THE ADOPTION OF GREEN BUILDING: A CASE STUDY OF EXSIM DEVELOPMENT SDN. BHD. IN RESIDENTIAL CONSTRUCTION SECTOR

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This thesis is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology Management (High Technology Marketing) with Honors

Faculty of Technology Management and Technopreneurship

Universiti Teknikal Malaysia Melaka

2024

DECLARATION

I hereby declare that this thesis entitled “The Adoption Of Green Building: A Case Study Of Exsim Development Sdn. Bhd. In Residential Construction Sector” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in the candidature of any other degree.

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Date : 26 January 2024

DEDICATION

This research paper is dedicated to my parents, whose continuous emotional and physical support has been an endless source of motivation for me as I finished my thesis. I also want to express my sincere thanks to my supervisor, Assoc. Prof. Ts. Dr. Chew Boon Cheong, for his constant encouragement and crucial advice during this research. His insightful advice and comments have greatly influenced the quality and development of my study. Furthermore, I want to express my gratitude to my panel, En. Mohd Shamsuri bin Md Saad, whose wise advice and attentive evaluation were very valuable. My work was considerably improved by his recommendations' clarity and depth.

ACKNOWLEDGEMENT

I sincerely thank many people whose assistance has been invaluable in finishing this study. Above all, I want to express my sincere gratitude to my supervisor, Associate Professor Ts. Dr. Chew Boon Cheong. His unwavering support and excellent advice have been a lighthouse throughout this effort. His insightful criticism and wise counsel have enhanced my academic and personal development and shaped the quality and direction of my study.

I also want to express my gratitude to En. Mohd Shamsuri bin Md Saad, my panel. His insightful counsel and kind feedback were invaluable throughout the thesis evaluation phase. His suggestions improved my work's analytical and enhanced the discussion of my results by adding depth and clarity.

I also want to thank all my friends who have directly or indirectly helped me with my work. Their advice and support have been beneficial. Special thanks go to my friends for being my backbone in challenging situations and their unwavering emotional support.

Finally, I thank Universiti Teknikal Malaysia Melaka (UTeM) for allowing me to conduct this study. I have gained more knowledge and insight in the area and have grown personally due to this experience. Without these people's efforts, this study would not have been feasible. I appreciate all of them.

ABSTRACT

This research examined the challenges and strategies of implementing green building practices at EXSIM Development Sdn Bhd, a prominent company in Malaysia's real estate sector. Given the rising global attention to sustainable construction, the study assessed the efficiency of EXSIM Development's efforts to address the practical impediments to the broader application of green building practices. The study, which used a qualitative case study technique and involved in-depth interviews and the analysis of firm documentation, found that the main obstacles faced were high starting expenses, extensive maintenance requirements, regulatory barriers, and a sizable skills gap. Other issues that surfaced as significant were the evolving market demand for green buildings and the absence of financial incentives. The study provided an empirical understanding of the particular needs for sustainable building and suggested a framework for strategy based on the methods used by EXSIM Development. This framework offers a model for industry-wide application and comprises innovative financing, targeted worker training, legal compliance techniques, market-responsive project diversification, and public awareness-raising educational programs. The results provided benchmarks and a reliable model that can direct other companies encountering similar obstacles, fostering a more sustainable building industry in Malaysia and other comparable marketplaces. The study's conclusions included suggestions for extending the research into green building practices across various building types and comparing adoption tactics.

Keywords: *Green building practices, Malaysia real estate, Sustainable construction*

ABSTRAK

Kajian ini menyelidiki cabaran dan strategi yang berkaitan dengan pengamalan pembinaan hijau dalam EXSIM Development Sdn Bhd, sebuah entiti terkemuka dalam industri pembinaan Malaysia. Dalam konteks peningkatan perhatian global terhadap pembinaan lestari, kajian ini mengenal pasti halangan praktikal utama untuk pelaksanaan amalan pembinaan hijau secara lebih meluas dan meneliti keberkesanan strategi yang digunakan oleh EXSIM Development untuk mengatasi cabaran ini. Melalui pendekatan kajian kes kualitatif yang merangkumi temu bual mendalam dan analisis dokumen syarikat, kajian ini mendapati bahawa kos awal yang tinggi, kompleksiti penyelenggaraan, halangan birokrasi, dan jurang kemahiran yang ketara merupakan cabaran utama yang dihadapi. Ketiadaan insentif kewangan dan permintaan pasaran yang terhad untuk bangunan hijau juga muncul sebagai faktor yang menyumbang. Kajian ini menyumbang pandangan empirikal mengenai keperluan khusus untuk pembinaan lestari dan mencadangkan kerangka strategik berdasarkan amalan EXSIM Development. Kerangka ini, yang merangkumi pembiayaan inovatif, latihan tenaga kerja yang ditargetkan, strategi pematuhan undang-undang, diversifikasi projek yang responsif terhadap pasaran, dan inisiatif pendidikan untuk meningkatkan kesedaran awam, menawarkan model untuk aplikasi industri luas. Penemuan ini menyediakan penanda aras dan model yang boleh diulang yang boleh membimbing syarikat lain yang menghadapi halangan serupa, dengan itu memacu sektor pembinaan yang lebih lestari di Malaysia dan mungkin juga pasaran serupa lain. Kajian ini diakhiri dengan cadangan untuk memperluas penyelidikan terhadap amalan hijau merentasi pelbagai jenis bangunan dan analisis perbandingan strategi pengambilan.

Kata Kunci: *Pembinaan hijau, Pembinaan lestari, Industri hartanah Malaysia*

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ABBREVIATIONS	MEANING
DCP	Design Control and Planning
PC	Project Coordinator
BTE	Building Technical Executive
PE	Project Executive
SRI	Sustainable and Responsible Investment
SDGs	Sustainable Development Goals
ESG	Environmental, Social, and Governance
IMTN	Islamic Medium-Term Note
ICP	Islamic Commercial Papers
GBI	Green Building Index
GreenRe	Design Control and Planning

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CHAPTER 1

INTRODUCTION

1.1 Background of the study

Luangcharoenrat et al. (2019) found that the proportion of construction and demolition waste generated worldwide spans between 13 and 60 per cent. Luangcharoenrat et al. (2019) further stressed that reducing construction and demolition wastes will preserve natural resources and reduce expenses arising from waste disposal. In light of these issues, Wang and Zhang (2018) indicated a need to find a more sustainable way to reduce waste, improve efficiency and use renewable energy resources in the construction industry. According to Kibwami and Tutesigensi (2016), with the rising global attention concerning the negative impact of the construction industry and the demand for sustainable construction, green buildings have been resorted to.

Promoting and implementing green buildings has become a primary theme of modern construction (Darko and Chan, 2016) because it promotes healthy, safe, comfortable and environmentally friendly buildings. According to World Green Building Council (2016), a 'green' building is a building that reduces or eliminates negative effects on its architecture, construction, or operation and can positively affect our atmosphere and the natural environment. Green building benefits include reduced

energy and water consumption, improved indoor air quality and improved health and productivity (Dwaikat and Ali, 2018).

With the global recognition of the numerous sustainability benefits of green building implementation, facilitating the effective and widespread adoption of green buildings has recently emerged as a priority topic in the construction industry (Chan et al., 2017). Chandra (2018) expounded on the definition of McGraw-Hill (2013) and indicated that the term "green building" applies not only to products but also to construction strategies, building design and construction practice and promotes the economic health and well-being of end-users. Hence, green building materials are an excellent approach to meeting this target. The selection of construction materials which create a minimum environmental burden is useful in the sustainable development of a country (Singh, 2018).

Despite the benefits, many challenges have been reported to hinder the broader adoption of green building practices (Mahdiyar et al., 2020). The cost-related issues are the most commonly reported imminent ones (Chen et al., 2019). Lack of interest, relevant policies and standards and incompetency are the most common knowledge- and awareness-related challenges reported in developing countries (Mahdiyar et al., 2020). In addition, some technical and climatic difficulties result in the low implementation of green buildings (Gerzhova et al., 2019). Luthra et al. (2016) mentioned that the financial factor is believed to be the main impediment to developers practising green. However, there are still other factors like lacking knowledge, expertise and experience in green practices. These barriers might be the reason causing the slow assimilation process of the green concept into the construction industry.

In this research, the researcher focuses on adopting green building practices in EXSIM Development Sdn Bhd, a prominent real estate development company committed to sustainability and environmental responsibility. With its extensive portfolio of residential projects, EXSIM Development Sdn Bhd has demonstrated a

proactive approach to integrating green building principles into its construction processes. The company prioritizes energy efficiency, resource conservation, and eco-friendly design elements to create sustainable living spaces that minimize environmental impact.

1.2 Problem Statement

In Malaysia, sustainable development has been promoted in the manufacturing sector since the earlier Ninth Malaysia Plan 2006-2010. However, despite recognising the numerous benefits of green building, the willingness of construction stakeholders to implement green practices is less positive than initially thought (Jaffar et al., 2022). Green initiatives have been long introduced to the construction industry, but there are still a small number of construction projects and complete buildings are practicing green practices in their operation (Mahdiyar et al., 2020). This indicates the presence of barriers that hinder construction developers from adopting green practices. These barriers might be the reason causing the slow assimilation process of the green concept into the construction industry.

Therefore, this study aims to identify the barriers faced by the construction industry in assimilating green concepts and developing effective strategies to overcome these barriers to promote the widespread adoption of green building practices in the Malaysian construction industry. The research questions are constructed as below:

RQ 1: What challenges does EXSIM face in adopting green building practices?

RQ 2: What are the strategies to overcome the challenges in green building adoption?

1.3 Research Objectives

EXSIM Sdn Bhd, as a prominent player in the construction industry, recognises the importance of incorporating green building practices into their residential projects. However, despite their commitment, various challenges hinder the widespread adoption of these practices. Therefore, the researcher aims to comprehensively understand the barriers EXSIM Sdn Bhd encounters and the factors contributing to their limited adoption of green building practices. Furthermore, by analyzing successful case studies, best practices, and innovative approaches through secondary data employed by EXSIM and other industry leaders, the study seeks to identify practical solutions and strategies to successfully implement green building practices within the residential construction sector. The research objectives of this study are stated below:

i. To identify the challenges faced by EXSIM Sdn Bhd in adopting green building practices in their residential project.

ii. To investigate strategies to overcome the challenges in green building adoption.

1.4 Scope, Limitation And Key Assumption

The scope of this research is to identify the specific challenges that hinder the widespread implementation of green building adoption and explore potential strategies to overcome these barriers. The research case study is conducted in EXSIM Sdn Bhd, a company operating in the commercial construction sector. By narrowing the scope to EXSIM Sdn Bhd, the researcher can conduct an in-depth analysis of their experiences, practices, and initiatives in adopting green building practices. This allows the researcher to gather detailed insights into their challenges. Additionally, the

researcher can explore the strategies and approaches employed by EXSIM Sdn Bhd to overcome these challenges and successfully integrate green building practices into their projects.

The present study has a limitation that should be acknowledged. It is important to acknowledge that the research conducted in this study is limited to a single case study conducted in EXSIM Sdn Bhd. While this case study provides valuable insights into the experiences and practices of EXSIM Sdn Bhd, the findings may not be fully generalizable to the entire population of construction projects in Malaysia. The specific characteristics, strategies, and context of EXSIM Sdn Bhd may differ from other companies in the industry. Therefore, caution should be exercised when applying the findings to a broader context. Future research should consider incorporating multiple case studies or utilizing additional data sources to provide a more comprehensive understanding of the topic across various organizations in the construction industry.

In this study, a key assumption is made regarding the accuracy of the data collected from participants. It is assumed that the participants from EXSIM SDN BHD will sincerely and honestly share their experiences and challenges related to the adoption of green building practices. It is assumed that the participants will provide accurate information without intentional misrepresentation or bias.

1.5 Importance of the study

As green building development is still a contemporary subject of discussion, this study contributes to a better understanding of the complexities and specific needs of companies operating in green building development. The proposed strategies can be a reference to guide other companies in the industry facing similar obstacles to enhance their adoption of green building practices. It also gives future researchers a guideline to investigate green building implementation more in-depth by focusing on other types of buildings, such as commercial buildings.

1.6 Summary

In summary, this research aims to investigate the challenges faced by EXSIM Development SDN BHD in adopting green building practices in their residential projects. The focus is on identifying the barriers and obstacles that hinder the implementation of sustainable and environmentally friendly practices. Additionally, the research explores strategies to overcome these challenges, providing practical recommendations for the company to enhance their green building initiatives.

The researcher selects a case study on EXSIM Development SDN BHD to collect accurate data and information for researching the challenges and strategies in adopting green building practices in their residential projects. Through this case study, the researcher aims to gain insights into the company’s specific hurdles in implementing sustainable and environmentally friendly procedures within the residential construction sector. By focusing on EXSIM DEVELOPMENT SDN BHD, the researcher can explore the company's experiences, processes, and strategies related to green building initiatives. The interview sessions with key stakeholders at EXSIM Development SDN BHD will provide valuable data and insights for this research.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

Green building practices have become increasingly critical in addressing climate change and environmental degradation. They are designed to minimize the adverse impact of the built environment on the natural environment while promoting sustainable development. Despite their numerous benefits, adopting green building practices still presents some challenges. This literature review aims to provide a comprehensive overview of the key themes and patterns that have emerged from the existing literature on green building practices. Specifically, the study will focus on the challenges associated with green building adoption and the strategies that can be employed to overcome them. This literature review will begin by discussing the concept of green building and its importance in promoting sustainable development. Then, examine the various barriers to adopting green building practices and explore the strategies to overcome these barriers.

