BARRIERS IN IMPLEMENTING THE GREEN BUILDING CONCEPT IN GREATER KUALA LUMPUR

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DECLARATION

I hereby declare that:

(1) This Research Project is the end result of my own work and that due acknowledgement has been given in the references to all sources of information be they printed, electronic, or personal.

(2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

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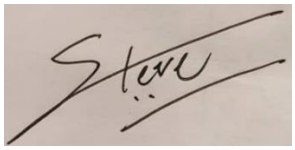
Signature: 

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LIST OF ABBREVIATION

ACEM	Consulting Engineers Malaysia
BEI	Building Energy Index
BIPV	Building With an Integrated Photovoltaic
BREEAM	United Kingdom Building Research Establishment Environmental Assessment Method
EE	Energy Efficient
GBI	Green Building Index
GEO	Green Energy Office
IEQ	Indoor Environmental Quality
LEO	Low Energy Office
PAM	Pertubuhan Akitek Malaysia
PTM	Pusat Tenaga Malaysia
RE	Renewable Energy
REHDA	Real Estate and Housing Developers
SEDA	Sustainable Energy Development Authority
SPSS	Statistical Package for The Social Sciences
VOC	Volatile Organic Compounds
ZEB	Zero Energy Building
ZEO	Zero Energy Office

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Abstract

This paper investigates the barriers to implementing the green building concept in Greater Kuala Lumpur. The study aims to determine the relationship between internal and external factors that influence the development of the green building concept in Malaysia, identify the most challenging factors across industry players in Greater Kuala Lumpur, and propose strategies to encourage industry players to adopt the green building concept in the future. The research involved 100 respondents and revealed that various factors create a barrier to the development of the green building industry in Malaysia. The study recommends that all stakeholders in the construction industry take responsibility for promoting green building practices, including architects, property agents, the government, universities, and customers. Creating an ecosystem where all stakeholders work together can enhance the development of the green building industry in Malaysia and promote a sustainable environment while contributing to economic growth.

CHAPTER I

INTRODUCTION

1.0 Introduction

This chapter will deliver the background of the research and the outline of the study. In the research, the designates process including the problem statement aims to study, research question, and research objectives.

1.1 Background of the study

The awareness of the green environment is growing rapidly among people. The history of green buildings is short since the year the 1970s. Malaysia is a country having plenty of intensity resources to generate energy and conveniently deliver to Malaysians. The efficiency of energy may lead households and commercials to cut their dependency on electricity reliance. The efficiency of energy usage enhance may reduce the energy shortage, flattening the rising of energy expenses, and reduce pollution to the environment. Solar energy has promoted by Henri Becquerel during the age of the industrial revolution in human civilization. The theory of photovoltaic power (Solar power) is converting the energy generated by the sun to steam power. During the year of 1950s, photovoltaic energy was used on a small scale and reflected a solution of research and design solar panels in our modern days. Besides that, green builders had made deeper research into optioning building materials to make a building Eco-friendly to our environment. The material used in a building is a major impact on global resource preservation. Although green buildings had gone through a few decades, green technologies are still a new concept in the construction field (Patsalides, 2011).

According to Yudelson and Kruger & Seville (2012), a green building is considered a high-performance property. This is due to, green buildings requiring complicated design factors, construction methods, and maintenance techniques to lower the pollution of our environment. Green buildings can increase the conservation of global resources, lower the rate of environmental pollution, and give a healthy environment to humans.

In terms of analyzing green building performance, the European nation developed its assessment tool, **"Leadership in Energy and Environmental Design,"** in the past decade. Whereas the United State of America is the first mover in adopting the green building concept around the globe. Japan had also developed its green building rating system to transform its building industry (Yudelson, 2008). Each of these nations has a different standard for the building to achieve the rating, depending on the climate of the nation, location, and the surrounding environment.

Malaysia has 2 green rating system, which is GreenRE by the Real Estate and Housing Developers (REHDA) and Green Building Index (GBI) by Pertubuhan Akitek Malaysia (PAM) and Consulting Engineers Malaysia (ACEM). GreenRE is the initial idea of the real estate segment in Malaysia. This ingenuity is encouraging housing developers in Malaysia to build greenhouses by inputting renewable energy technology into residential properties properly allocating the direction of shading and positioning of the building to decrease the consumption of the artificial cooling system and opting for passive design. GBI is a Green Rating Tool more focuses on commercial property. It is a profession-obsessed ingenuity to lead the Malaysian Building industry in an Eco-friendly direction. In Malaysia, GBI received support from Malaysia's market building and property players, which planned to encourage sustainability in the environment and increase awareness among field players, such as; developers, architects, engineers, planners, designers, contractors, and the public regarding the environment matters (Tan, 2019)

A decade ago, Malaysia launched the first green-rated office building, Pusat Tenaga Malaysia (Malaysia Energy Centre). Pusat Tenaga Malaysia is as known as the Zero Energy Office (ZEO) (Green Building Index, 2019). ZEO is located at Bandar Baru Bangi, Kajang, Selangor with a 5-acre plot. ZEO was designed according to the various principal, to achieve the 35kWh/m2 annual energy consumption by maximizing the usage of renewable energies.

- Consume minimal electrical energy
- Minimal wastage
- Zero blackout
- Sustainable energy
- Connected grid

Pusat Tenaga Malaysia signified that; the building energy consumption is not consumed more electrical energy than what is produced in the building by renewable energy sources. It accomplished the BEI guidelines which were developed by the Ministry of Energy, Telecommunication & Post (2009). The BEI had set an Energy Efficient building energy consumption ceiling guideline with an index of 135kWh/m2 per annum. Hence, it shows a greater performance compared to LEO buildings in Malaysia, by having an Energy Efficient Index 100kWh/m2 annually. Pusat Tenaga Malaysia Zero Energy Office was the first of its kind of categories in South East Asia.

