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THE BARRIERS OF NORMALIZING DEVELOPMENT FOR RESIDENTIAL GREEN BUILDINGS IN PERAK TENGAH REGION

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ABSTRACT

This paper examines the potential barriers of normalizing development for residential green buildings. The details and effects of green buildings are stated and as well as their impacts to the economy and surrounding environment. By integrating green design concepts into residential developments, the aim is to promote a greener and cleaner environment. These buildings are constructed with the goal of minimizing resource usage and ensuring long-term sustainability. To gather insights on the subject, semi structured interviews were conducted with five registered contractors around the Perak Tengah region. Their perspectives provide valuable insights into the topic at hand by listing out the barriers and generate recommendations in order to solve the issues. The study provides insight on why green residential developments are not in the norm of housing projects. The barriers are then ranked based on data collected to determine the common factors in the study. These findings may assist local governments, housing developers and construction industries on overcoming the barriers of developing green residential housing.

Keywords: “green,” “building,” “residential,” “barriers,” “contractors.”

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INTRODUCTION

Green architecture, also known as green building, is a holistic concept that recognizes the substantial impact the constructed environment can have on the natural surroundings. It acknowledges that the built environment has a direct impact on the daily lives of its occupants, both in positive and negative ways. By focusing on the entire life cycle of a building, green buildings strive to enhance positive impacts and minimize negative ones, such as waste generation and pollution. (Hari Srinivas, 2015). Key aspects encompassed in the planning, design, construction, and operation of green buildings include energy efficiency, water conservation, indoor environmental quality, material choices, and the project's overall impact on the surrounding area. (Jacob Kriss, 2014).

Green construction emphasizes resource conservation, internal recycling, using renewable energy sources, recyclable or biodegradable building materials, and blending in with the surrounding landscape, particularly in rural locations. The goals are to include human health factors while minimizing environmental effects. (Hari Srinivas, 2015). According to the Malaysia Property Market Centre (NAPIC), Malaysia has approximately 7 million residences. This statistic includes over 5.8 million residential properties, as well as offices, retail centers, shops, serviced apartments, commercial structures, and hotels (Property Guru, 2018). However, Malaysia has just 389 registered Green Building Index (GBI) projects.

The objectives of this research analysis are to identify the barriers to green buildings in Malaysian residential developments and to rate and identify the barriers to developing green buildings in Malaysia. The selection of case study location is in the Perak Tengah Region area, as housing projects have exploded over the years with more and more stages of houses being erected. The significance of this research is to enable governments and residents to have an insight on the insights on the need for green residential buildings and their impact on the economy and environment. The methodological approach for this research is to conduct interview sessions with local contractors to receive data that is then collected and analyzed.

LITERATURE REVIEW

The process of development is a process where a project or plan must endure in order to be acknowledged and examined before proceeding with construction. This is important in order to determine the type of building, the measurements and dimensions, the cost of construction, the obedience to the law, the location of the project, and the safety and strength of the construction. (Jeremy, 2018). The Green Building Index (GBI) serves as a recognized grading system for green buildings in Malaysia. It aims to promote sustainability in the built environment and raise awareness among the public and professionals about environmental concerns and our responsibility towards future generations. The GBI rating tool provides developers and building owners with an opportunity to design and construct eco-friendly, sustainable buildings. These buildings contribute to energy and water savings and offer healthier indoor environments, improved access to public transportation, and integration of recycling and landscaping practices to minimize their environmental impact. (GBI, 2009)

Green Buildings offer numerous benefits, including lower energy consumption, decreased operating expenses, sustainable resource utilization, reduced CO₂ emissions, improved productivity, and enhanced quality of life. However, certain challenges are associated with green building implementation, such as initial investment costs, identifying appropriate technologies and materials, finding knowledgeable experts, and the dependence on suitable locations for success. (Rosenkranz, 2021). However, although green buildings can provide a high return on investment in a short period of time, an initial investment is required. These can cost rather significantly, depending on the goal and

how many technologies and solutions must be used. There will be challenges in selecting the proper technology for each construction, which is a disadvantage because extensive study is required to match the products to the structures. Some technologies may be difficult to get because they must be imported, which takes time. Another disadvantage is that the green building business is very young and has only recently seen significant breakthroughs. (Rosenkranz, 2021)