2.1 Green Building

"Green" refers to environment-friendly practices from building design to landscaping choices (Chandra, 2018). Many definitions of green buildings exist today. Green building is the foundation of sustainable development (AlSanad, 2015). A green building, also called a sustainable building, is a construction method that uses resources sparingly and is considerate of the environment throughout the life cycle of the building (EPA, 2016; Wei et al., 2015). Buildings designed and constructed this way are also known as green buildings because they try to create environmentally more sustainable buildings that may be more energy-efficient, less polluting, and provide users with a healthier atmosphere (Mahdiyar et al., 2020). Natural resources are utilized effectively during design, building, operation, maintenance, and destruction (Kasai and Jabbour, 2014). The Indian Green Building Council defines a green building as "using less water, optimizing energy efficiency, conserving natural resources, generating less water and providing healthier spaces for occupants, compared to a conventional building." (Jaffar et al., 2022) stressed that green buildings save energy and water and improve the health and comfort of their occupants by controlling temperature and humidity, interior air quality, using natural lighting, and taking waste management measures.

According to Gerzhova et al., 2019, poorly constructed structures result in inefficient land use, higher energy consumption, decreased production, contamination of surface water, loss of agricultural areas, and fragmented ecosystems. Kruger and Seville (2013) identified the main principles or elements of green building as energy efficiency, water efficiency, resource efficiency and sustainable development. Hence, green construction has grown to be crucial to sustainable development. Green building revamps traditional, non-green construction methods using special building techniques, practices, and materials that help achieve sustainability (Darko et al., 2017). The benefits of green buildings are vast, including cheaper construction costs that result in lower operating expenses, more comfort, cleaner indoor air quality, improved durability, and fewer maintenance costs (Singh, 2018). The construction of greener buildings has been identified as providing several advantages to customers. For

instance, in Brazil, customers of green buildings report an appreciation of the property, a 50 per cent reduction in water consumption, a 30 per cent reduction in energy consumption and an 80 per cent reduction in waste generation, besides an average appreciation of 15 per cent in their resale price (Green Building Council Brazil, 2012).

In another context, McGraw-Hill (2013) described a green building as a project that is either certified by a reputable worldwide green rating system or constructed to meet certification requirements. The concern for green construction has grown around the globe as a result of many climatic and environmental problems, and the creation of several grading systems and assessment tools for green growth has accelerated. Green building rating systems aim to assess a "whole building's" life-cycle performance and compare it to performance benchmarks (Fowler and Rauch, 2016). LEED-USA, BREEAM-UK, Green Star-Australia, GBI-Malaysia, and Green Globes are well-known global standards.

2.2 Challenges to the Adoption of Green Building Practices

2.2.1 Higher Costs of Green Building Process and Material

Numerous studies found that cost was the biggest obstacle to adopting green building features (Hwang and Ng, 2013). Cost-effectiveness is considered the most important of all the other aspects (Hasan and Zhang, 2016). The estimated cost for sustainable building ranges from 1% to 25% more than conventional building (Dwaikat and Ali, 2016). The higher cost results from the design layout's complexity coupled with modelling and green practices (Wu et al., 2019). Green buildings often have greater initial design and construction expenses than conventional buildings (McGraw-Hill Construction, 2016). Cruywagen (2013) asserted that green buildings cost more than traditional buildings since green materials are more expensive. Sustainable building materials cost 3–4% more than conventional building materials

(Zhang et al., 2011). In addition, The design and acceptance of green applications entail several risks and uncertainties, necessitating a total contingency amount in the budget allocation (Qian et al., 2015). Similar results were observed in research that concentrated on the USA and Hong Kong, showing that the initial cost was the most critical factor in green applications (Ahn et al., 2013). The lengthy payback time for green buildings often encourages developers to choose conventional structures (Mosly, 2015).

Though researchers and professionals claim that green technologies, such as energy-saving systems, lead to long-term (life cycle) lower running costs, users and developers have not been very much convinced because the benefits that green buildings provide is over long-term, people hesitate to take decisions, which only bring benefits beyond their lifetime.

2.2.2 High maintenance cost

In addition to initial costs, high maintenance costs are also a barrier (Latief et al., 2017). For instance, a green structure could have more extraordinary maintenance expenses since it requires regular irrigation and pruning (Mayor, 2008).

2.2.3 Construction process technicalities

The processes involved in constructing sustainable buildings could be overly complex as they may be associated with complicated technologies and construction procedures (Wu et al., 2019). Project complexity increases by adopting green building practices. Project management and construction difficulties are barriers to green feature applications (e.g. Zhang, Platten and Shen, 2011; Zhang, Shen and Wu, 2011). When the complexities in the construction processes are not communicated early, the overall performance of the project management team could be compromised.

2.2.4 Long Bureaucratic Processes

Graeber (2015) reported that the bureaucratic process for accepting new and modern technologies in construction projects could increase the completion time. Zhang et al. (2011) also outlined the lengthy approval processes which management must go through to seek acceptance of the construction processes for their projects. This lengthy approval poses many challenges, especially to project management.

2.2.5 Unfamiliarity with Green Building Technology

Advanced project management approaches, tools, practises, and procedures must be developed and used to effectively implement green initiatives (Sabini, 2016). The biggest obstacle is the complexity of the technology associated with green applications (Hasan and Zhang, 2016). The same view was echoed by Zhang, Platten and Shen (2011) and Zhang, Shen and Wu (2011) by demonstrating the complexity of the building methods and procedures involved in using green technology. Silvius et al. (2012) explained that stakeholders need more knowledge about sustainable construction materials and processes. Darko et al. (2018) emphasised that unfamiliarity with sustainable technologies adversely affects project outcomes and performance.

Zhang et al. (2011) opined that a project management team is required to perform according to the requirement of the project owner/client. However, performance outcomes could be affected when project management teams are unfamiliar with the technologies for green building. The modern technologies used in achieving sustainability are complex and require project management teams to be abreast with them to ensure their implementation (Wu et al., 2019).

The inability of project management teams to understand how these new technologies and tools, such as Building Information Modelling, artificial intelligence, the internet of things, and virtual reality, can hinder the project management teams'

ability to achieve sustainable building performance (Silvius et al., 2012). The existence of little knowledge in operating the requisite tools and technologies to ensure the sustainable building is a major challenge which needs to be addressed to enhance project management teams' readiness in sustainable building processes (Darko et al., 2018).

2.2.6 Inadequate Awareness

The conventional notion of how a building must be constructed exists, but many builders do not want to engage in sustainable construction because of the perceived risks (Kibert, 2016). Environmental auditing adoption, a beneficial sustainable building practice, is mostly not done because of a lack of understanding (Agyekum et al., 2019). There is also inadequate public education concerning the advantages of sustainable construction because of the paucity of sustainability studies, specifically on issues concerning indoor environmental conditions, productiveness, and the health of occupants (Darko, 2019). Opoku et al. (2019) postulated that this lack of awareness is a major challenge associated with sustainable building processes.

2.2.7 Lack of Financial Incentives from Government

By offering financial and other incentives, governments may play a significant role in encouraging green features. A substantial obstacle to the development of green buildings is the absence of financial incentives and awareness campaigns by the government (Jason, 2009).

2.2.8 Market Demand and Interest

Current market conditions impact developers' motivation and desire to implement green building features (Gou et al., 2013). For example, there is little public interest in green building applications in China, discouraging owners and tenants from investing in green applications. (Gou et al., 2013). According to McGraw-Hill Construction, (2016), green building features often require upfront investment and may have higher initial costs than conventional construction.

Developers may face challenges convincing owners and tenants to invest in green features if there is a lack of public interest or awareness of green building applications. Developers may face challenges convincing stakeholders to allocate additional funds for sustainable features without sufficient demand. Daniel (2022) observes that various factors, including technological advancements, policy changes, consumer preferences, and environmental concerns drive market evolution.

2.2.9 Lack of Sustainable Product Information

The lack of sustainable product information concerning sustainable materials and sustainable construction process, which needs to be understood in sustainable buildings constitute a challenge for project management teams (Schoggl et al., 2017; Hakkinen and Belloni, 2011). Builders are continually compelled to interact with specialists who have such knowledge. Other identified challenges are risks due to the different contract forms of project delivery (Koolwijk et al., 2018), communication and the interests of project team members and more time needed to enforce sustainable building processes on construction sites.

2.2.10 Lack of Skill and Expertise

Implementing every practice in the built environment depends on the information available to the responsible parties due to training and education. According to Chan et al. (2018), there is a need to develop a comprehensive national sustainability database for professionals with accurate and updated information regarding sustainable building processes. Robichaud et al. (2011) asserted that implementing sustainable building processes depends on the training and education construction professionals obtain. Implementing the requisite training and education could help project management teams select good designs and construction materials to ensure the sustainability and circularity of materials at end-of-life (Sauv´e et al., 2016). In a similar study, Samari et al. (2013) believed that the lack of professional knowledge and training is a barrier to implementing sustainable building processes in developing countries. Most developing countries' Project management teams appear to have little understanding of sustainable building processes (Silvius et al., 2012).

2.3 Strategy to Overcome the Challenges in Green Building Practices

2.3.1 Financial Incentives from the Government

"Financial incentives for green building adoption" and "Low-cost governmental loans and subsidies" have been widely reported as the most significant drivers of green building adoption (Tabatabaee et al., 2019). The importance of these tactics refers to the government's involvement in encouraging the adoption of green buildings by offering a variety of financial assistance to reduce the high initial investment cost of green buildings (Mahdiyar al., 2020). These incentives would increase the motivation of stakeholders to take up green approaches and help overcome the barriers of higher initial investment, lack of financial incentives, and resistance to

change due to cost. Ametepey et al. (2015) state that the government should provide funding and regulatory incentives for green construction development.

2.3.2 Educating Stakeholders on the Future Benefits of Green Buildings

This category includes information exchange on green construction, green building education programmes for developers and contractors, and environmental consciousness-raising via workshops, seminars, and conferences. Most green building technologies are new and complicated. Thus stakeholders must be educated about them to become familiar with, acquainted with, and knowledgeable about their operations as well as their costs and advantages before they can implement them in their projects (AlSanad, 2015; Djokoto et al., 2015; Chan et al., 2017; and Manoliadis, 2006). Both Potbhare et al. (2009) and Chan et al. (2017) also identified educational programmes to enable green building knowledge acquisition by stakeholders. Alsanad (2015) notes that heightened levels of awareness through education increase demand for green buildings.

To mitigate the challenges faced in implementing green building practices, it was identified that educating stakeholders on the future benefits of green buildings could enhance the implementation of the concept irrespective of the high initial cost (Opoku et al., 2019a). Simpeh and Smallwood (2015) indicated a lack of information regarding the full benefits sustainable practices could offer, especially in developing countries. This hinders their willingness to invest in such practices. Wu et al. (2019) opined that training and educating stakeholders would reduce the challenge of project management teams in convincing stakeholders to undertake green adoption.

2.3.3 Cooperation and Partnership

Previous research by Darko et al. (2017) highlights that project participants' collaboration and partnership are emphasised as factors that affect and encourage adopting certain sustainable construction practices. This factor may also include potential advantages, choices, or actions that motivate professionals to adopt green buildings. Partnerships assist with implementation strategies and reenergize global collaboration for sustainable development (Davis, 1999). Individual company action is necessary but insufficient to bring about comprehensive and transformative change toward sustainable development. Participation, partnership, and cooperation will be crucial (Fiszbein and Lowden, 1999).

2.3.4 Creation of Public Awareness

A similar study by Li et al. (2014) in China-proposed strategies to promote green building uptake, including enhancing stakeholders' awareness. In concurrence, Häkkinen and Belloni (2011) advocate for developing an understanding of clients concerning the benefits of green building as a critical action to green building implementation. As such attitudes and behaviours of consumers significantly influence green building promotion, strengthening publicity and education may be an efficient and effective way to enhance public awareness of environmental sustainability and customers' willingness to pay for green building (Zhang, 2015).

2.3.5 Engaging Personnel with Green Building Background

The complexities and cost implications of the sustainable building process require that experts with backgrounds in green building are consulted from the beginning of the construction project (Wu et al., 2019). Nduka and Sotumbo (2014) highlighted that investing in sustainable buildings presents benefits to buyers and consumers and current opportunities to other stakeholders in the industry. The survey experts also agreed that project management teams would have less challenges when working with experts who understand sustainable building processes and have a green building background. Such a team of experts could bring their nonpareil skills on the job, enhance the reduction of rework and waste, and give great recommendations regarding material choice, energy usage and ensuring efficiency of operations during construction (Hwang et al., 2017).

2.3.6 Setting Sustainable Priorities and Goals Early in Feasibility Study

To ensure sustainability of construction projects, implementing the key sustainable principles from the feasibility stage of projects cannot be overemphasized (Darko, 2019). This is because, at this stage there are little or no cost implications when changes are made to the construction drawings or the choice of materials and even the processes and concepts to adopt for the building (Wu et al., 2019). Project management teams could also benefit from set sustainability goals, which could enhance their decisions and initiatives in presenting and handing over projects within pre-set budgets (Zhang et al., 2011a,b).