Green Building Concept is proposed to transform the energy efficiency building to another level. The building industry is a complex environment, due to every individual having their own experiences with their approach and knowledge of the intensity and efficiency of building design (Yang & Becerik-Gerber, 2016). Due to the complex environment, Stephenson, (2017) highlighted that energy-efficient technology has a high chance of failure, a reason for the operator's perception of decision-making.

1.2 Problem statement

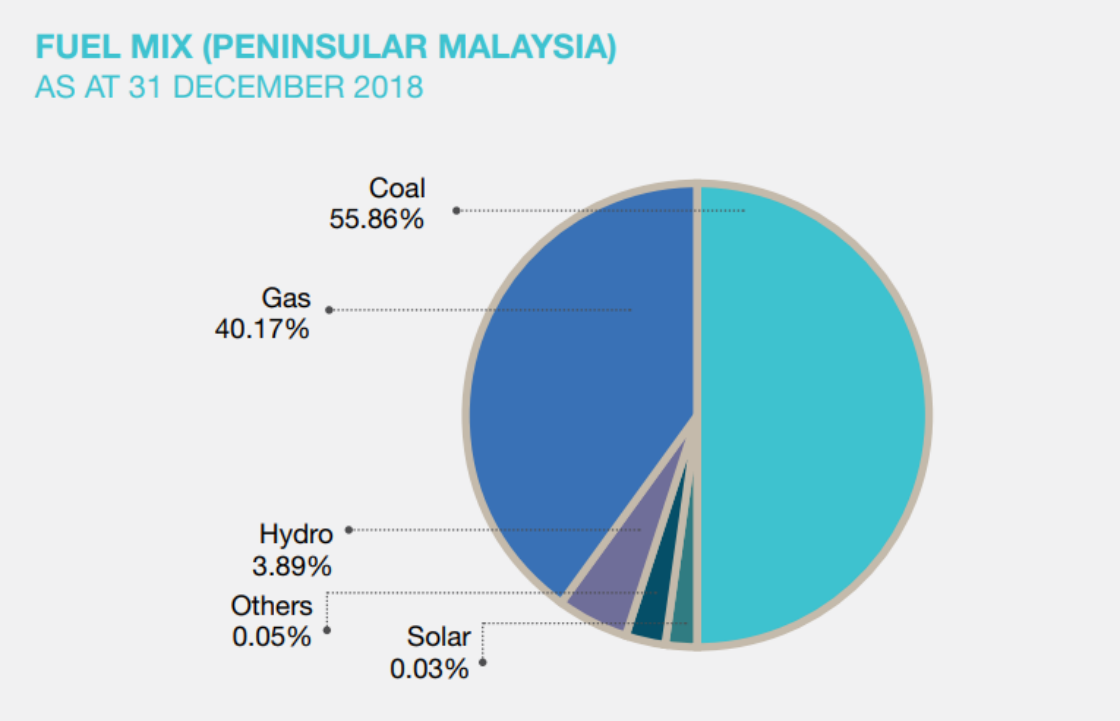
The greenhouse effect on the environment is the main concern of every nation across the globe, due to the universal warming paradox. The Green building concept is relatively new in Malaysia. People in Malaysia lack awareness of the existing green building technology construction in Malaysia.

Sustainable development is one of the important criteria in the current modern era, natural resources are limited and unrenewable. Hence, the awareness and importance of green building must be speeding up spreading toward everyone in the nation. According to Sim & Putuhena, (2015) government, agencies formed SEDA (Sustainable Energy Development Authority) and GBI (Green Building Index) to commit a sustainable development in the future. The Malaysian government has an interest in implementing the green building concept towards all the players in the field, Malaysia is lacking behind the green building concept, compared to other nations in Asia.

In Malaysia, office buildings require approximately 245kWh/m2 energy per annum to operate, and more than 60% of this energy is consumed by air-conditioning operations, ±15% for lighting, and ± 25% for other office appliances. Malaysian office buildings have a high energy consumption on lighting during daytime due to the design of minor natural daylight allowances. Furthermore, the energy consumption in an office building goes to life operation, escalators, and office equipment. In the comparison with the PTM ZEO building, the design and energy-efficient system managed the building's 35kWh/m2 consumption per annum. Green Building Concept is playing an important role while the energy consumption of the building is increasing and causing pollution to our environment by releasing CO2 into the air at the power plant.

According to the chart bellowed provided by TENAGA NASIONAL, (2018) power generation by energy fuel mix source in Peninsular Malaysia.

Figure 1.1: TNB Energy to Sustain Communities



Source: Tenaga National Berhad (2018)

The figure above shows the reading from Tenaga National Berhad 2018, which is the main Malaysia electricity distributor. The pie chart shows there is 55.86% of the electricity is generated by coal revel, 40.17% is generated by Gas, 3.89% is generated by hydropower, 0.03% is generated by solar, and others is 0.05%.

Based on the chart above, the power generated by renewable energy stands a very minor margin in the entire power generation in Peninsular Malaysia with a total of 3.92%. Whereas in Peninsular Malaysia the generated electrical power is relying on non-Eco-Friendly unrenewable energy.

Malaysia is located near the equator and with a summer season the whole year, the temperature is around 27°C to 38 °C. Due to the climate characteristic, the daylight is consistently loaded and reflected solar energy is sufficiently provided. According to Ng & Zainal (2011), Malaysia

averagely received 7 hours of sunlight a day. The humidity of Malaysia is containing high moisture within 60% to 85% in a month. Across Peninsular Malaysia, the month of February has the minimum mean relative humidity with a range of 85%, whereas November is having the highest humidity with an 88%. The daily variation of moistness in Malaysia is greater compared to the annual variation (Wong et al., 2016). The minimum humidity variation can be low as 41% during the dry season, whereas the highest humidity will be 70% during the monsoon season (Ng & Zainal 2011).

However, Ng & Zainal's (2011) research found that most of the buildings in Malaysia are unable to achieve the scoring of the Building Energy Index. In the year 2007, a Zero Energy Building in Kuala Lumper has been built according to the Green Building Concept, and as the result of 3 years of effort, the building was unable to success reward the intensity of energy consumption.