Certification of green building

The Green Building Index (GBI) is a nationally recognized green grading system for buildings in Malaysia. Its purpose is to encourage sustainability in the built environment and to increase public and professional knowledge of environmental challenges and our duty to future generations. The GBI rating tool gives developers and building owners the chance to plan and build environmentally friendly, sustainable buildings that can save money on energy and water, create healthier indoor environments, have better access to public transportation, and incorporate recycling and landscaping into their projects to lessen their impact on the environment. (GBI 2009)

Green Building Index Sdn Bhd selects a certifier to analyze the building design in order to commence the GBI certification procedure. Following that, a preliminary certification is issued, followed by the final certification when the finished building has been evaluated to confirm that it complies to the design. To maintain certification, the facility is reevaluated every three years. Points are earned for exceeding industry norms and benchmarks. Based on the results, the buildings will be assigned one of four grades: Certified, Silver, Gold, or Platinum. Commercial and residential buildings are graded using the GBI grading system based on the six major elements listed below:

Table 1: GBI Rating Score

Criteria	Maximum Points	Score
Energy Efficiency (EE)	35	
Indoor Environment Quality (EQ)	21	
Sustainable Site Planning & Management (SM)	16	
Materials & Resources (MR)	11	
Water Efficiency (WE)	10	
Innovation (IN)	7	
Total Score	100	

- 86 to 100 points (Platinum)
- 76 to 85 points (Gold)
- 66 to 75 points (Silver)
- 50 to 65 points (Certified)

Advantages of green building

Green Buildings have many advantages, such as reduced energy consumption, reduced operating costs, sustainable usage of resources, reduced CO2 emissions, increased productivity, and quality of living. On the other hand, some downsides are the initial investment, finding the right technologies and materials, finding experts, and the success depends on the location. (Eric, 2021)

Therefore, implementing green designs into residential buildings is a crucial step on curing the environment. Below states the benefits of adopting green designs into development projects.

- **Reduced Energy Consumption**

One of the primary benefits of green buildings is their capacity to dramatically reduce energy use. Given both corporate and residential buildings consume a substantial amount of energy, there is a significant possibility for global savings. Green buildings utilize energy-efficient construction, insulation, lighting, and appliances, decreasing energy consumption and greenhouse gas emissions. According to studies, green buildings save between 25% and 50% more energy than conventional constructions. (US LEED 2017.)

- **Reduced Operating Cost**

In several ways, green building technology is reducing operational expenses. First, the expenses associated with obtaining it through the public network will be cheaper due to the decreased energy use. Renewable technologies, like solar panels, may frequently generate extra revenue for the building by reselling power to the general public.

- **Sustainable Resource Usage**

The more sustainable use of resources, including water, construction materials, plastic, and electricity, is another benefit of green building. Utilizing modern plumbing techniques, recycling spent water, and collecting rainwater may all help to minimize water use. Bamboo, earth, wool, recycled steel, and recycled concrete are some sustainable building materials.

- **Reduced CO2 Emission**

As the building sector accounts for a large part of the global CO2 emissions, a big green building advantage is that it can greatly reduce these. By relying on sustainable materials, smart building technology, IoT, and renewable energy sources, there is a big potential for improvement.

- **Increased Productivity of Occupants**

Studies have indicated that improved air quality can improve employee office performance by up to 8%. This not only improves everyone's health, but it may also increase productivity at a business.

- **Improve Standard of Living**

The higher living standards for renters are another benefit of green buildings. People who live and work in these green buildings will experience various health benefits due to the enhanced lighting, temperature, and atmosphere. These include improved sleep and cognitive abilities.

Disadvantages of green building

Green Buildings tend to bring beneficial impacts when implemented into practice for the financial market and the surrounding environment. However, there are barriers when implementing these green designs, which is detailed below:

- **Initial Expenditure**

Although green buildings can offer a significant return on investment in a short period of time, there must be an initial expenditure. These can climb rather high, depending on the objective

and how many technologies and solutions must be applied. State of the art technologies may cost a fortune to purchase, and more is added to properly install the equipment.