2.4 Theoretical Framework

Figure 2.1: Challenges to the Adoption of Green Building Practices.

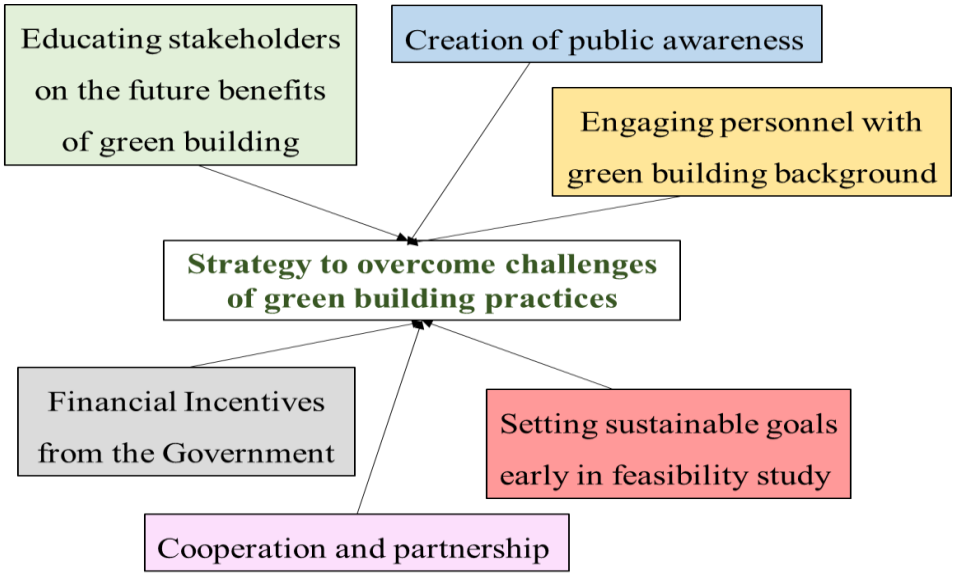

Figure 2.2: Strategy to Overcome Challenges of Green Building Practices.

2.5 Summary

Green building practices have gained significant attention in recent years due to their potential to mitigate the adverse impacts of the built environment on the natural environment. However, the adoption of green building practices faces several challenges. To overcome these challenges, various strategies have been proposed for the effective implementation of green building practices. Although several methods have been proposed to overcome these challenges, a significant research gap exists in understanding the specific challenges and opportunities for adopting green building practices, particularly in Malaysia. Therefore, this study aims to fill this research gap by investigating the particular challenges and strategies for green building practices in Malaysia.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

According to Mehta (2023), research methodology is the systematic and scientific approach employed to collect, analyse, and interpret data to answer research questions or test hypotheses. Researchers may use several types of research methodology, depending on the nature of the research question, the available resources, and the study's goals. Each research methodology has strengths and limitations and is best suited for different research questions and situations. Choosing the appropriate research methodology approach is essential in conducting valid, reliable, and meaningful research.

The research methodology employed in this study is designed to gather comprehensive and reliable data to address the research objectives effectively. The research design used in this study is descriptive research. As for the methodological choice, the researcher utilised qualitative data collection techniques. This chapter also

delves into the primary and secondary data collection methods adopted for this research while specifying the research location where data will be gathered from the identified company. The research strategy focuses on a case study approach involving the collection of actual data from company employees who hold relevant job positions suitable for providing primary data. The time horizon and scientific canons guiding the study are also explained and clarified. Lastly, the research framework, which provides a structured roadmap for the study, will be outlined in the last section of this chapter.

3.2 Research Design

The research design refers to the general plan to address research questions (Saunders et al., 2019). It will include well-defined objectives derived from the research question, identification of data sources, data collection and analysis methods, and a discussion of ethical considerations and potential constraints during the research process (Saunders et al., 2019).

Saunders et al. (2019) categorize research designs into four types: exploratory, descriptive, explanatory, and evaluative. In the context of this study on the challenges and strategies of green building adoption, the researcher has selected the descriptive research design. This design is well-suited for providing an accurate and detailed profile of the events, individuals, and situations related to adopting green building practices. Descriptive research is an extension of exploratory research or a preliminary step before conducting explanatory research (Sauders et al., 2019). It is crucial to clearly understand the phenomenon under investigation before data collection (Saunders et al., 2019).

Descriptive research questions will likely include ‘Who,’ ‘What’, ‘Where’, ‘When’, or ‘How’ (Saunders et al., 2019). In this research, the two research questions

are what challenges does EXSIM Sdn Bhd face in adopting green building practices, and what are the strategies to overcome the challenges in green building adoption?

Descriptive research is an essential approach for this study as it aims to understand and define the research investigation's context comprehensively. Atmowardoyo (2018) noted that descriptive research involves accurately describing existing phenomena. This study will employ descriptive research to document the specific phenomena related to the challenges and strategies of green building adoption in EXSIM Sdn Bhd's residential project.

3.3 Methodological Choices

According to Saunders et al. (2019), the methodological choices consist of three types: quantitative method, qualitative method, and mixed method research design. The selection of an appropriate methodological approach is crucial for researchers to interpret and analyze the collected data effectively. Choosing a reliable and suitable technique that aligns with the research objectives and enables a comprehensive investigation is important.

For this research, qualitative research techniques were employed. Saunders et al. (2019) highlight that qualitative research focuses on capturing meanings and expressions through words and images rather than relying on numerical data. In qualitative research, words and images often possess multiple and sometimes ambiguous meanings, emphasizing the significance of engaging in discussions and clarifications with participants. Moreover, qualitative research aligns with an interpretive philosophy (Denzin and Lincoln, 2018). Adopting an interpretive approach enables the researcher to understand and explore how the researched event can be comprehended in terms of its subjective and socially constructed meanings.

Qualitative research encompasses various data collection methods, such as interviews (Saunders et al., 2019). In this study, interviews were employed as the primary method of qualitative research to gain a deeper understanding of the perspectives and viewpoints of the respondents. The researcher interviewed 15 respondents, capturing textual descriptions and literate data to enrich the research findings. Through the interview sessions, the researcher aimed to gather relevant information related to the research topics by asking a range of pertinent questions.

By employing qualitative research techniques, this study aims to uncover and analyse the nuanced perspectives and interpretations surrounding adopting green building practices at EXSIM Sdn. Bhd.

3.4 Primary Data Sources And Secondary Data Sources

The research utilizes both primary and secondary data sources to gather information. Primary data refers to data collected directly by the researcher for the first time (Saunders et al., 2019). This can be achieved through various methods such as surveys, observations, questionnaires, and interviews. For this study, the researcher conducted semi-structured interviews with 15 respondents from EXSIM Sdn Bhd to gather primary data. This interview provided valuable primary data that directly captured the perspectives and experiences of individuals within the organization.

On the other hand, secondary data refers to information that has already been collected by someone else for a different purpose but can be utilized by researchers to address their own research questions or objectives (Saunders et al., 2019). By acquiring and analyzing secondary data, the researcher can get additional knowledge,

interpretations, or conclusions that may contribute to their studies (Bishop and Kuula-Luumi, 2017). The researcher accessed a variety of secondary data sources to enrich the study. These sources included the company website, industry publications, government websites, books, journal articles, and internal records. The researcher obtained comprehensive information about green building practices by tapping into these diverse resources. Furthermore, company reports, public records, and official statistics on construction projects and environmental regulations were also used as valuable secondary data sources.

3.5 Method Of Primary Data Collection

According to Boddy (2016), case studies often involve a sample size of 15 to 30 interviewees. In this research, the researcher selected 15 respondents from EXSIM Sdn Bhd, representing various job roles within the organization, including project managers and engineers and site supervisor. A semi-structured interview approach was employed to gather data from these respondents. The researcher chose to conduct a semi-structured interview because it offers flexibility in asking questions. It allows the researcher to explore specific topics in more depth while allowing the respondents to share their unique insights and perspectives. This is important as it enables a better understanding of the challenges and strategies related to green building adoption within the context of EXSIM Sdn Bhd. The complexity of these challenges and strategies requires a flexible approach that can capture the diverse viewpoints and experiences of the participants. Additionally, a questionnaire was developed to collect more precise data from the respondents.

3.6 Research Interview

According to Saunders et al. (2019), research interviews are categorized into three types: structured interviews, semi-structured interviews, and in-depth interviews. The researcher has used a semi-structured interview approach to investigate the challenges and strategies associated with adopting green building practices at EXSIM Sdn Bhd. Through these interviews, the researcher aims to gain valuable insights and perspectives from the employees of EXSIM regarding their experiences, beliefs, and perceptions related to green building.

Open-ended questionnaires were used during the semi-structured interviews to provide a comprehensive understanding of the subject matter and to gather valuable insights from the participants. According to Saunders et al. (2019), semi-structured interviews commence with a predefined list of themes and possibly some pivotal questions linked to these themes, providing a framework for guiding each interview session. Open questions, also known as open-ended questions, allow participants to express their thoughts and experiences freely. By employing a semi-structured format and using open-ended questionnaires, the interviews balance having a set of predetermined questions and allowing for open-ended discussions.

Semi-structured interview approach was employed to gather data from key individuals within EXSIM Sdn Bhd who possess valuable insights into the challenges and strategies of green building adoption. A total of 15 respondents were carefully selected based on their roles and responsibilities within the company, including the project manager, engineers and site supervisors involved in green building initiatives. The open-ended questionnaires used in the interviews were tailored to the specific job scopes of the respondents. The interview session is approximately 30 minutes to 1 hour. Data from the semi-structured interviews were audio-recorded and later transcribed to ensure accurate documentation of the participant's responses. Additionally, detailed notes were taken during the interviews to capture important non-verbal cues or observations.

3.7 Location Of The Research

Research for this study focused on EXSIM Development Sdn. Bhd, a prominent real estate development company, is known for its focus on sustainable and environmentally-friendly practices. The company was established in 2009 and is located at No. 18, Block 2, Jalil Link, Jalan Jalil Jaya 2, Bukit Jalil, 57000 Kuala Lumpur. EXSIM Development has completed numerous projects in prime locations across Malaysia. Their portfolio includes various properties, including condominiums, serviced residences, commercial towers, and mixed-use developments. Each project is meticulously designed to cater to the evolving needs and preferences of modern urban living.

They prioritize incorporating green practices into their projects to minimize negative environmental impacts and promote a healthier living space. One of their notable accomplishments is their maiden residential development, The Treez, which received the esteemed title of "First Green Residential Building" in Southern Kuala Lumpur. By adhering to Malaysia's Green Building Index standards, EXSIM Development Sdn Bhd ensures that its projects align with its philosophy of creating a sustainable environment for the future.

The researcher has chosen EXSIM Development Sdn Bhd as the focus of the research because EXSIM Development Sdn Bhd has a significant presence and reputation in the residential construction sector. The company has a track record of successful projects and has received recognition for its sustainable development initiatives. Their commitment to green building has earned them prestigious certifications such as LEED (Leadership in Energy and Environmental Design). EXISM Development has strongly committed to green building practices and sustainable development, which makes it a suitable case study for investigating the challenges and strategies of green building adoption

3.8 Research Strategy

According to Saunders et al. (2019), a research strategy is a roadmap that guides the researcher in systematically conducting their study, enabling them to pursue the research objectives and address the research questions effectively. There are various research methodologies: experiments, surveys, case studies, action research, grounded theory, ethnography, archival research, and narrative inquiry (Saunders et al., 2019). The researcher has chosen to employ a case study approach among these methodologies. This method enables the researcher to focus on examining the case of EXSIM Development Sdn Bhd and gather in-depth insights into the specific challenges faced by the company and strategies to promote sustainable practices in the residential construction sector.

According to Ngozwana (2018), case studies involve comprehensive investigations of specific events, programs, groups, or other defined topics of interest, collecting data from multiple sources. A case study aims to conduct an in-depth exploration of a particular topic or phenomenon in its real-life context, providing detailed empirical descriptions and contributing to theory development (Yin, 2018). Case study research relies on qualitative data to thoroughly understand the dynamics within the case (Saunders et al., 2019). This case study focuses on understanding how EXSIM Development Sdn Bhd has adopted green building practices and the strategies implemented to ensure their effective adoption.

Additionally, Saunders et al. (2019) highlight that the term 'case' can encompass various entities such as individuals, groups, organizations, change processes, events, and more in case study research. This study selected EXSIM Development Sdn Bhd as the case study subject to explore the challenges in adopting green building practices. According to Yin (2018), a case study aims to comprehensively understand the unique aspects of a specific example related to a particular research issue.

As Saunders et al. (2019) mentioned, collecting data from a specific subgroup rather than all potential participants can help streamline the data collection. Analyzing and collecting data from the organizational levels would be time-consuming and costly. The researcher employed a judgmental sampling technique to select participants who would provide the most relevant insights for addressing the research questions. In this study, project managers and engineers and site supervisors from EXSIM Development Sdn Bhd were chosen because their expert skills or expertise in a specific subject can give excellent data and correct conclusions during this research study. By focusing on this particular subgroup, the researcher can gather high-quality and accurate data regarding the organisation's challenges and strategies for green building adoption.