In this case, the building meets the problems of supportable intensity building construction enhancement. The Green Building Concept in Malaysia is not common among the players and the public. The Green Building Concept is suitable to be implemented by the scope of the sustainable design of buildings in Malaysia and the construction plan. One of the answers to the examination in the study is, the contribution of satisfying this drawback by seeing and investigating the practicality of Zero Energy Building (ZEB) ideas approaching actualized in Malaysia furthermore find the alleviation to uphold the idea in Malaysia.

1.3 Research Question

The research question applies as a guide to finding the answer from this study. The research can be capable to respond the study question based on.

1. What are the main internal factor and external factors that influence Green Building Concept development in Malaysia?

2. What are the most challenging internal factor and external factors across industry players in Greater Kuala Lumpur in implementing the Green Building Concept developed in Malaysia?
3. What are the strategies between internal factors and external factors to encourage industry players in the future to adopt Green Building Concept in Malaysia?

1.4 Research objectives

1. To determine the main internal factors and external factors that influence Green Building Concept developed in Malaysia.
2. To evaluate the most challenges internal factors and external factors that influence the Green Building Concept development across industry players in Greater Kuala Lumpur, Malaysia.
3. To propose the strategies between internal factors and external factors to encourage industry players to adopt Green Building Concept in Malaysia.

1.5 Scope of Studies

This study will focus on the supply-side perspective of Green Building and examine the reasons why there is a lack of interest in developing Green Buildings for the public. Specifically, the research will investigate the major barriers that hinder the implementation of the Green Building concept in Greater Kuala Lumpur.

1.6 Significant of Studies

This research will contribute data to the future researcher to understand the barrier to the supply of Green Building in Greater Kuala Lumpur, and the benefit of Green Building to the nations.

Furthermore, this study is important to create awareness among local authorities of the barrier to Green Building Concept development in Greater Kuala Lumpur and affect the industry player to develop Green Building in the future.

1.7 Chapter Layout

The structure of this study is outlined as follows:

In Chapter 1, a brief overview is provided of the barriers to implementing the Green Building Concept on the supply side in Greater Kuala Lumpur. The chapter will also cover the factors that influence the development of the Green Building Concept, challenges faced by industry players, and strategies to encourage industry players.

Chapter 2 involves a literature review, which includes articles, journals, and research by various scholars on the barriers to implementing the Green Building Concept. Industry players' considerations, both pros and cons, will also be examined, as this affects their final decision to construct a Green Building. The literature review data will form the basis for the hypothesis.

Chapter 3 is dedicated to the research methodology, which will explain the research design of the questionnaire, respondent data collection methods, and the use of primary and secondary data. A survey questionnaire will be utilized to obtain feedback from targeted respondents in the Klang Valley area.

Chapter 4 is devoted to the analysis of the collected data from the targeted respondents. The Statistical Package for the Social Sciences (SPSS) software will be used to analyze the data, and the findings will be presented to understand the relationship between industry player considerations and factors.

In Chapter 5, the findings from the data analysis will be discussed, and the hypothesis will be generated and translated based on the results of the SPSS data. Additionally, the limitations of the study and recommendations for future researchers and readers will be provided to enhance their understanding of this research.

1.8 Chapter's Conclusion

This chapter outlines the structure of the research and presents a graphical representation of the study. It covers important aspects such as the research background, problem statement, research objectives, and research questions.

CHAPTER II

LITERATURE REVIEW

2.0 Introduction

This chapter will be studying a few criteria related to the green building concept. First of all, it will be defining the definition of green building, and how does the building categorize as a green building? Secondly, it will be reviewing the concept of green building and what does the concept emphasize? Furthermore, it will be understood the guideline set by Malaysia Green Building Index, to evaluate how green in particular, is it. Besides that, the idea of Green Building design, which the building design and material used able to reduce energy consumption.

Moreover, the following will be studied the benefit of Green Buildings will be discussed how the building is built and future usage able to comply with the reduction of environmental pollution, such as emission reduction, air pollution, and water pollution. Additionally, it will be researching the local Green Building project. Lastly, will be reviewing the challenges faced by the local industry players.

2.1 Definition of Green Building

Green Building Index (2013) discusses that “Green Building” is defined as the building lifecycle having minimal impact on human health and the environment, through construction, design, operation, siting, maintenance, and demolition. Furthermore, it also emphasizes the efficiency of resource selection and uses during construction and after handover to owners. These resources included water, energy, and the material used. The green building operates with a minimal impact on the environment and human health with high performance, compared to traditional building (Fischer 2008).

The part of energy consumption of the building, it is included air-conditioning, lighting energy, and other electrical appliances. These energy consumptions achieve the minimal wastage of energy from the energy supply is categorized as EE (Energy Efficient) (Green Building Index 2013). During the construction period of a building, parties involved in construction activity are consuming a huge amount of energy. These energies are consumed by the required machinery while doing construction, the transportation of the building material, and relocating soil.

2.2 Green Building Concept

The Green Building concept is referred to how the building is designed to reduce the impact on the surrounding environment. It includes human health, consumption of natural resources, which as water and energy, the productivity of workers, waste reduction, and pollution to the environment. Likewise, the Green Building practice also leverages the conventional building design focus on sustainability, durability, and economy. (Iyer-Raniga & Kashyap, 2021)

2.2.1 Implementation of Green Buildings in the United Kingdom

The United Kingdom Building Research Establishment Environmental Assessment Method (BREEAM) found that on the subject of One Angle Square Green Building in Manchester, United Kingdom. The environmental feature of this building is emphasized by the natural heating, cooling, and lighting system. The designated soaring open atrium allowed the building

to harvest natural lighting, instead of depending on the artificial lighting generated by the incoming electricity supply. Moreover, the designated double-skinned façade on the exterior of the building created a natural heating and cooling system. These exterior façades can minimize the heat transmitted by the sun towards the internal of the building ("One Angel Square, Co-operative Group HQ, Manchester | BREEAM - Sustainability Assessment Method", 2016).