- **Choosing the Technology for Each Building**

There will be difficulties on choosing the appropriate technology for each structure, which is a drawback as throe research is needed in order to match the items to the buildings. Some technologies could be hard to get as some are needed to be imported, which takes time. More useful because every home is unique and situated in a distinct area.

- **Finding Eco-Friendly Parts and Components**

In addition to the technology, finding green construction materials might be challenging. Due largely to the drive toward green construction, these are frequently not readily available everywhere in the world and may require lengthy delivery periods. Moreover, a building will require a large sum of eco materials which makes the building and installation process more complex.

- **Achieving Experts in the Field**

Another drawback is that the green construction sector is still relatively young and has just recently witnessed more advancements. This implies that there are not many specialists and professionals who can aid with these issues, as these materials require qualified and experienced individuals in this field.

- **Success Is Location-Dependent**

The effectiveness of green construction might also rely on the site, which is still another drawback. Some technologies might not function as well as others due to environmental and temperature variations.

Barriers to residential green buildings

The barriers to residential green buildings are also known to be factors that hinder a developer's progress or initiation to conduct a residential green building project. A study by Hoffman et al. (2018), states that the barriers are divided into two categories which are physical obstacles and social obstacles. Physical obstacles are usually directed to the overall cost of the project, the supplies, and the manpower needed for the project. It states that the challenge of attending suitable materials graded or categorized as green materials greatly adds to the project's total cost. Moreover, the lifespan of green materials consists of very little data that support or indicates that green materials are more durable and sustainable. These are a few examples if, say, a developer chooses to adopt green initiatives into their projects, it greatly increases the project's cost. This affects the developer's overall profit in the project hence making the idea more difficult without further consultations, as profits are the main goal of a business. Below states the barriers identified in the study:

- **Barrier 1: Builder Incentives**

The biggest obstacle to the widespread adoption of green buildings is the lack of financial incentives for builders. Green buildings save energy and improve worker productivity, but these benefits are only realized over time and accrue to the building's owners, not the builder. The issue is finding a way to transfer some of the long-term value to the builder to offset initial costs, as the added expenses cannot be easily passed on.

- **Barrier 2: Lack of Product Information and Availability**

Participants in the study highlighted the shortage of accessible information on green products and building systems, causing difficulties for projects. The absence of information on performance and cost attributes of building components may lead to reliance on specialized consultants or risks of costly call-backs for low-performing green products. Furthermore, limited product information creates skepticism from building departments, hindering the use of green products that bring air quality and energy conservation benefits. For example, high fly ash content concrete faces official doubt due to limited information. Once a product becomes more widely used, product information barriers become less of an issue. The challenge is to initially obtain the information.

- **Barrier 3: Limited Client Awareness**

Private sector participants noted the client-driven aspect of their projects, stressing that clients' interest in incorporating green features is crucial to overcoming the challenges and costs of adding them. To attract and support green clients, evidence of the benefits of green building is needed. This includes case studies of green materials and performance, long-term studies on environmental impacts, fiscal studies on cost increases for green features, and research on the impact of green design and construction on occupant productivity. Another issue with client knowledge is navigating complex building codes and regulations. Clients and developers often struggle to understand the costs and requirements of compliance and may view green specifications as causing costly delays when regulations require modifications to building design or site plans.

METHODOLOGY

The approach for the research study is classified as qualitative research. Qualitative research delves deeper into real-world issues to gain a deeper understanding. The main qualitative method used in this study is a semi-structured interview with contractors with experience with housing developments. Semi structured interviews are a type of data collection method used in research, typically in the fields of marketing, social science, and survey methodology.

Interview data collection

Structured interview questions are utilized as a qualitative approach at this stage. The sample for this research will include five individuals who are contractors who have been involved in residential projects and will be interviewed. Because it is based on structured interview questions answered by the target respondents, this technique will assist in increasing knowledge of the obstacles in green building adaption at residential projects. The structured interview questions are divided into three sections, as follows; Section A: Interview questions regarding the personnel that several demographic information questions are posed to the responder. Section B: Interview questions regarding green residential buildings more focused on the knowledge and experiences of the interviewee regarding green residential buildings. The last section is section C: Interview questions regarding factors affecting green residential development.