To ensure the reliability of the data collection process, a pilot test was conducted with selected members of the target population. Following the recommendation of Saunders et al. (2019), the questionnaire was tested with individuals who closely resembled the intended respondents. The purpose of the pilot test was to refine the questionnaire, ensuring that the questions were clear and that respondents could provide prompt and accurate responses. Before distributing the questionnaire to the entire sample, two participants from EXSIM Development Sdn Bhd were chosen to participate in the pilot study. Their feedback and insights were invaluable in fine-tuning the questionnaire and optimising its effectiveness for the main data collection phase.

3.9 Time Horizon

The time horizon in research refers to the duration it takes to collect data and conduct the study. Regardless of the chosen research technique, it is important to establish the temporal range as part of the research design, as noted by Saunders et al. (2019). There are two primary types of time horizons: cross-sectional and longitudinal studies (Saunders et al., 2019). Cross-sectional studies are characterized by a one-time data collection at a specific point in time, providing a snapshot of a particular occurrence (Saunders et al., 2019). These studies gather data from different demographic groups within a defined period, such as a week, month, or year. They aim to examine current or past affairs without necessarily exploring patterns or historical trends (Bell et al., 2022). On the other hand, longitudinal studies, also known as diary perspective temporal horizon studies, investigate the process of change and patterns of a phenomenon over an extended period (Saunders et al., 2019).

The researcher has chosen to employ a cross-sectional study design for this research. According to Saunders et al. (2019), cross-sectional studies are commonly adopted in academic research projects due to time and resource constraints. This study has a specified timeframe from March 2023 to January 2024, within which the investigation needs to be conducted to fulfil the research objectives. Considering these factors, a cross-sectional study design was deemed appropriate.

3.10 Scientific Canon

In the scientific canon, internal validity, external validity, construct validity, and reliability are essential factors contributing to the research's overall quality and credibility. These are crucial concepts for modern studies since they help to improve the accuracy of the assessment and evaluation of studies (Tavakol & Dennick, 2011). In the natural sciences and quantitative social sciences, reliability and validity are essential for evaluating the quality of research (Saunders et al., 2019). Validity and reliability enhance transparency and reduce the chances of researcher bias in qualitative research (Singh, 2014).

3.10.1 Internal Validity

Saunders et al. (2019) explain that internal validity refers to the extent to which the researcher's findings can be attributed to the intervention researcher is researching rather than to flaws in the research design. When an intervention can be statistically shown to produce an effect rather than this being caused by another confounding variable functioning concurrently, internal validity is proven (Saunders et al., 2019).

Researchers can reduce the possibility of ancillary variables and improve the study's internal validity by limiting the investigation's scope to the research topic, question, and objective. This research examines Exsim Development Sdn Bhd's challenges in adopting green building practices and strategies to overcome them. The researcher has resisted the urge to discuss unrelated or tangential issues by concentrating on the study questions and objectives. As shown in Table 1 below, some factors might influence the internal validity of the researcher's work.

Table 3.1: Threats to internal validity

Source: Saunders et al. (2019). Research Method for Business Students.

Threat	Definition and explanation
Past or recent events	A situation that alters participants' perspectives. For instance, a policy change related to green building practices during the research could impact stakeholders' perceptions of adopting green building practices. This could lead to a shift in their responses, which might influence the validity of the study's findings. To mitigate this threat, the researcher stays updated with relevant policy changes and communicates to participants that their responses should reflect their genuine opinions and experiences, independent of any external influences.
Testing	The impact of testing on participants' views or actions. For example, if participants from EXSIM Sdn Bhd are informed about the research project, they may modify their responses that align with what they perceive as desirable. This is especially true if they believe their answers may have future consequences for their evaluations or performance reviews. The researcher assures the participants that their responses will remain anonymous and confidential and emphasize that the study aims to understand the challenges and strategies related to green building practices, rather than evaluating individual performance. This approach will help create a safe environment where participants can provide honest and genuine feedback without fear of any negative consequences.
Maturation	The effect of a participant's change impacts their attitudes or behaviours but is unrelated to the study. For example, suppose a management training program was

	implemented at EXSIM SDN BHD during the research. In that case, it may influence the participants' perspectives and potentially lead to revised responses during subsequent stages of the study. To address this threat, the researcher be mindful of external factors that may influence the participants' maturation process.

3.10.2 External Validity

According to Saunders et al. (2019), external validity concerns whether a study's research findings can be generalized to other relevant contexts. Validity describes how successfully a research study's findings may be applied to other populations, settings, and situations. This is crucial because if external validity is demonstrated, it suggests that the results may be used in comparable people. The researcher will choose participants with characteristics relevant to the research question. The researcher ensures that the study participants represent the population of interest to ensure external validity in examining whether the Exsim Development Sdn Bhd case study reflects the hypothesis interaction links inherent in the challenges of green building practices.

3.10.3 Construct Validity

According to Saunders et al. (2019), construct validity is the degree to which a collection of questions captures the presence of the construct the researcher sought to test.Therefore, minimising each scale item depends on lexical and sentinel miscompr

ehension. Through job analysis, task analysis, and curriculum analysis, one may examine the boundaries and organisational structure of a construct domain and establish construct validity. These techniques entail dissecting the concept into its components and analysing how it manifests in various circumstances. Before distributing the measure to the study participants, the researcher can pre-test the standard with a sample of respondents to determine any possible issues or misunderstandings with the items and make any required adjustments. Besides that, the researcher interviewed 15 employees with experience in the company. Researchers claim that this is because they possess both theoretical and practical talents. While the data collected through employee interviews may provide helpful context and support for the study's results, it's crucial to apply a range of techniques to demonstrate construct validity and guarantee the dependability and correctness of the data.

3.10.4 Reliability

Consistency and replication are terms related to reliability. A research project would be dependable if the researcher could duplicate a previous study design and provide the same results (Saunders et al., 2019). Sometimes a difference between internal and external reliability is established when reliability is considered. To ensure uniformity across a research project is to provide internal reliability (Saunders et al., 2019). External reliability refers to whether the data collection techniques and analytic procedures would produce consistent findings if the researcher repeated them on another occasion or replicated them by a different researcher (Saunders et al., 2019). Since any bias or inaccuracy will impact the findings and subsequent interpretation and raise questions about the methods used to quantify the phenomena being examined, unreliable research will also be ineffective (Saunders et al., 2019). To ensure reliability in the study, the researcher compiled a table of concerns that should be examined in the Exsim Development Sdn Bhd case study. By addressing these concerns, the researcher can improve the accuracy and validity of the results.

Table 3.2: Threats to reliability

Source: Saunders et al., (2019). Research Method for Business Students.

Threat	Definition and explanation
Participant error	Any factor that negatively affects a participant's performance or response. One common cause of participant error is timing. When a person is asked to complete the questionnaire right before lunch, it could result in hurried or careless answers, increasing the risk of errors or inaccuracies in the data. To minimize participant error, the researcher chooses a less sensitive time and avoids scheduling interviews when participants are likely to be busy or distracted, such as at the beginning or end of a workday. Instead, scheduling interviews may be more effective when participants are more likely to be relaxed and focused, such as mid-morning. Other than that, the researcher uses shorter interview sessions rather than longer ones. Shorter sessions help to maintain participants' attention and concentration.
Participant bias	Any factor that may influence a participant to provide an incorrect response. This can occur when a participant feels pressure or desires to give a specific answer, even if it may not be true or accurate. One example of participant bias is when an interview is conducted in an open space where the participant may feel uncomfortable or self-conscious about being overheard. The researcher ensures that participants feel comfortable and relaxed during the interview to feel more comfortable sharing their honest opinions and experiences.
Researcher error	Any factor which alters the researcher's interpretation. This error can arise for several reasons, such as the researcher being tired, distracted, or unprepared to conduct the study. The researcher should clearly understand the research questions and be familiar

	with the literature in the field to ensure their data interpretation is accurate. During the interview, the researcher had to actively listen to the participant's responses and probe further to understand their opinions.
Researcher bias	Any factor which induces bias in the researcher's recording of responses. A researcher's personal beliefs, values, and experiences can affect their interpretation of data, which can lead to inaccurate. The researcher must acknowledge that beliefs and assumptions may impact the data collection and analysis. It is critical for the researcher to have an unbiased perspective and to abstain from any personal biases that can affect the findings. The researcher should approach the research with an open mind and use objective measures and methods for collecting and analyzing data.

3.11 Data Analysis

Saunders et al. (2019) outlined various data analysis techniques, including thematic analysis, template analysis, explanation building and testing, grounded theory method, narrative analysis, discourse analysis, visual analysis, and data display and analysis. In this research, thematic analysis was chosen to analyze the qualitative data.

Thematic analysis, as described by Saunders et al. (2019), involves the identification of themes or patterns within qualitative data such as interviews, observations, documents, diaries, or websites. This method enables researchers to code and analyze the data to uncover relevant themes or patterns related to the research question. Braun and Clarke (2006) emphasise that thematic analysis provides a systematic yet flexible and accessible approach to analyzing qualitative data.

In summary, thematic analysis was employed to analyze the qualitative data gathered in this research. Through this analysis, the researcher obtained crucial and pertinent information to address the research questions and achieve the objectives.

3.12 Interview Protocol

An interview guide includes a list of the topics or questions that will be covered during the interview. An interview guide is created to ensure that each interviewee receives the same fundamental lines of questioning. The interviewer can investigate, delve into, and ask questions that will further clarify and highlight the subject within the context of the topics or areas provided by the interview guide. (Rubin & Rubin, 2012; Seidman, 2013; Weiss, 1994) Thus, the interviewer is still free to develop a discussion around a specific issue, ask questions informally, and maintain a casual tone while emphasising a predefined subject. Using the instructions as a checklist will ensure that all pertinent questions are answered during the interview.

The benefit of an interview guide is that it ensures that the interviewer or evaluate has carefully considered how to utilize the constrained time available in an interview setting. By defining the topics to be covered in the interviews, the guide aids in making the process more systematic and thorough. Focus group interviews need a guide to keep the discussions on topic while allowing for the emergence of individual opinions and experiences. With an interview plan, the investigator may arrange the interview using a tentative travel route (Brinkmann & Kvale, 2015; Patton, 2015). It does not explain in detail what will occur at each step of the travel, how long each stopover will take, or where the investigator will be at any given time. Still, it does provide a strong sense of the direction of the journey and the final terrain it will cover.

To have high-quality qualitative data on interview protocol, a trustworthy interview protocol is essential. The preceding delimitation of the subjects to be addressed simplifies the interview process involving multiple groups of individuals in a methodical, consistent, and thorough way (Gugiu & Rodriguez-Campos, 2007; Patton, 2015). Additionally, by ensuring complete information is gathered within the allotted time, an interview protocol improves the efficacy of the interview process. Using rich qualitative data, the researchers may better comprehend the respondents' experiences and pinpoint critical components pertinent to the topic.

Table 3.3: Four-Phase Process to Interview Protocol Refinement (IPR)

Source: (Yeong et al., 2018).

STEPS	EXPLANATION	EXAMPLE
Aligning the Interview Question to the Research Question	- Increase the usefulness of interview questions - Ensure that the study's questions are necessary	The researcher set the interview questions to align with the specific objectives of the study on green building adoption. Instead of administering a comprehensive questionnaire covering all aspects of green building practices, the researcher selected and prioritized relevant questions based on the respondents' roles and knowledge in EXSIM Development Sdn Bh.
Creating an inquiry-based conversation	- Interview questions are distinct from research questions - Conversational social rules - Prompt questions	The researcher constructed a list of questions based on the research question. At the same time, the researcher avoided asking new questions in isolation to the respondents and ensured that earlier questions provided guidance for asking further questions.
Getting Feedback from the Interview Protocol	- Expert opinion on the interview protocol - Expect responses from respondents	After completing the questionnaires, the researcher consulted with an expert to ensure that the questions were not

	- Ensure understandability	considered sensitive or unsuitable for data collection.
Piloting the Interview Protocol	- Feedback from actual respondent - Gaining interview experience - Interview scenario testing	The researcher designed a short interview section test to determine whether the questions were successful and easy to understand for the respondents. The researcher then investigated whether the respondents could map their 'in mind' answers onto the available answer categories.

3.13 Summary

In conclusion, this chapter outlines the research methodology employed in this study. This study has established the research design as descriptive, specifically using a case study approach. The research design has been carried out, and determined the research questions and objectives. A descriptive research design was employed, comprehensively describing the research topic. Utilizing a descriptive research design in this study will benefit the researcher by enhancing their ability to evaluate data and synthesize ideas.

The researcher opted to employ qualitative data collection techniques, specifically interviews, as the chosen methodological approach. This decision was driven to engage directly with respondents with expertise and insights about green building development. Through interviews, the researcher seeks to gather rich and nuanced data, capturing the meanings expressed by the participants through their words and images. The selected 15 respondents for the interviews will include project manager, engineers, and site supervisor from EXSIM Sdn Bhd that are involved in the

green building industry. The opinions and unstructured responses received from these respondents through the interview sessions were the primary data of this research. Furthermore, various secondary sources such as articles, books, and reputable websites on green building will be consulted to enrich the research study.

The research strategy employed in this study is a case study approach focusing on EXSIM Development SDN BHD. By adopting a case study research strategy, the researcher can uncover valuable insights into EXSIM Development SDN BHD's successful green building practices and any challenges faced and lessons learned. The case study lasted less than a year, beginning early March 2023. The specific time frame of this case study influenced the decision to opt for a cross-sectional study design.