Figure 2.1: One Angel Square, Co-operative Group HQ, Manchester, UK

Source: One Angel Square, Co-operative Group HQ, Manchester | BREEAM - Sustainability Assessment Method" (2016)

2.2.2 Implementation of Green Building in Singapore

Singapore's Building and Construction Authority (2020) found that the term green building concept is minimally different from European nations and America. In Singapore, the green building concept is more emphasis on applying the latest technologies into the building to regulate the temperature instead of relying on the conventional air-conditioning system. In the article mentioned, the dependency on the air-conditional system is high due to Singapore being located in the equatorial zone.

Hence, the utilization of passive design and façade application became one of the musts to minimize solar irradiation from the sun. Based on the case study by United Nations Environment Programme mentioned Singapore encourages including green roofs in architectural design. Green roofs refer, to a layer of planted vegetation on top of the building to mitigate solar heat transmission into the building and create a solution to reduce "grey" in a building.

The Zero Energy Building on BCA Braddell Campus in Singapore is one of the buildings that achieve zero energy consumption for nearly 10 years since the year 2009 to 2018. The building works by integrating customized tropical conditions and green building technologies into existing buildings, and passive design. The building features a "hybrid" cooling system rather than using a conventional air-conditional system. As a result, the building achieved suitable thermal comfort by consuming lesser electricity compared to a conventional air-conditional system.

Figure 2.2: BCA Braddell Campus, Singapore

Source: Singapore, Building, and Construction Authority (2020)

In Malaysia, the Green Building concept is defined by the 6 major benchmarks, which are mentioned in the Green Building Index (GBI) (Green Building Index 2013).

2.3 Green Building Index (GBI)

Green Building Index (GBI) (2013) is Malaysia's Green Rating Tool on property. The index is widely used in evaluating non-residential and residential property in Malaysia. GBI Malaysia is created by Pertubuhan Akitek Malaysia (PAM) and the Association of Consulting Engineers Malaysia (ACEM). It is a profession-driven initiative to lead the Malaysian property industry toward environmental development. The index is created to (1) uniform the standard as a medium to evaluate the building performance, (2) reduce pollution environmental by

transforming the built environment, and (3) create awareness of the building design to provide a better environment for humans.

Green Building Index assessment, 6 benchmarks is the rating tool in the consideration of determining the green performance of the building. Under this rating tool the points allocation is as follows (see Figure 2.3):

Figure 2.3: Green Building Index Assessment Criteria

Energy Efficiency - 35 points	Indoor Environmental Quality - 21 points
Sustainable Site Planning and Management - 16 points	Material and Resources - 11 points
Water Efficiency - 10 points	Innovation - 7 points

Source: Green Building Index Sdn Bhd (2019)

In Green Building Index, it categorizes the building into various types of fields as shown in the figure below.

Figure 2.4: Green Building Rating Tools

NRNC **NON-RESIDENTIAL NEW CONSTRUCTION**	RNC **RESIDENTIAL NEW CONSTRUCTION**	NREB **NON-RESIDENTIAL EXISTING BUILDING**	INC **INDUSTRIAL NEW BUILDING**	IEB **INDUSTRIAL EXISTING BUILDING**	T **TOWNSHIP**
DATA CENTRE		**RETAIL**			
HOTEL		**HOTEL**			
RESORT		**RESORT**			

Source: Green Building Index (2013)

2.4 Idea of Green Building Design

UN Environment Programme (2022) mentioned the construction industry is one of the industries that consume plenty of energy and generate Green House Gasses. The industry consumes approximately more than 30% of global energy and water resources. In this case, the global warming crisis is increasing, and lead to the awareness of green building concept development is important.

The Green Building Concept is not just focused on the building's active and passive design, it is included green construction. The term green construction is referred to material uses, the method of construction is environmentally friendly, and material allocation is efficiently planned with minimal waste. Moreover, the life cycle assessment is one of the important criteria in the Green Building Concept, due to the process of construction, operation, maintenance, renovation, and destruction will affect the green performance of the building ("Green building", 2022).

There are 5 main ideas to categorize the building as Green Building, which are: Energy-saving, Environment friendly, harmonizing with the local climate, Improving the quality of health and well-being, Spurs innovation.

2.4.1 The factors that make buildings energy saving.

The factors that make buildings energy efficient consist of 3 main items. 1. building design concept, 2. energy-efficient design criteria, 3. energy-reducing method.