The ethics and practices

Five contractors were selected for the semi structured interviews. The sessions were conducted virtually due to distance and time restrictions. The interviewees are categorized and coded based on their data. Each interviewees provided similar but different insights on the topic hence needing analyzation in order to find the common factors.

Table 2: Background of respondents

Details	RESPONDENTS				
	R1	R2	R3	R4	R5
Age	25	23	33	36	29
Gender	Male	Male	Male	Male	Male
Contractor Grade	G2	G1	G4	G3	G3
Academic Level	Bachelor Degree	Diploma	Bachelor Degree	Diploma	Bachelor Degree

RESULT AND DISCUSSION

Semi-structured interviews were conducted in order to find the common factors to the studied topic. The main factors are analyzed through the main data gathered from the interview sessions. The subfactors are then correlated from the literature review and the interview session by identifying the similarities of both data collection methods.

Table 3: Identification of barriers

RESPONDENTS	POSSIBLE BARRIERS			
	COST (H1)	EXPERTISE (H2)	TECHNOLOGY (H3)	LOCATION (H4)
R1	✓	✓	✓	✓
R2	✓	✓	✓	X
R3	✓	✓	X	✓
R4	✓	X	✓	X
R5	✓	X	✓	X
SCORE	5 / 5	3 / 5	4 / 5	2 / 5

Data gathered from the interview above states that four barriers are identified in the interview process. The barriers are cost, expertise, technology, and location. Based on the score gathered, cost has the highest score of 5, followed by technology with a score of 4, expertise with a score of 3, and lastly, location with a score of 2. This shows that the most factor agreed upon is cost, and the least agreed upon is location.

Table 4: Identification of subfactors

Identification of Possible Barriers Affecting the Development of Green Residential Buildings		Literature Review	Interview Session
H1	The high initial cost of the project	✓	✓
(a)	(Installation of green technology and features)		

H1 (b)	Importing and purchasing eco-friendly technologies (Most modern technologies are not available locally)	X	✓
H2 (a)	Lack of expert and certified workers for green designs. (Eco friendly and sustaining concept and design)	✓	✓
H2 (b)	Specified technologies require specific experts in the field. (Some technologies are complex and needs certified and experienced workers to install)	✓	✓
H3 (a)	Difficulty on obtaining certification (Green buildings must be equipped with green technology which are expensive)	X	✓
H3 (b)	Low supply and demand for green technologies. (Most modern green technologies are not built locally due to the lack of demand)	X	✓
H4 (a)	Green residential areas require a specific and suitable area in order to be function properly	✓	✓
H4 (b)	Lack of demand from the public. (The market demand is high on affordable housing)	X	✓

The table above states the identification methods used to identify potential sub-factors for the topic. The data is compared by analyzing the data from interview sessions and literature review examination. Based on the table, H1(a), H2 (a), H2 (b), and H4 (a) are stated in literature review and interview sessions which determines these are the subfactors.

Table 5: Ranking of barriers

NO	BARRIERS IDENTIFIED
1	HIGH OVERALL COST OF GREEN RESIDENTIAL PROJECTS
2	LIMITATION IN WORKERS AND EXPERTISE
3	LACK OF GREEN TECHNOLOGY
4	LOCATION OF GREEN RESIDENTIAL DEVELOPMENTS

The study underscores the existence of various barriers that impede the normalization of green residential projects in the Perak Tengah region. These barriers include high costs, limitations in workers and expertise, lack of available green technologies, and challenges related to the location of green residential developments. Recognizing and addressing these barriers is crucial for promoting and advancing sustainable residential construction practices in the region.

CONCLUSION

Normalizing green residential in residential developments is the key step in ensuring Malaysia is in a greener and cleaner future. The purpose of this study is to investigate the factors which effect the development of green residential buildings in the Perak Tengah region. The factors which have been identified are the high initial cost of the project, limitation in workers and expertise, lack of green technology, and location of green residential developments. These factors are causing the reduced number of green residential projects especially in the studied area. It is hoped that these factors may contribute findings to governments, housing developers, and construction industries in order to ensure green housing developments.

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