALYSIS AND DISCUSSION

Demographic Analysis

Table 2: Background of the respondents and working experience



Source: Authors (2023)

Table 2 shows the position of the respondents and their years of working experience. The respondents are consultants (consisting of architects and

engineers), contractors, developers, and operations managers around Selangor and Kuala Lumpur. A total of 120 forms were distributed, however, the number of returned questionnaires was 73. The ages of the respondents who replied to our survey demonstrate that most of them are in the advanced stages of their careers. Forty percent of them, or 29 people, are between the ages of 31 and 35. The age group between 36 and 45 is closely represented by 38% (27 people), showing that this group is both experienced in green building and still in the process of growing professionally. A notable 22% (16 people) of the respondents are seasoned experts between the ages of 45 and 55. This makes sure that the survey is full of seasoned insights. It's not very representative of people at the ends of their careers; only 5% of those surveyed are under 26 years old and 3% are over 55. This is because entry-level and near-retirement roles are becoming less common in the modern workplace. To the question of nationality, the survey shows a concentrated demographic, with all 72 respondents identifying as Malaysian. This gives a detailed look at the professional setting in Malaysia, but it also warns people not to apply these results too broadly to other cultures or countries. When it comes to jobs held, consultants make up the largest group with 39% (28 people), which suggests that the survey included a lot of professionals who give specialized advice. Twenty-five percent (18 people) of the survey population are developers and contractors, which gives the results a broader view. On the other hand, only 5% are in operations and maintenance, which may limit the insights that can be gained from this sector.

Lastly, the level of experience of the respondents shows that the survey is aimed at professionals with a lot of experience. More than half of the respondents (36 people) had more than 10 years of experience in green building projects. People with 6 to 10 years of experience make up 29% of the group (21 people), which is a good representation of professionals in the middle of their careers. The survey seems to underrepresent newcomers to the industry; only 21% of those who answered had between 2 and 5 years of experience in green building projects and only 21% had less than 2 years (15 individuals).

Issues in Implementing Green Building

Table 3 below provides a detailed summary of the results gathered from the online questionnaire survey. It comprises selected issues from impactful articles. An article that examines the issues that arise in green buildings. By providing an in-depth analysis of the six factors that influenced the survey's findings.

Table 3: Survey results: Issues of Green Building in Malaysia Context

No	Issues	Rating Scale					Mean Score
		1	2	3	4	5	
1.	Operational and Maintenance (O&M)	3	4	14	25	27	3.95
2.	High Cost (Construction Materials and Planning)	7	6	18	25	17	3.53
3.	Lack of Coordination	6	7	20	16	25	3.68
4.	Legislation Challenge	6	10	18	25	14	3.42
5.	Lack of Knowledge and Expertise	3	12	21	27	10	3.40
6.	Assessment Tools (GBI)	3	4	14	25	27	3.95

1. Operational and Maintenance (O&M)

With an estimated mean score of 3.95, O&M has the highest score among concerns, indicating that the majority of respondents agree that this is a significant concern. Based on the distribution of responses showing that the majority of respondents (25 responses) tend to "Agree" or "Strongly Agree," O&M is an important determinant that affects respondents' operations. A few of the respondents only expressed a difference of opinion (3 "Strongly Disagree" and 4 "Disagree"). Potentially indicating respondents' encounter with the complexity, expense, and nature of ongoing operational and maintenance challenges is a large level of consensus. This may suggest that respondents perceive O&M as a formidable obstacle that hurts operational efficiency, expenditure, and overall performance term (Roslee et al., 2022; Yusof & Jamaludin, 2014). A strong consensus may indicate that better operations and maintenance (O&M) methods, maintenance investments, or the implementation of new technologies to speed up the process are needed. (Ali et al., 2018; Azmi et al., 2022; Zhang et al., 2023)

2. High Prices (Construction Materials and Planning)

The average score for the High-Cost issue is about 3.53. This indicates that there is a moderate level of consensus, although it is lower than O&M. A large number of participants disagreed (n=73) or disagreed (6 responses) regarding the importance of this matter. Variability in responses could potentially be attributed to different respondent experiences or preferences. Certain individuals may experience the effects of overspending with greater intensity, either due to geographic differences in material expenditures or the magnitude of their efforts (Dwaikat & Ali, 2018). Potentially as a result of having greater resources or more effective cost control mechanisms, some individuals may not perceive cost as a barrier. This discrepancy implies that although cost is a factor to consider, its effects may not be equally distributed among participants (Indriani et al., 2020).

3. Lack of Coordination

The mean score for Lack of Coordination was approximately 3.68, with most respondents expressing a neutral stance (20 responses). This spread of responses suggests that while coordination is recognized as an issue, its severity may vary based on factors like project complexity, stakeholder count, or communication barriers (Gündes & Yildirim, 2015). The ambivalence might indicate that coordination difficulties are acknowledged but not always seen as a major obstacle (Lee et al., 2020).

4. Legislation Challenge

Legal Challenges had a mean score of approximately 3.42, with most comments being neutral (18 responses). This low level of consensus suggests that views on legal challenges vary by industry, location, or familiarity with the legal environment. While regulation can pose difficulties, it is not universally seen as a major concern. This may be due to some domains having well-established frameworks, while others face more dynamic or restrictive rules (Ghabra, 2018; Indriani et al., 2020).

5. Lack of Knowledge and Expertise

Lack of Knowledge and Expertise has the lowest mean score, about 3.40, which is almost neutral. This finding shows that the majority of respondents have a neutral stance regarding the importance of this matter. Responses showed a slight, if not significant, tendency toward agreement. Concerns with the lowest scores may indicate that respondents believe that they have sufficient access to knowledge and skills in their business or through partnerships, despite the importance of expertise (Au-Yong et al., 2022; Set et al., 2017; Haushdh et al., 2020). Additionally, this may reflect that respondents are more concerned with other issues than the need for additional expertise, or it may indicate that they are confident in their ability to overcome knowledge-related barriers through hiring or training.

6. Assessment Tools

The GBI assessment tools line-item measures respondents' agreement on the significance of assessment tools, possibly associated with the Green Building Index" (GBI) or a similar acronym depending on the survey's context. It has a high relevance ranking of 3.95, equal to "Operational and Maintenance (O&M). Only 3% of respondents considered it unimportant, while 66% showed moderate to high agreement. This is a base for creating sustainable building and development. Chan (2021) and his team's analysis highlighted how specific measures were carefully designed to reduce energy usage and carbon emissions in buildings, demonstrating Malaysia's dedication to environmentally friendly practices in the construction industry.

CONCLUSION

This paper discusses Malaysia's efforts towards sustainable green buildings and the challenges faced in implementation, such as maintenance difficulties, coordination problems, and high costs. This research highlights the need for better operational efficiency, financial management and expertise. To address these issues, the paper recommends a holistic strategy with extensive training and education for industry professionals, better coordination mechanisms and regulatory adjustments. A multi-stakeholder approach is encouraged to integrate these strategies into national policies for sustainable urban development. This study emphasizes the importance of informed and methodical efforts to advance green building practices in Malaysia.

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