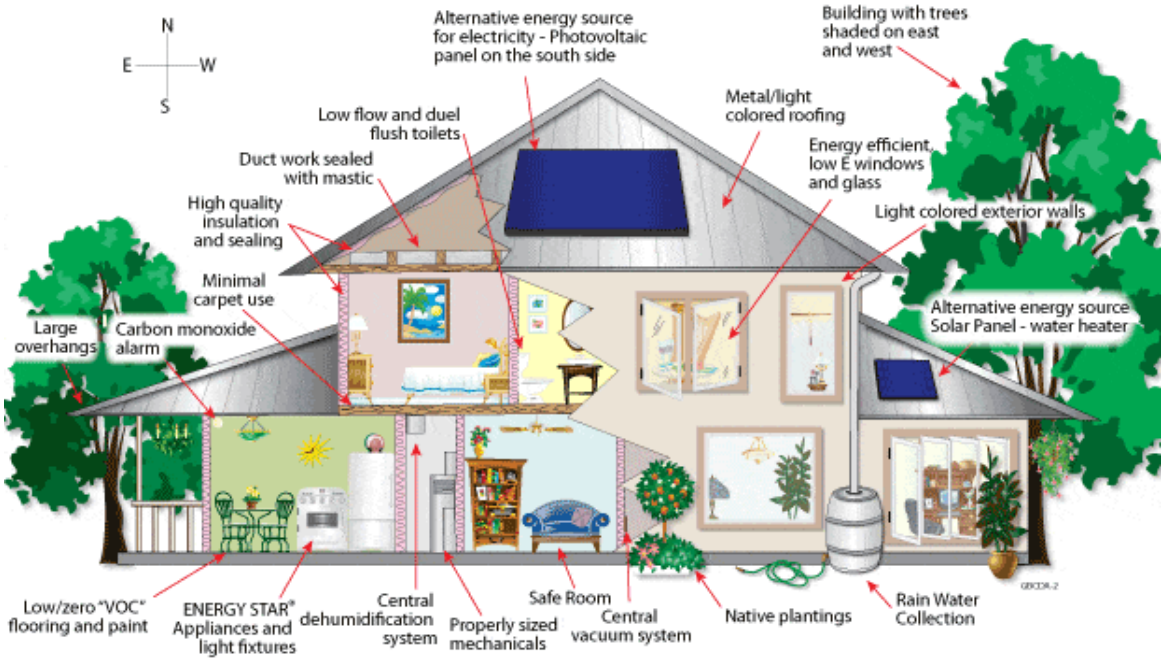
The figure below shows the idea of a green concept adapted to a residential house. In the building design concept shown in the figure, the building orientation is facing east to minimize the solar radiation which caused heat. The heat generated from morning sunlight is far lesser compared to facing west. Besides that, the large overhangs, light-coloured roofing, and high-quality insulation and sealing blocked some of the repel the heat into the building. Therefore, the inner building's thermal comfort wouldn’t rely on air conditioning. Furthermore, the

building with trees shaded on the east and west can make used as a natural sunblock, which reduced direct exposure to sunlight.

The application of the building is using alternative energy sources for electricity and water heater systems, which are generated by the photovoltaic panel as known as a solar panel. The panel can reduce the dependency on non-renewable energy, which reduced the carbon emission generated in power plants. Moreover, the appliances and light fixtures are using ENERGY-STAR-certified products, which translated to energy-efficient electronic appliances.

The rainwater harvesting system in the figure below is made used for garden watering. Hence, fresh water is not wasted, and rainwater can be recycled.

Figure 2.5: Criteria of Green Building



Source: Mishra (2021)

2.4.1.1 Integrated energy-efficient building design concept

Design and planning are the core during the initial stage of the building that affected the green performance of the building.

The design concepts are in consideration of holistic design. Holistic design is referred to the building design plan holistically, to observe the building location and environment, and then study all mechanisms before designing from the exterior. It also treated building stands single in which numerous small details are made to improve the performance, in the end, total up to enhance the greater final performance of the building. For example, an insulated wall is unable to turn the building into better energy efficient. Therefore, the matured application in the green building field is discussed to unify design and participants in a project, including the architect, consultants, engineers, owner, and contractors, who coordinate as a team from the initial stages of development to minimize energy consumption with numerous strategies. As an example. first, minimizing internal heat gains, second harvesting natural lighting, third optimizing natural ventilation, fourth adopting passive or active design. This cooperative tactic is proposed to certify stakeholders contribute methods and ideas to achieve the Green Building Concept (Francis et al., 2014) namely, (1) appraise energy consumption across various design options, (2) obtain technique and expertise for building energy study, (3) observe the energy design.

In contrast, energy-efficient (EE) building design should be linking applicants of appropriate revelries to work out the energy-efficient approach. The fundamentals of energy-efficient design principles are maximized energy efficiency (EE) performance and electrical sub-metering. Minimizing energy consumption in buildings is the key to accomplished EE design. Therefore, is resulting carbon dioxide emission to the atmosphere can be lowered. BEIT (Building Energy Intensity Tool) software can easily calculate heating transfer and receive data on energy savings. Sub-metering able easily indicates energy consumption. Where energy consumes more than 100kVA such as mechanical & electric rooms, lifts, car parks, and small common areas.

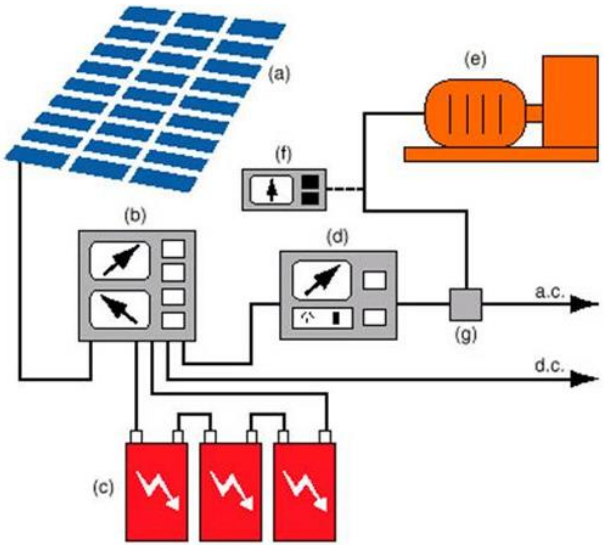
The Energy consumption reduction consists of 2 methods, firstly lighting zoning, and secondly renewable energy. Automation of lighting motion sensors is the first lighting zoning method

as discussed. The idea is to controlled match the lighting zoning by providing flexible shade controls to enhance energy savings. The use of renewable can lessen the pollution impact and carbon dioxide emissions.

Furthermore, the application of passive design is one of the elements to make the building greener. The building orientation is one of the key considerations, due to the front of the building being exposed to high irradiation of sunlight might cause to building inner temperature to increase, hence, to overcome this issue the building orientation as much as possible face to the North and South, and cover with façade screen, awnings, or roof overhang to reduce direct sunlight irradiate and heat transfer. Besides that, a Central open-air courtyard with great penetration of daylight might reduce the dependency on artificial lighting, which is generated by electricity. The research and design of natural ventilation systems are important, due to the good design of natural ventilation might efficiently reduce the depended-on air-conditioning system and heat transfers into the building. Which is reduced the inner temperature of the building.