3.14 Research Framework

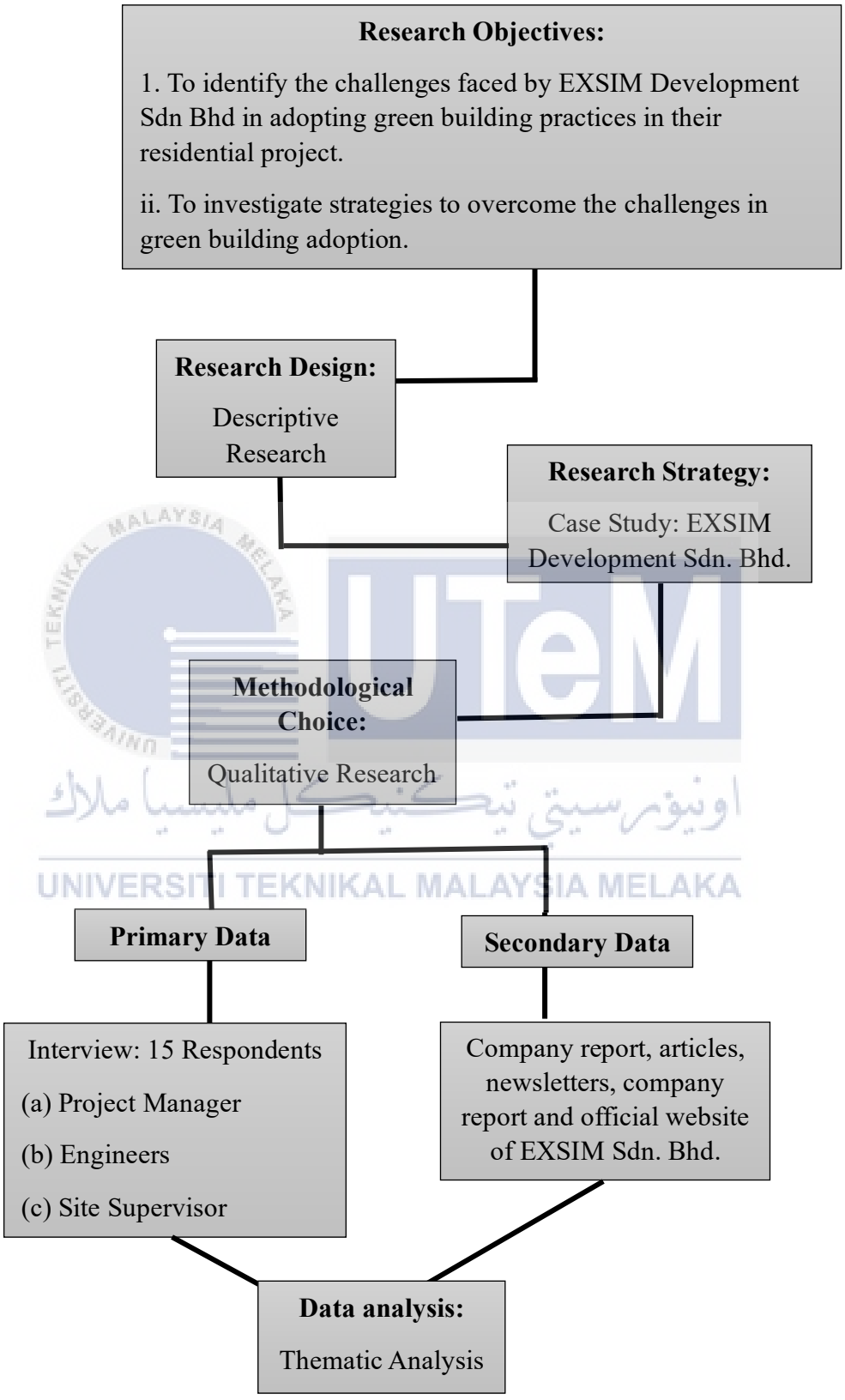

Figure 3.1: Research Framework

CHAPTER 4

DATA ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter discusses and analyzes the study, incorporating primary and secondary data. The data collection phase was conducted between the 28th of September to the 6th of October. In this chapter, the researcher presents the findings and discusses the set research objectives, ensuring that each aim is comprehensively addressed and achieved through the analysis.

4.2 Description of Respondents

This section profiles the respondents from EXSIM Development Sdn. Bhd. is a significant player in the real estate sector based in Bukit Jalil, Malaysia. Established on October 14, 2009, EXSIM Development primarily functions as an investment holding company in real estate activities involving owned or leased property.

The data was collected through a series of qualitative interviews. Table 3 presents a detailed overview of the 11 managerial executives and industry experts carefully selected for their roles and expertise. Their diverse backgrounds, from

technical execution to strategic planning, significantly contributed to a comprehensive understanding of the challenges and strategies in green building. The insights gleaned from these interviews were subsequently examined and analyzed using thematic analysis.

Table 4.1: Profile of Respondents

No	Position	Code	Job description
1	Design control & planning 1	DCP 1	- Liaison with the consultant on detailing should there be any changes in technical understanding in the development of all drawings. - Providing support to the project team on design and technical issues of the project especially in term of architectural design. - Assisting the project team to review the designs of the project.
2	Design control & planning 2	DCP 2	
3	Design Control & Planning 3	DCP 3	
4	Project Coordinator 1	PC 1	- Supervise construction works and ensure that all works are performed in accordance with the project's specifications. - To assist Project Manager to supervise, monitor, coordinate at Project Site with Contractors and Consultants. - Ensure that all works executed are in accordance with drawings, specifications, construction plans and procedures.
5	Project Coordinator 2	PC 2	
6	Project Coordinator 3	PC 3	
7	building technical executive 1	BTE 1	- Assist the Building Manager in the daily operations. - Lead a team in the provision and implementation of maintenance services at designated client's site. - Supervise, plan and organize a team of on-site contractors in carrying out planned
8	building technical executive 2	BTE 2	

			and ah-hoc maintenance and their work routines.
9	Project Executive 1	PE 1	- Involve in project planning, monitoring & control and reviewing for the entire project from planning stage to expiration of defect liability period. - Propose recommendations or solutions in regards with construction issues to superiors. - Ensure the necessary statutory requirements and certifications are in order for relevant authorities. - Review and manage the overall designs of the development in terms of authorities' requirements, marketability, practicality, constructability, maintenance friendly, suitability of material selections, green and eco-friendly design.
10	Project executive 2	PE 2	
11	Project executive 3	PE 3	

4.3 Challenges in Adopting Green Building Practices in Residential Projects

Adopting green building practices is essential for sustainable development in residential projects, yet it faces challenges. The first research objective was to identify these challenges as experienced by EXSIM Sdn Bhd. To this end, the study involved interviewing key organizational personnel to gain a detailed perspective on these issues.

4.3.1 Higher Cost of Material

The high upfront costs of sustainable building provide a significant obstacle to adopting green building methods. This concern, shared by PE 1 and BTE 2 at EXSIM Sdn Bhd, highlights that green buildings often incur higher upfront expenses than traditional construction, primarily due to the complexities of sustainable design and eco-friendly materials.

PE2 further elaborates on this by explaining that the longer lifespan and lower environmental effect of these materials over time, which need a more significant initial investment, might be the reason. Moreover, these materials often come with certifications to support their sustainability claims. PE 2 pointed out that a stringent verification procedure is required to obtain these certificates, which may add to the total expenses.

This finding is consistent with existing literature; studies by Hwang and Ng (2013) and Hasan and Zhang (2016) have identified cost as a significant barrier to the adoption of green building features, with sustainable buildings estimated to cost between 1% to 25% more than conventional buildings (Dwaikat & Ali, 2016). The use of green materials, which are around 3–4% more costly, and the intricacy of the design further increase these costs (Zhang et al., 2011; Cruywagen, 2013).

Conversely, DCP 2 and PE 3 provide contrasting viewpoints, arguing that the initial higher expenses need to be considered in the context of the building's lifecycle. They argue that long-term environmental and economic advantages, including energy savings and operational efficiencies, may balance the initial cost. This perspective aligns with Mosly (2015), who suggested that the potential long-term savings associated with green buildings may offset their initial higher costs. Similarly, PC 3 addresses a common misconception regarding the affordability of green buildings by noting that the long-term economic returns often justify the higher upfront costs.

The researcher believes that comprehending sustainable development requires a consideration of the expenses related to green construction. Even while upfront costs are more significant, it is essential to consider the long-term advantages—both financial and environmental. The perspectives from experts in the field and scholarly research emphasize the need for a paradigm change in assessing building expenses, considering the broader framework of long-term worth and consequences.

4.3.2 High Maintenance Cost

The growing trend of environmentally conscious development has increased the popularity of green buildings. However, these benefits present some unique difficulties regarding maintenance expenses. As Latief et al. (2017) identified, the necessity for consistent maintenance of sustainable elements in green buildings typically increases maintenance costs. With their practical knowledge, Design Control and planning executives at EXSIM Sdn Bhd have noticed that elements like living walls and green roofs demand regular, specialized care.

Moreover, a 2023 report by Wint.ai underscores the extra cost of upkeep of high-performance equipment and water-saving technology in green buildings. Building Technical Executives specializing in building systems recognize that maintaining and performing periodic repairs on these intricate systems requires specific expertise. Even while these cutting-edge technologies save money over time, they need ongoing care from qualified specialists, which raises the total maintenance cost.

4.3.3 Construction Process Technicalities

Another significant challenge in adopting green building practices is the complexity involved in the construction processes. According to scholars (Wu et al., 2019), complicated technology and construction techniques in sustainable buildings may significantly increase project complexity. This covers various construction and project management issues, as mentioned by Zhang, Shen, and Wu (2011) and Zhang, Platten, and Shen (2011). These complexities can negatively impact the project management team's overall performance if they are not handled well from the beginning.

The experiences of experts at EXSIM Sdn Bhd reflect this difficulty. EXSIM Sdn Bhd's DCPE 1 commented on how adding green technology often causes delays and complications in project schedules. The primary cause of this complexity is these technologies' advanced and sometimes untested nature. Implementation uncertainties may exist since they are new to the market or have yet to be tried in certain project situations. Further expanding on this, PC1 showed how new energy-efficient technologies may not have extended use histories, necessitating more testing, modification, and backup plans. These unknowns may lead to delays and need more planning, so construction teams must be adaptable as they effectively integrate these green technologies into projects.

Furthermore, a BTE at EXSIM focused on the technical nuances of green building, such as the specific expertise needed for material procurement. Choosing materials for green buildings involves more than just economics; sustainability, life cycle, and environmental effects all need to be carefully considered. When these components are included in the construction process, implementation becomes more complex and time-consuming.

4.3.4 Long Bureaucratic Processes

Lengthy approval procedures have been noted by Zhang et al. (2011) as a significant obstacle in green construction projects; EXSIM Sdn Bhd's experiences support this result. Both BTE 2 and PC3 at EXSIM highlight the complex and multi-phase GreenRE certification process, which involves rigorous compliance checks and necessitates adherence to evolving sustainability guidelines. To comply with this procedure, EXSIM must maintain up-to-date knowledge of the most recent standards and laws at all project stages, from design to construction and operation.

According to PC3, project planning takes significant time due to the multi-stage certification approval procedures. DCP elaborates on this, pointing out that design plans must always be modified to fit changing standards. This often necessitates several redesigns and updates to fulfil the most recent specifications. Furthermore, as a fundamental component of efficient project planning, PE 1 highlights how important it is to be up-to-date with environmental legislation. According to their official website, there are several steps in the GreenRE certification process, from application to final verification, and each one requires close attention to detail and rigorous adherence to regulations.

Figure 4.1 shows the multi-stage GreenRE Certification Process procedure. It starts with the "Application" phase and moves through the following stages: "Pre-Assessment," "Actual Assessment," "Provisional Certification," "Site Verification Assessment," and finally, "Award of Final Certificate" (GreenRE, 2023).

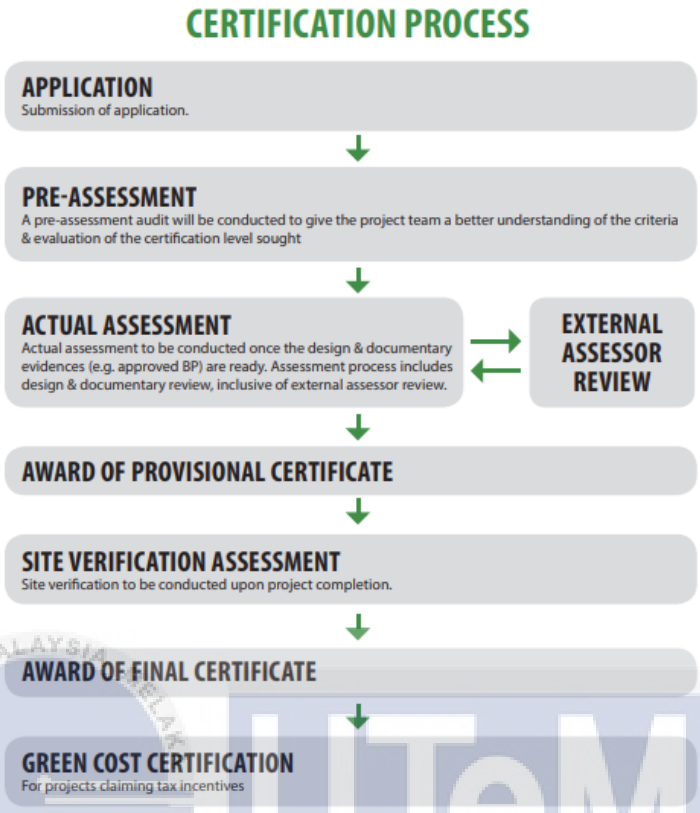

Figure 4.1: GreenRe Certification Process Flowchart

Source: GreenRE. Official Website

In the researcher's view, obtaining a green building certification transcends the mere presence of greenery, such as gardens or trees. It involves a rigorous process where developers must satisfy a stringent and specific set of criteria to be granted such a designation. This certification is reflecting an commitment of the company to environmental stewardship rather than just a few visible green features.