The second method of renewable energy is the application of the Building with an Integrated PhotoVoltaic (BIPV) system (known as the Solar System), which is shown in Figure 2.6 below. The appliances can transform solar energy into electricity supply in buildings. The BIPV system can be a structure with or without a battery reserve to store energy production. BIPV system (Steven 2016): (1) the PV modules (crystalline or thin-film, transparent, semi-transparent, or dense), (2) energy reserve system: the grid in utility-interactive systems or, several batteries in stand-alone, (3) charge controller: to adjust the power supply or demand of the battery (without battery reserve), (4) inverter as equipment to convert the Power of PV modules' DC output to AC compatible with the utility grid.

Figure 2.6: Photovoltaic (BIPV) system

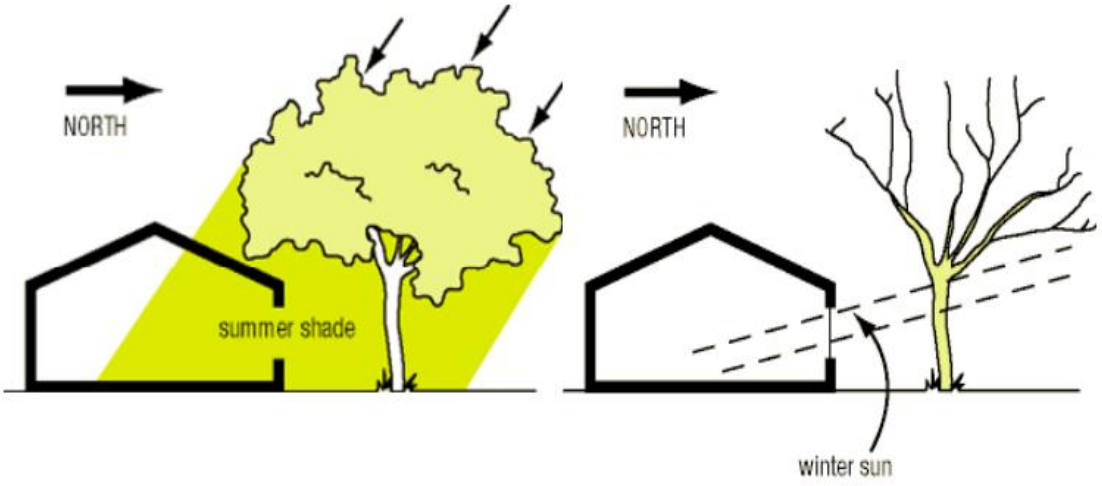


Source: Whole Building Design Guide (2016)

2.4.2 Consideration of Environmental Condition

Consideration of environmental conditions is involved outdoors and indoors. The outdoor environment condition is focused on the vegetation surrounding the building. Vegetation can make changes to the surrounding climates by shading the surface, and evapotranspiration by changing storage and exchange of heat between urban surfaces. The shading of trees effectively regulates inner building temperature by reducing the solar radiation directly hitting onto building roof and walls. Furthermore, the shade of trees can regulate the soil temperature surrounding the building at a lower temperature, which acts as a "heat sink" for a building (Aminu Misni, 2012).

Figure 2.7: The northwest side of the house reduces the indoor air temperature in summer by providing shade and increases indoor air temperature in winter by allowing the sun to enter the house.

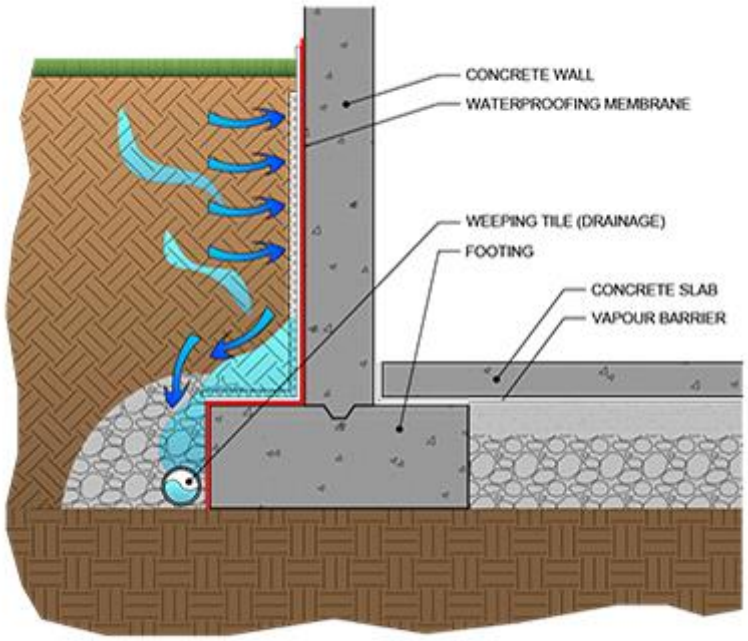


Source: Ha (2009)

However, planting trees surrounding the building can reduce the evapotranspiration process, the outdoor surface water might trap in soil which causes a series of issues. Improper managed outdoor surface water can cause indoor environmental quality problems with mole stains on the wall. This is due to high humidity, caused by the intrusion of rainwater into buildings. Furthermore, the surface water might cause intrusion into areas such as basements.

Francis et al (2014) mentioned a layer of waterproofing chemical must be applied to the basement concrete wall to ensure surface water will not easily stain on a concrete wall. Furthermore, the researcher highlighted a foundation drainage system serves as another layer of protection by using drainage mats, crushed gravel, and sub-soil drainage pipe to divert groundwater away from the building. Exterior waterproofing is another layer of protection.

Figure 2.8: Ground Structure Waterproofing



Source: Foundation Waterproofing, Below-Grade Walls (2022)

The indoor environmental quality (IEQ) includes the circumstances inner building, which are air quality, thermal conditions, and lighting that affect the building user. The IEQ approaches is focuses on human health and quality of life. A good indoor environmental quality might enrich the lives of buildings users, lower the liability of building owners, and improve the building's market value. Low volatile organic compounds (VOC) and formaldehyde material is encouraged to be applied due to the material being categorized as healthy materials and finishes (LEED, 2014).

Recycling and reusing materials can minimize the embodied energy required to minimize raw material source consumption. There is various sample of reuse materials, such as Dimensional lumber, Roofing shingles, Plywood, Hardware, Gypsum board, Wall protection, and Windows (Liu & Little, 2012). Cement concrete is the key consumable construction resource in a

building. Recycled aggregate can use in Concrete mixing, this recycled aggregate is generated by the crushed concrete from the removal of reinforcement concrete. According to the studies (Malešev et al., 2010), the load test for the reinforced concrete with the application of good quality recycled aggregate, there is no influence on the compressive strength, nonetheless the replacement ratio of convectional aggregate. Rapidly selecting renewable materials can reduce the depletion of natural resources, which consumes a long period to grow. These materials are included; bamboo flooring, cork flooring, carpet fiber derived from corn, cotton insulation, and natural rubber flooring.

Francis et al (2014) mentioned a water recycling and rainwater harvesting system can reduce the dependence on the freshwater source. The most frequent application of harvested rainwater is for toilet flushing. A green building should offer clean drinking water by applying adequate filtering and treatment of municipal water.

2.5 History of Green Buildings in Malaysia

Sustainable development in Malaysia has been a public goal for the future. The Vision 2020 was drafted by Prime Minister Mahathir bin Mohamad in 1991, Malaysia's governments, organizations, and residents have loved the prospect of the perfect, green, fully developed, and brought-together country it proposed. Through liberal green business motivations, more circumspect modern guidelines expanded environmental awareness, and economic leaning toward sustainable development, Malaysia is gaining genuine headway toward its vision. In a new demonstration of the objective, there has been a gigantic push for green buildings in Malaysia.

Driven by a concern for environmental humiliation and national energy security, Malaysia's green building sector is expanding. As air quality deteriorates, building emissions are being considered and focus on energy saving. As landfills spill into rivers, an emphasis on waste management encourages the efficient use of eco-friendly construction materials (Clean Malaysia, 2015).

Since the establishment of the Green Building Index (GBI), green building concept development furthered the trend. The first certified green building in Malaysia started since the year 2009, is Pusat Tenaga Malaysia (PTM). The PTM building is the first recognized green building, which obtained a certified green building cert given by Green Building Index Malaysia.

2.5.1 Pusat Tenaga Malaysia (Green Energy Office)

Pusat Tenaga Malaysia (Green Energy Office) is the first official Malaysia-certified Green Building under Green Building Index Rating. The building plan was started building in the year 2005. The building uses to be Zero Energy Office (ZEO) and now is officially recognized as Green Energy Office (GEO). The concept of building Pusat Tenaga Malaysia emphasizes the integration of Energy Efficiency (EE) and Renewable Energy (RE) into the building. The energy intensity of the building is 35kWh/m2 per annum (Energy Smart Communities Initiative, 2016).

The rating is much lower than the most energy-efficient building LEO (Low Energy Office) in Malaysia before the year 2005. During the implementation stage, the awareness of the Green Building Concept is in the infant stage, and the building managed to score full points under the Energy Efficiency and Innovation section in the GBI Rating ("Green Energy Office Building - Malaysian Green Technology and Climate Change Centre", 2021).

Figure 2.9: Pusat Tenaga Malaysia

Source: Energy Smart Communities Initiative (ESCI) (2016)

2.6 Factors of Influence on Green Building Concept to be Developed (Internal Factor)

Based on the studies from the previous researcher, multiple industry players have given various reasons affecting the decision on planning and building a Green Concept building. These industry players include Developers, Main Contractors, Engineers, Architects, and Labourers.

2.6.1 Awareness Factor

Multiple researchers highlighted public awareness and knowledge of the Green Building Concept as one of the reasons causes construction industry is unfamiliar with the delivered benefit. (Gundogan, 2012; Balaban, 2013). Furthermore, in the perception of the supply side, contractors, and developers, are focused on the profit figure. If the Green Concept application into the project will cause higher investment or operational costs without the opportunity to make extra benefits that are not corresponding with the business, the supply side will not be expected green buildings are their consideration in planning and developing a building (Balaban, 2013; Sahid et al., 2020). According to the studies by Wu et al., (2019), the government introduced incentive policies in China, such as subsidies for certified green buildings to encourage local's stakeholders. The generated outcome is not expected well, due to weak stakeholders' awareness of the environmental issue, and inflexible demand for real estate.

2.6.2 Professional Support Factor

Professional support giving a big impact on green building concept development. Good professional support will provide a clear image to an industry player, of what should do, and what must do. Through the support, the green building concept can be developed smoothly and achieve the theoretical goal.

However, if the green building concept is lacking professional support, the Green Concept development will be facing plenty of obstacles to proceeding with the entire planning, design, and construction stage (Hwang & Tan 2012). According to Samari et al (2013), plenty of contractors are not familiar with the sustainability issue and practices. Furthermore, while

implementing Green Concept into a Building, the architect and consultant must propose the idea within the budget given by the client. Hence, these parties are the key person who promoting Green Concept development in the future. If these parties are not familiar with Green Building Concept, they are unable to provide better professional support and might cause overspending on material selection. Green Building Concept requires professionals to assist contractors during the construction stage, to achieve minimal waste on the material used. Without advice from professionals, contractors are facing major issues while developing.

2.6.3 Technology Support Factor

Implementing Green Concepts into Buildings requires plenty of Green Technology applications. Some nations are in the infant stage while building a Green Building and without a proper contract, or a guide to refer to (Saleh & Alalouch, 2015). Due to this reason, Green Technologies are often imported from advanced nations (Samari et al, 2013). Furthermore, contractors are not familiar with the Green Concept. The performance of green technologies will be less efficient, due to contractors are hard to understand the usage of green tools and technologies (Saleh & Alalouch, 2015)

2.6.4 Incentives Support Factors

One of the reasons that caused implementing the Green Concept into Building less attractive among the players, due to the government did not provide a sufficient incentive to Green Concept developers. Government plays an important role in promoting green development (Kamaruzzaman & Pitt, 2014). Developers are price sensitive towards the project they produced, hence if financial advantages are ably provided to developers, developers will be having a higher acceptance rate on adopting Green Concept into the building.