4.3.5 Unfamiliarity with Green Building Technology

The construction industry has a significant problem due to the fast expansion of green building technologies, which necessitates specialists to adjust to innovations constantly. BTE 1 from EXSIM Development Sdn Bhd emphasizes the need for ongoing education and the successful integration of modern technologies into projects. This opinion is supported by BTE 2, highlighting the difficulties brought on by the rapid advancements in green building technology. For example, continual skill and knowledge upgrades are needed to integrate energy-efficient HVAC systems and Building Information Modeling (BIM).

BTE 1 provided an example: The company's technical team had to undergo intensive on-the-job training since the switch to smart energy systems required them to navigate unfamiliar software and hardware. This practical example emphasizes the difficulties in integrating quickly developing technology into green buildings. A proactive strategy for workforce development is necessary in addition to financial investment to keep up with these advancements.

This aligns with the findings from the scholars. According to Silvius et al. (2012), the industry's lack of knowledge of sustainable technology may harm project results and performance. The rapid evolution of green technologies requires a workforce that is skilled and adaptable to new advancements (Sabini,2016). In the researcher's view, successfully implementing new techniques in green construction involves more than just financial resources; it also requires a committed effort to educate and train the workforce so they are prepared to use this new technology.

4.3.6 Inadequate Awareness

PC highlighted a significant obstacle to sustainable building: more awareness among builders and the general public. They observed that many in the sector are reluctant to abandon conventional building techniques because they do not fully comprehend the long-term economic and environmental advantages of sustainable

building. According to DCPE, there is a widespread misperception that green construction is either too expensive or complicated, which often hinders investment and acceptance.

Supporting this viewpoint, Darko (2019) notes that insufficient public education on the benefits of sustainable building exacerbates the problem and suggests that a lack of thorough understanding is a factor in the slow adoption of green methods. Furthermore, Kibert (2016) notes that a lack of knowledge and awareness about the advantages of green building approaches is another reason why many builders are reluctant to participate in sustainable construction.

A 2022 report from Real Estate Asia indicates that Malaysian buyers are willing to pay only a 3% premium for green homes despite the cost of building a green-certified residential building up to 6% higher. This disparity between cost and willingness to pay suggests that the market needs to be fully aware of the benefits of green buildings. According to the report, while sustainability is becoming increasingly important in real estate, Malaysian purchasers are still picky about how expensive green elements should be.

However, SE 2 presented a different viewpoint, suggesting that inadequate awareness might now be the least significant barrier to adopting green building practices. They saw a change in the public's and industry experts' perceptions, with the majority becoming more aware of the long-term advantages of sustainable buildings. Therefore, the increasing familiarity with the benefits of green construction points to a positive trend of increased acceptability and awareness, which may make this task less complicated.

Supporting this positive shift, the rise of green buildings in Kuala Lumpur underscores the enhanced public recognition of sustainable building practices (CIDB Malaysia, 2023). It implies that while a historical obstacle has been a need for more

awareness, continuous educational initiatives are essential to promote the adoption and use of green construction methods.

In the research's opinion, this counterargument shows that the barriers of inadequate awareness among the public that is historically significant are being addressed, reflecting a broader societal shift towards sustainability. This evolving understanding is crucial for the continued growth and implementation of green building practices.

4.3.7 Lack of Financial Incentives from Government

The construction of green buildings is hindered by the need for more sufficient financial incentives from the government, as Jason pointed out (2009). A growing issue facing the sustainable construction sector in Malaysia is the need for substantial financial incentives from the government. Project Executives at EXSIM highlight that while the Malaysian government does provide some incentives for green building, they need to be more impactful to drive the adoption of these practices significantly. They pointed out that the available incentives often fail to offset the additional costs associated with green construction.

BTE 1 cited that the limited scope of tax exemptions provided by the government is a significant hurdle, particularly for smaller firms. According to the report by the Malaysian Green Technology and Climate Change in 2023, this issue is particularly pronounced in Malaysia, despite governmental initiatives such as extending the Green Investment Tax Allowance and Green Income Tax Exemption until December 31, 2025. The fact that green construction approaches still need to be widely adopted suggests that these incentives may need more, as noted by PE 2 from EXSIM.

In contrast, the approach taken by Singapore, as detailed in Baker McKenzie's Global Sustainable Buildings Index, demonstrates a more comprehensive strategy. Singapore offers developers additional gross floor area incentives for achieving specific Green Mark ratings and co-funding energy-efficient upgrades under the Green Mark Incentive Scheme for Existing Buildings. The Singapore government has also allocated funds for research and development in green building technologies and supports training initiatives to develop a skilled workforce in this sector.

Ahzahar et al. (2022) corroborate these findings, identifying high construction costs, limited tax exemptions, and legislative challenges as barriers in Malaysia. This analysis underscores the need for a more strategic and robust approach to financial incentives, drawing inspiration from successful models like Singapore's.

4.3.8 Market Demand and Interest

According to Gou et al. (2013), market interest and demand are crucial in determining the state of green construction. Daniel (2022) further asserts that market demand evolves due to various factors, including technological advancements, policy changes, consumer preferences, and environmental concerns.

Design Control & Planning and Building Technical Executives at EXSIM Sdn Bhd have stressed the need for constant innovation to meet these evolving consumer expectations. They observe that what was considered state-of-the-art a few years ago may now be the minimum standard. The rapid rise in standards demands continuous innovation to maintain competitiveness and satisfy evolving customer demands. Moreover, they note a trend where the demand for green buildings now extends beyond functional benefits to include design and aesthetic appeal. Developers are now giving equal weight to sustainable elements and the design and aesthetics of their buildings as a result of this changing demand.

A 2020 report by Gensler highlights the shift towards multifunctional home office spaces, driven by the rise in remote work, as many people have started working from home. The evolving preferences indicate a dynamic market for green buildings constantly changing in response to societal trends and preferences. In the researcher's opinion, developers have two obstacles due to the shifting market trends: they must constantly innovate and make sure that project offers reflect changing customer preferences. Developers must be flexible and sensitive in an ever-changing market environment to ensure their projects appeal to sustainability in both design and function.

4.3.9 Lack of Sustainable Product Information

A significant obstacle in the sector is the need for more comprehensive and trustworthy information about sustainable building materials and techniques, as Schoggl et al. (2017) and Hakkinen and Belloni (2011) noted. BTE 1 from EXSIM Development Sdn Bhd highlighted this issue, noting the difficulties in accessing information necessary for selecting environmentally friendly materials suitable for Malaysian conditions. This gap in information leads to challenges in making informed decisions critical for sustainable construction projects.

The need for more readily available knowledge on sustainable building techniques was further highlighted by BTE 2 from EXSIM, who noted that the issue extends beyond the technical application of materials. According to BTE 2, the absence of practical, in-depth knowledge about sustainable construction techniques presents a considerable barrier to the effective planning and execution of projects. This underscores the need for more extensive educational resources and training tailored to the industry's specific needs.

Project Coordinator 1 from EXSIM also noted that the absence of a centralized information repository necessitated regular consultations with sustainability experts. This gap highlights the need for a centralized source of information tailored to the local

Malaysian context and affects the overall efficiency and effectiveness of project execution.

4.3.10 Lack of Skill and Expertise

The need for specialized knowledge to use green building techniques is a significant obstacle in sustainable construction. Environmentally friendly building approaches need specialist knowledge and experience, as Chan et al. (2018) and Robichaud et al. (2011) noted. Building Technical Executives at EXSIM Sdn Bhd voiced concerns about the gap between existing professional proficiency and the advanced skills required for implementing green practices. The quickly changing field of sustainable building demands continual education and skill improvement, even with certified staff.

BTE 2 observed that customers' need for eco-friendly features is growing, pushing building companies to keep improving their methods. Agile project management and development are necessary in this changing business environment. EXSIM Sdn Bhd has recognized the need for education in cutting-edge green technology to carry out sustainable projects successfully and keep up to date. To satisfy the growing demand for sustainable building features, construction professionals must have access to opportunities for ongoing professional development, such as seminars and certification programs.

Table 4.2 Thematic Analysis of the Challenges in Adopting Green Building Practices in Residential Projects

Challenge	Theory	Primary Data	Secondary Data
1. Higher Costs of material	McGraw-Hill Construction (2016), Wu et al. (2019): a) Higher initial investment b) Due to the use of sustainable materials.	Project Executive: a) Eco-friendly materials are designed to last longer and have a lesser environmental impact over their lifecycle, which can result in higher initial costs. b) These materials often come with certifications to prove their sustainability, which can add to the cost due to the verification process	Zhang et al.(2011), Hasan and Zhang (2016): b) Green materials are 3–4% more expensive.
2. High maintenance cost	Latief et al. (2017) a) Green buildings may incur higher costs due to the need for regular maintenance.	Building Technical, Design Control & Planning : a) Sustainable features in buildings lead to the increased need for routine maintenance. b) Their specialized nature requires regular planting, irrigation, and care.	Wint.ai (2023): a) The need for specialized maintenance for systems like maintenance for water-saving technologies and high-performance equipment requires additional expenses.
3. Construction process technicalities	Wu et al. (2019): The innovative nature of sustainable designs, which often involve new, sometimes untested construction methods and materials.	Design Control & Planning : a) Specialized knowledge needed for energy modeling and material sourcing. b) Complicate project timelines due to their advanced nature.	Zhou (2020): Quality management must address unnecessary operations, emphasizing the technicalities involved in sustainable construction practices.

4. Long Bureaucratic Processes	Zhang et al. (2011): Lengthy approval for project acceptance.	Project Coordinator: Keeping up with constantly changing standards causes delays. Senior Executive : Multi-stage certification approval processes add considerable time to project planning.	Green Real Estate (GreenRE) Website: Certification Process Flowchart
5. Unfamiliarity with Green Building Technology	Sabini (2016): Rapid evolution of green technologies requires a workforce that is skilled and adaptable to new advancements.	Building Technical Executive: a) Constant technology changes require continuous learning and effective integration into ongoing projects. b) Integrating smart building technologies needs continual skill updates.	Darko et al. (2018) a) Lack of familiarity with these technologies affects project outcomes.
6. Inadequate awareness	Darko (2019), Kibert (2016) Lack of knowledge about the benefits of green building among the public.	Project Executive: a) A lack of understanding among the public of the long-term benefits. b) Led to hesitation to invest in green residential.	Real Estate Asia (2022): Malaysians are only willing to pay a 3% premium for green homes. However, the cost to construct these green-certified homes is actually up to 6% higher.
7. Lack of Financial Incentives from Government	Jason (2009): The absence of government incentives hinders green building development.	Project Executive, Project Coordinator: a) The limited scope of tax exemptions b) Need to be more impactful to drive the adoption of these practices significantly..	Baker McKenzie's Global Sustainable Buildings Index:: a) Singapore offers developers additional gross floor area and co-funding energy-efficient upgrades.

8. Evolving Market Trends	Daniel (2022): a) Markets evolve due to various factors b) technological advancements, policy changes, consumer preferences, and environmental concerns.	Design control and planning, Building Technical: a) What was considered state-of-the-art a few years ago may now be seen as the minimum standard, pushing them to innovate and adapt to newer, higher standards constantly. b) Consumers are not only interested in the functional aspects of green buildings but also in their design and aesthetic.	Gensler (2020) With more people working from home, there has been a shift towards consumer demand for home office spaces.
9. Lack of Sustainable Product Information	Schoggl et al. (2017); Hakkinen and Belloni (2011): Difficulties faced due to a lack of information on sustainable materials and methods.	Project Executive: The challenge of easily accessible sustainable product information complicates project planning and sustainable practice implementation.	CIDB's National Construction Policy 2030: Emphasizes the importance of adopting technologies like BIM for improved project management.
10. Lack of Skill and Expertise	Chan et al. (2018): Lack of professional knowledge and training in sustainable processes in developing countries. Robichaud et al. (2011): Dependence on training for sustainable building processes.	Building Technical Executive: a) Professionals feel they are not equipped to implement green practices. b) Consumers demand more innovative sustainable features, which require continuous improvement of their practices to meet these expectations.	UNCTAD (2023): The need to strengthen capacities in developing countries for sustainable development.

4.4 Strategies to Overcome the challenges in green building adoption

The second objective of this research was to investigate strategies to overcome the challenges in green building adoption. This section discusses the strategies employed by EXSIM Development to address the challenges. These strategies include innovative financial tools, comprehensive workforce training, active legal department engagement, diverse project development, and initiatives to raise public awareness.

4.4.1 Partnership and Collaboration with Financial Institutions

In addressing the financial challenges of green building adoption, EXSIM Development's approach demonstrates a notable shift from traditional strategies highlighted in Chapter 2. While the literature review emphasized the role of government incentives in promoting green building adoption, as noted by Tabatabaee et al. (2019) and Mahdiyar et al. (2020), EXSIM has adopted innovative financial tools like the **SRI Sukuk Programme and Green Financing with HSBC Amanah.**

4.4.1.1 Sustainable and Responsible Investment (SRI Sukuk Programme)

In addressing the financial challenges, SE 2 noted that EXSIM Development has strategically utilized the Sustainable and Responsible Investment (SRI Sukuk Programme) introduced by the Securities Commission Malaysia. According to Capital Markets Malaysia (2024), this program was designed to facilitate financing for projects that contribute to achieving the Sustainable Development Goals (SDGs) and also adhere to the principles of Environmental, Social, and Governance (ESG). The launch

of the SRI Sukuk Framework is to promote socially responsible financing and investment. It represents part of the Securities Commission's developmental agenda to facilitate a conducive ecosystem for SRI investors and issuers. It is also in sync with the rising global trend of green and social impact bonds to promote sustainable and responsible investing (Capital Markets Malaysia, 2024).

According to a press release of EXSIM in 2020, the company has successfully established an RM3 billion sukuk program, including an RM2 billion Islamic Medium-Term Note (IMTN) and an RM1 billion Islamic Commercial Papers (ICP), which has been pivotal in addressing the capital requirements for the company's sustainable projects. The Edge Prop (2020) reported that United Overseas Bank (M) Bhd (UOB Malaysia) has been appointed as the principal advisor and lead arranger, alongside Danajamin Nasional Bhd, providing guarantees and liquidity facilities for the first tranche of the programs.

As per The Edge Malaysia (2022), UOB Malaysia's Deputy Chief Executive Officer, Ng Wei Wei, expressed the bank's commitment to supporting EXSIM's ESG agenda, emphasizing their dedication to assisting the company in driving green and sustainable projects for homebuyers. She further explained the UOB's Sustainable Finance Framework for Green Building Developers and Owners, aiming to help Asian companies progress responsibly while reducing their carbon footprint. This initiative enabled EXSIM to address capital requirements for their sustainable projects, including refinancing existing projects, land acquisition, and maintenance of working capital (The Edge Malaysia, 2022).

The Managing Director of EXSIM, Lim Aik Hoe, has emphasized the strategic importance of these programs, stating: "These Sukuk programs will power EXSIM's growth and provide liquidity for future projects, ensuring value for our stakeholders" (The Edge Prop, 2020). His words underscore the significance of this innovative financial structure in catalyzing EXSIM's journey toward achieving its sustainable development aspirations.

Furthermore, in a media release of Securities Commission Malaysia in June 2022, the SRI Sukuk Programme expanded under the Securities Commission's SRI-linked Sukuk Framework to include SRI-linked Sukuk issuers. This expansion allows companies like EXSIM to offset significant external review costs, encouraging carbon-intensive industries to transition towards improved sustainability practices. This move supports Malaysia's commitment to a low-carbon and climate-resilient economy and underscores the evolving nature of the financial sector's role in fostering sustainable development (Securities Commission Malaysia, 2022).

Figure 4.2: Signing Ceremony of RM3 billion sukuk programme between EXSIM Group, UOB Malaysia and Danajamin.

Source: (The Edge Prop, 2020)

This financing strategy aids EXSIM in meeting capital expenditure and working capital needs for their new and existing projects. This method provides the necessary liquidity for EXSIM's sustainable development projects, demonstrating an effective solution to overcome the financial challenges in green construction.

4.4.1.2 Green Loans/Financing – HSBC Amanah

In a strategic move to overcome financial barriers in sustainable construction, EXSIM Development has strategically partnered with HSBC Amanah. A notable example, as shared by Senior Executive 2, is 'The Stallionz @ Ipoh White Times Square', which received a provisional GreenRE gold certification as stated on their official website. In an article of HSBC in 2023, this project has been partially funded through the Commodity Murabahah Financing facility offered by HSBC Amanah, which focuses on financing EXSIM projects that comply with Environmental, Social, and Governance (ESG) principles. This collaboration represents a shared commitment to sustainability between EXSIM and HSBC Amanah other than financial support. The executive further notes that this form of Green Islamic financing is crucial for EXSIM to navigate the upfront investment challenges encountered in their green construction.

According to the article by MarketScreener in 2021, the Green Trade Finance proposition by HSBC Amanah includes Islamic trade finance products such as Islamic Documentary Credit, Bank Guarantee, and Clean Import Financing. These products aim to promote the integrity and transparency of green trade finance products by setting the standard for green financial solutions. This proposition also aligns with the Sustainable Development Goals (SDGs), demonstrating HSBC Amanah's commitment to financing projects contributing to a sustainable future.

4.4.2 Training and Education

In the journey to adopt and integrate green building practices effectively, one of the critical challenges identified is the skill gap in green building technologies and a general unfamiliarity with these practices. EXSIM Development has significantly emphasized 'Training and Education' for its workforce to address this. This section

explores the dual strategies implemented by EXSIM: 'Training and Certification Programs' and 'Hands-on Learning and Mentorship,' highlighting how they collectively work to bridge the knowledge and skill gap within the organization.

4.4.2.1 Training and Certification Programs

EXSIM Development recognizes the critical role of continuous education in bridging the skill gap in green building technologies. According to PE 1, the company has embraced a comprehensive approach by actively participating in training programs provided by the Green Building Index (GBI) and GreenRE. BTE explained that these programs are designed to keep EXSIM's workforce abreast of the latest advancements and standards in green building, ensuring that their team is knowledgeable and proficient in contemporary sustainable construction practices.

DCPE 1 at EXSIM underscores the importance of these training sessions in equipping staff with advanced skills in sustainable design and green technology. This approach is crucial for tackling the intricacies of green construction, ensuring that the workforce can effectively adapt to and implement the industry's evolving requirements. Moreover, DCPE 2 highlights the role of the Malaysia Green Building Council's training programs in informing the workforce about the constantly evolving regulations and standards in green building. Such educational initiatives are crucial to navigating green construction's legal and technical dimensions, ensuring compliance with ever-changing green building standards.

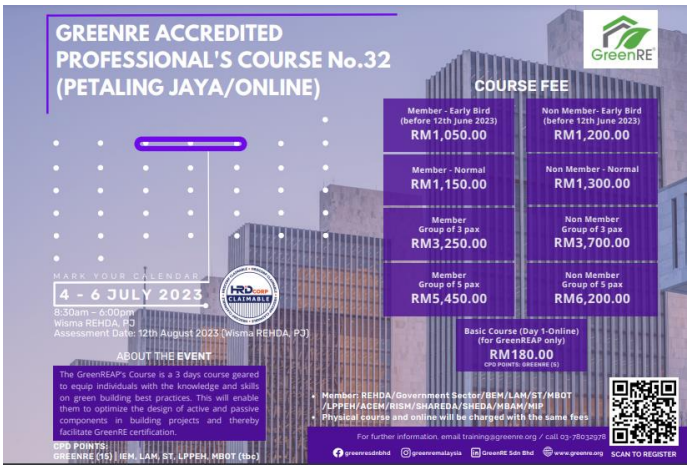

Figure 4.3: "GreenRE Accredited Professional's Course No.32 Flyer."
Source: GreenRE official website, 2023.

Figure 4.4: "Innovation and Technology in Green Building Seminar Flyer."
Source: MalaysiaGBC, 2022.

These training initiatives collectively enhance EXSIM's ability to implement and sustain green building practices efficiently, thus overcoming the workforce skills gap in this rapidly evolving sector.

4.4.2.2 Hands-on Learning and Mentorship

Complementing formal training, EXSIM has also implemented an on-the-job training and mentorship program, as highlighted by PC 1. This program strategically pairs less experienced staff with seasoned professionals on actual green building projects, offering a hands-on learning experience. This practical approach allows newer team members to acquire sustainable construction methods from experts directly, fostering an immersive and experiential learning environment. PE 2 noted that EXSIM ensures that this mentorship effectively translates theoretical knowledge from training programs into practical skills. Such a strategy fills the existing skills gap. It prepares its workforce for future challenges in green building, ensuring that EXSIM stays at the forefront of sustainable development in the industry.

In the researcher's opinion, training and education strategies implemented by EXSIM Development are more than just tactical responses to the immediate skill gaps identified in the green building sector. They represent a strategic investment in human capital, which is essential for the industry's sustainable growth. The commitment to continuous professional development through training and certification programs and the practical application of skills through mentorship exemplifies a forward-thinking approach. It prepares the workforce for the current technological and regulatory landscape and equips them with the adaptability required for future advancements in green building practices.

4.4.3 Legal Department Engagement for Regulatory

As mentioned by the Project Coordinator at EXSIM, the company has a dedicated legal department to navigate the complex legal landscape in sustainable development. The legal department's involvement in regulatory matters addresses the

challenge of long bureaucratic processes, ensuring compliance with green building certifications and regulations. This department plays a vital role in ensuring that EXSIM's green building projects adhere to the latest regulations and standards. With a team of seasoned legal professionals, the legal department provides oversight and guidance to maintain compliance with the Green Building Index (GBI), GreenRE standards, and other relevant environmental laws.

As elaborated by a Project Executive, the department is actively involved in liaising with consultants on technical aspects of projects and reviewing designs to ensure they align with EXSIM's sustainability goals and regulatory requirements. Their duties also encompass managing crucial documentation and facilitating effective communication among various stakeholders. This comprehensive involvement is pivotal in maintaining the legal governance of the company's operations in green building.

EXSIM's commitment to sustainable practices is further evidenced by its strategic pursuit of green building certifications. The successful attainment of multiple Green Real Estate (GreenRE) and Green Building Index (GBI) certifications for their projects, as shown on their official website, stands as a testament to the effectiveness of their legal department in ensuring compliance with evolving sustainability guidelines. These certifications are not merely accolades but tangible evidence of EXSIM's commitment to environmental responsibility.

Figure 4.5 shows some of their residential projects that obtained GreenRe certification. The specific details of these certifications, including the projects that have been certified, can be found on EXSIM's official website, which serves as the source for this information.

Figure 4.5: GreenRE Certifications awarded to EXSIM's Residential Projects. - D'Terra Residences, D'Vine Residences, Nidoz Residences @ Desa Petaling, and D'Clover Residences.

Source: EXSIM official website

The researcher opines that the legal department's active involvement in obtaining multiple Green Real Estate (GreenRE) and Green Building Index (GBI) certifications for their projects clearly indicates their effectiveness. These certifications are more than accolades; they are tangible evidence of EXSIM's commitment to environmental responsibility. EXSIM's legal strategy is essential for maintaining trust and confidence among consumers and industry partners in an industry driven by eco-friendly demands.

4.4.4 Strategic Project Diversification to Address Evolving Market Demands and Interests

In response to the evolving trends and diverse preferences in the real estate market, EXSIM Development has developed a broad portfolio of projects, each tailored to different market segments. As outlined by DCPE 2 at EXSIM, this strategy addresses the challenge of dynamic market demands and interests, demonstrating EXSIM's adaptability and foresight in the rapidly changing landscape of green

building. This approach to project diversification is not covered in the literature review of Chapter 2, showcasing an innovative strategy in the sustainable construction sector. The implementation of this strategy by EXSIM Development may serve as a valuable case study for future academic research in sustainable construction.

a) The Rainz Residence: A Nature-Centric Approach

As shared by Desing Control & Planning of EXISM, one of the standout projects in EXSIM's portfolio is 'The Rainz Residence.' This project embodies a nature-centric approach, catering to a segment of urban residents who prioritize green living spaces. Designed to focus on wellness, 'The Rainz Residence' integrates herb gardens, outdoor gyms, forest trails, scented gardens, and reflexology paths (EXSIM Development, 2018). DCP 1 highlights that these amenities align with the growing preference for wellness-oriented urban living spaces and emphasize a deep connection with nature. Setting 'The Rainz Residence' apart as an exemplar of sustainable urban living is integrating a rainforest-themed landscape that provides a unique, resort-like environment.

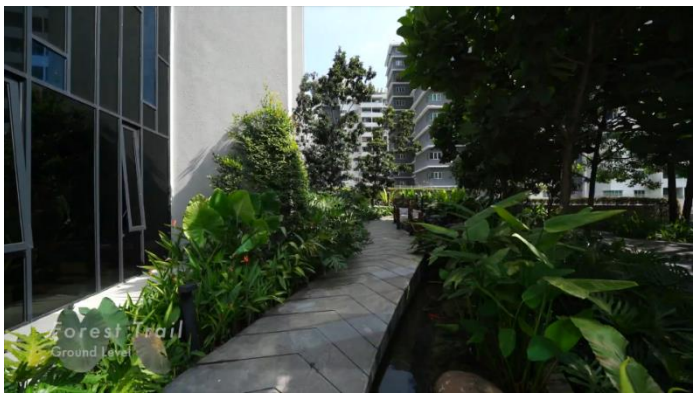

Figure 4.6: Forest Trail at The Rainz Residence
Source: EXSIM Development Sdn. Bhd. Official Website

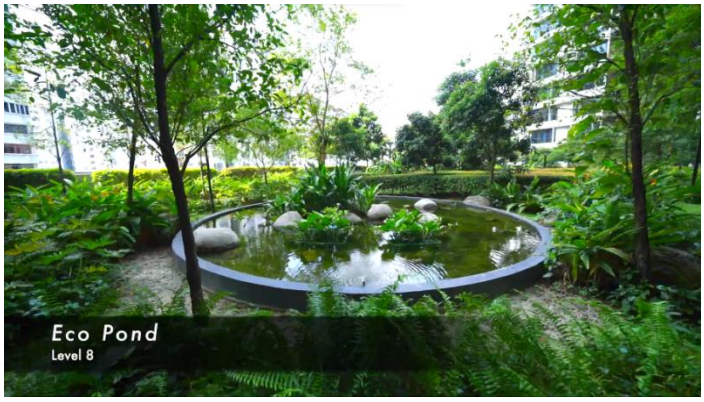

Figure 4.7: Eco Pond at The Rainz Residence
Source: EXSIM Development Sdn. Bhd. Official Website

Figure 4.8: Rainforest-themed Landscape of The Rainz Residence.
Source: EXSIM Development Sdn. Bhd. Official Website

b) The Fiddlewoods: Luxury and Global Culture

In contrast, DPC 2 provided another residential project, 'The Fiddlewoods, ' which targets a different consumer base, focusing on luxury and global cultural themes. This project exemplifies EXSIM's ability to cater to luxury-seeking urban dwellers, offering exclusive experiences and high-end lifestyle amenities. Features like the Santorini 360 Degree Sky Pool, Switzerland Thermal Sky Bath, Moroccan Sky

Lounge, and Japan Sakura Inspired Garden are designed to evoke a sense of global travel and cultural immersion right within the residents' living spaces (EXSIM Development, 2022). 'The Fiddlewoods' is a testament to EXSIM's versatility in project development, appealing to a niche market segment that values exclusivity and unique experiences.

Figure 4.9: Artist's Impression of the Japan Sakura Inspired Garden at The Fiddlewoods residence

Source: EXSIM Development Sdn. Bhd. Official Website

Figure 4.10: Artist's Impression of the Moroccan Sky Lounge at The Fiddlewoods residence

Source: EXSIM Development Sdn. Bhd. Official Website

Figure 4.11: Artist's Impression of Santorini 360 Degree Sky Pool of The Fiddlewoods residence
Source: EXSIM Development Sdn. Bhd. Official Website

In the researcher's opinion, EXSIM's strategy of developing diverse projects, ranging from eco-conscious to luxury-focused developments, is a robust response to the varied market demands. This approach demonstrates an understanding of consumer needs and showcases EXSIM's commitment to innovation and adaptability. EXSIM enhances customer satisfaction and loyalty by offering a spectrum of projects that can maintain a competitive edge in the green property development sector. Such diversity in project development is essential in an industry increasingly influenced by shifting consumer preferences.

4.4.5 Elevating Green Consciousness Through Education

PE 1 highlighted that in their effort to elevate green consciousness through education, EXSIM Development has played a pivotal role as the Platinum Sponsor for the 13th and 14th International Conference on World Class Sustainable Cities (WCSC) in 2022 and 2023. This strategic involvement primarily targets inadequate public awareness regarding sustainable construction practices. As noted by PE 2, their active participation in these conferences has been instrumental in enhancing understanding

and promoting sustainable urban development practices. This was notably emphasized in the works of AlSanad (2015) and Chan et al. (2017), who stressed the need for information exchange and education programs to familiarize stakeholders with green construction. EXSIM's sponsorship and participation in WCSC align with these recommendations, showcasing a practical approach to enhancing understanding and promoting sustainable urban development practices.

The 13th WCSC, themed 'KL2040: Towards A Liveable Urban Future' (Pertubuhan Akitek Malaysia, 2022), and the 14th conference themed 'Resilient Urbanisation: Planning Towards Malaysia Madani' (Pertubuhan Akitek Malaysia, 2023). These conferences provided essential platforms for dialogue and learning about resilient, sustainable, and livable cities, aligning closely with EXSIM's commitment to sustainability. EXSIM's ongoing support for these conferences demonstrates their proactive role in promoting sustainability and addressing the awareness gap in green building practices.

Figure 4.12: 13th International Conference on WCSC 2022
Source: FuturArc (2022)

Figure 4.13: 14th International Conference on WCSC 2023

Source: Business Today (2023)

Reinforcing this approach, Golbazi et al. (2020) noted that individuals' awareness and knowledge about green buildings significantly influence their willingness to pay a premium. As consumers become more familiar with the advantages of green buildings, they are inclined to pay a higher price premium, a point that DCP 3 has echoed. This insight highlights the critical role of educational and awareness-raising efforts in enhancing consumer willingness to invest in green buildings in Malaysia. Therefore, targeted educational and awareness-raising efforts are the key to increasing consumer willingness to invest in green buildings in Malaysia.

CHAPTER 5

CONCLUSION AND FUTURE WORK

5.1 Introduction

Two key objectives of this research are identifying challenges in adopting green building practices and investigating strategies to overcome these in EXSIM Sdn Bhd's residential projects. This chapter synthesizes the findings from previous chapters, discussing how the identified challenges impact green building practices and how the proposed strategies address these issues. It also explores the broader implications of these findings for sustainable construction and proposes recommendations for future research.

5.2 Challenges in Adopting Green Building Practices in Residential Projects

Several key areas have been identified in concluding the analysis of challenges in adopting green building practices in residential projects. One of the challenges is the elevated initial costs. Professionals from EXSIM Sdn Bhd pointed out that green buildings often have higher upfront expenses due to the complexities of sustainable

design and eco-friendly materials. However, while these costs pose a barrier, some respondents also emphasized the long-term economic and environmental benefits, suggesting a need for a broader perspective on the value of green buildings.

Moreover, the maintenance of green buildings presents additional financial challenges. Sustainable features like living walls or advanced water-saving technologies require specialized maintenance, contributing to the higher costs of green building upkeep. The complexity of construction processes in green buildings was highlighted as a critical challenge. This complexity stems from integrating advanced technologies and specialized methods, often complicating project management and execution.

Lengthy bureaucratic processes were identified as a substantial hurdle, particularly in obtaining green building certifications. The multi-stage certification processes, like GreenRE, demand meticulous attention and compliance with evolving standards, posing challenges for project teams. Another challenge the building professionals emphasize is a notable skills gap in green building technologies. The rapidly advancing field requires continuous learning and adaptation. Additionally, inadequate awareness among builders and the broader community about the benefits of sustainable construction was noted, often leading to hesitancy in departing from traditional construction methods.

The absence of financial incentives from the government also poses a significant challenge, especially when compared to more comprehensive approaches seen in countries like Singapore. The dynamic nature of market demand and interest, with evolving consumer preferences, demands ongoing innovation and adaptability from developers. Lastly, the limited access to detailed information on sustainable construction materials and methods was recognized as a challenge, affecting the effective planning and execution of green projects.

5.3 Strategies to Overcome the Challenges in Green Building Adoption

EXSIM Development has effectively utilized financial instruments such as the Sustainable and Responsible Investment (SRI Sukuk Programme) and partnerships with financial institutions like HSBC Amanah for Green Financing. These initiatives provide the capital for sustainable projects, overcoming the significant financial barriers typically associated with green construction. The SRI Sukuk Programme, aligned with the Sustainable Development Goals (SDGs) and Environmental, Social, and Governance (ESG) principles, and the Commodity Murabahah Financing facility by HSBC Amanah are examples of EXSIM's innovative approaches to financing.

EXSIM has invested heavily in training and education to address the technical complexities and skill gaps. The company's participation in programs offered by the Green Building Index (GBI) and GreenRE and its focus on hands-on learning and mentorship illustrate its commitment to equipping its workforce with the necessary skills and knowledge for sustainable construction.

To ease the regulatory and bureaucratic constraints, the involvement of EXSIM's legal department in navigating the complex regulatory landscape of sustainable development has been crucial. Their role in ensuring compliance with green building certifications and regulations and their proactive participation in various aspects of project development highlight the importance of legal governance in sustainable construction practices.

EXSIM's strategic diversification of projects, catering to different market segments with a focus on sustainability, demonstrates its adaptability and innovation. Projects like 'The Rainz Residence' and 'The Fiddlewoods' showcase EXSIM's ability to blend eco-conscious features with luxury and cultural themes, responding effectively to evolving market demands and interests.

Lastly, EXSIM's involvement in educational initiatives, such as its sponsorship of the International Conference on World Class Sustainable Cities, underscores its commitment to raising public awareness about sustainable construction practices. These efforts contribute to increasing consumer knowledge and acceptance of green buildings and position EXSIM as a leader in promoting sustainability in the real estate sector.

5.4 Contribution of Study

The foundational research framework established in Chapter 2 laid the groundwork for understanding the challenges and strategies associated with adopting green building practices. This study has expanded upon that foundation by exploring the specific challenges and strategies implemented by EXSIM Sdn Bhd, offering rich empirical insights that deepen our understanding of sustainable construction in practice. This case study analysis has provided detailed insights into the operational challenges, market responses, and strategic decisions underpinning the adoption and implementation of green practices. The findings from this study serve as a valuable reference for other companies seeking to navigate the complexities of sustainable construction within Malaysia. They could be adapted for use in similar international markets.

Moreover, the strategies identified through this research offer actionable guidance for construction companies facing similar barriers. These strategies, as exemplified by EXSIM Development, have been synthesized into a strategic framework that other firms can use as a reference. The framework's adaptability is crucial, enabling companies to tailor the strategies to their unique circumstances while adhering to the fundamental principles of sustainable construction.

5.5 Future Recommendation

Building upon the findings of this study, which concentrated on adopting green building practices within EXSIM Development Sdn Bhd's residential projects, a recommendation for future research can be proposed to broaden the understanding and application of sustainable construction in Malaysia. Future research should extend the investigation of green building practices to encompass a broader range of building types beyond residential units. This includes delving into the sustainability initiatives within commercial buildings, office spaces, and industrial facilities. Each building type presents its design challenges, usage patterns, and environmental impacts, requiring tailored green building strategies.

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APPENDICES

APPENDIX A: GANTT CHART FOR FINAL YEAR PROJECT (PSM 1)

	Gantt Chart for PSM 1																3 month semester break
	March				April				May				June				
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Mid-sem break	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Study Week	
Task																	
(Topic/RQs/ROs), Research Framework																	
Introduction																	
Writing Chap 1 (Introduction)																	
Completion Chap 1 (Introduction)																	
Literature Review (LR)																	
Writing Chap 2 (LR)																	
Completion Chap 2 (LR)																	
Research Method																	
Writing Chap 3 (Research Method)																	
Completion of Chap 3 (Research Method)																	
Questionnaire Construction																	
Completion of Questionnaire Construction																	
Data Collection																	
Completion of Questionnaire Construction																	
Data Analysis																	
Completion of Data Analysis																	
Chapter 4																	
Chapter 5																	

APPENDIX B: GANTT CHART OF FINAL YEAR PROJECT (PSM 2)

	Gantt Chart for PSM 2															
	October				November				December				January			
	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Mid-sem break	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Study Week
Task																
Discussion & Analysis																
Write up Chap 4 (Discussion & Analysis)																
Writing Chap 1 (Introduction)																
Completion Chap 4 (Discussion & Analysis)																
Conclusion																
Writing Chap 5 (Conclusion)																
Completion Chap 5 (Conclusion)																
Edit the entire dissertation																
Proof read the entire dissertation																
Intend submission and ready for presentation																
Presentation																

APPENDIX C: QUESTIONNAIRES

INTRODUCTION OF THE INTERVIEW

<< READ OUT TO RESPONDENT>>

Thank you for participating in this interview.

The purpose of my research is to explore the challenges and strategies associated with adopting green building practices within the Malaysian construction industry, with a specific focus on EXSIM Development Sdn Bhd. Your insights are invaluable to deepen the understanding of this topic and contribute to the findings of this study.

I will document all your responses, and, with your consent, I would like to voice record our conversation to ensure accuracy in capturing your valuable inputs. Please be assured that all information you provide will be confidential and used for academic and research purposes.

I encourage open discussions during this interview. If at any point you have questions, need clarifications, or feel uncomfortable with any topic, please feel free to communicate this. Your comfort and willingness to participate are of paramount importance to me.

The interview is anticipated to last about 30 minutes. Thank you once again for your participation and valuable contributions to this research. If you are ready, let us begin the interview session.

QUESTIONNAIRE:

1. What are the challenges EXSIM face in adopting green building practices in the residential project?

2. Which challenge have the most significant impact on EXSIM's residential project?

3. Why do this challenge exist ?

4. How do this challenge impact EXSIM's overall green building initiatives?

5. Which green building practice has the greatest challenge for EXSIM to implement within the residential projects?

6. Which residential projects of EXSIM have obtained certification for green building practices?

7. When did EXSIM start incorporating green building practices in their residential projects?

8. What guidelines does EXSIM refer to when assessing the appropriateness of green building practices?

9. What are the strengths of EXSIM in implementing green building practices?

10. What strategies have implemented to overcome the challenges?

11. What other strategies currently exploring to enhance the adoption of green building practices in their residential projects?

12. Which strategy has been identified as effective in addressing the challenges?

13. How does this strategy contribute to overcoming the challenge?

APPENDIX D: PHOTO WITH RESPONDENTS FROM EXSIM SDN. BHD