2.6.5 Costing Factor

According to Goh, Seow & Goh, (2013), developers would not be having consideration towards implementing Green Concepts into their projects is due to the financial risk is higher than in conventional building development. The higher upfront cost of developing a Green Concept building is the main reason it's not popular on the supply side (Hwang & Tan, 2012).

Furthermore, the developing cost of Green Buildings is approximately 25% higher than conventional buildings (Goh, Seow & Goh, 2013). Besides that, the duration of implementing a Green Building is longer than the conventional building. Malaysia is lacking technology support for developing Green Building; hence the majority of the equipment is required to spend additional cost on importing the advanced tools and equipment from overseas (Chan, Lee & Lee, 2014).

2.6.6 Pricing Factor

Due to higher development costs, developers are forced to increase the selling price of Green Concept buildings, which causes challenges in implementing Green Building in the future (Goh, Seow & Goh, 2013).

2.6.7 Consumer Demand Factor

Since the design of green buildings is to enhance natural daylight as much as possible, the shape of the buildings adopting the green concept might be rather unusual. The exterior architecture might not be accepted by all the public and many people might even reject buying a property adopted with the green concept since they just do not prefer the green buildings design. Developers are concerned about the sales performance of their projects as well as the affordability of the public. The medium and low-cost building is widely accepted by the public in the property market. Due to the buying behavior of the public, the decision on implementing buildings adopted with green concepts by developers will be affected (Gehry, 2022).

2.7 Factors of Influence Implementation of the Green Building Concept among the industry players (External Factor)

Factors of the green building concept are a framework of benefits that can be classified into the environmental, economic, social, market, and organizational.

2.7.1 Environmental Factor

Syahriyah & Bhaskara (2019), and Mokal, et al. (2015), building adopted a green building concept able to minimize the negative influences on the environment. The green building concept emphasizes the principle of water and energy efficiency, minimal construction waste, and sustainable construction materials (Ahmad, 2018).

The green materials application in the green building concept will be enacted debited on the environment. During the construction process of building with adapting green building concept, it is efficient to ensure the environment is as clean as possible and minimize the emission of carbon. Furthermore, the reduction in carbon emissions would be giving the advantage to reduce the speed of climate change and create a more sustainable environment for the ecosystem (Krueger et al., 2019).

2.7.2 Economic Factor

Economics is one of the factors that leverage the implementation of the green building concept. This is due to, the building adapting green concept will minimize the dependency on non-renewable energy and freshwater (Gundogan, 2012). According to ("The Business Case for Green Building: A Review of the Costs and Benefits for Developers, Investors, and Occupants | World Green Building Council", 2022), Building adapting green concept have been shown to minimize operation cost through minimize energy and freshwater consumption, it is effectively lower down the long-term operations and maintenance cost. In contrast, the low operating overhead will maximize the net profit for the building owners and create value-added for the building by adopting a green concept.

Moreover, the development cost of building with a green concept will be reduced through better efficiency of the design, resource usage, energy consumption, and material usage. This principle will be minimizing the input and maximize output, which is the performance and function of the building while enhancing the usage of resources, and in a contrast, the development will be reduced (Berawi et al., 2019).

Building with a green concept will minimize the operating cost in the long term and reflect a higher profit in the future. The features of adapting the building with a green concept will create an interest in buyers (Gundogan, 2012). According to Nalewaik & Venters, (2010), the benefits from operating cost saving will create attraction to owners, and certain aspects of sustainable design mirror value engineering principles in right-sizing the building and systems. In addition, benefits may be earned by enhancements in the green concept construction process or improvements made for the quality of life of the building occupants. The "feel-good" factor or social value is deciding to build the building with a green concept out of the economic equation and shifting towards the principles and values of corporate responsibility.

2.7.3 Social Factor

The social refers to the factors that improve the productivity of occupants in the building in terms of promoting the green building concept in the construction industry.

According to Seitablaiev & Umaroğulları (2018), and Akadiri et al., (2012), people are spending more than 70% of their lives in an enclosed space. This is included, living, working, etc. Thus, comfort expectations for enclosed spaces are an essential task of architecture to provide building user health, productivity, physiological comfort, and physiological satisfaction. The idea of health is important for identifying the concept of a "sustainable green building" in terms of building performance (i.e., indoor air quality, thermal comfort, and lighting quality). A sustainable industry is required to stabilize human necessities with the carrying ability of natural and cultural ecosystems. A healthy building is free of harmful materials (e.g., lead and asbestos) and adept at fostering the well-being of the building user through its whole life cycle, maintaining social needs and improving productivity. A healthy building identifies human health needs, and comfort, as our main concern.

According to Akadiri et al., (2012), health and comfort is essential attribute defining the quality of life of an occupant in a building. Allowing natural daylighting into the building is part of the important design consideration in the green building concept. The principle of allowing daylighting into the building is to optimum use of natural light and provides plenty of advantages compared to artificial lighting which is generated by electricity. Maximizing natural daylighting in the house is an important consideration during the design stage. A good daylight design is translated to the level of daylight that is sufficient to provide better visuals without glare or overlight exposure.

Moreover, Akadiri et al., (2012) mentioned:

"A sustainable industry must balance human needs with the carrying capacity of natural and cultural environments."

The emphasis of natural ventilation in a building is the process and method of recirculating fresh air in any space to allow high indoor air quality without the dependency on mechanical application. Good internal ventilation conditions will directly impact on human health, comfort, and well-being of the building user. Natural ventilation has become a part of the significance to study to create a sustainable building for humans. This theory can be applied through external fresh air allowance design, odors and pollutants deductions, and internal heat exhaust. During the design stage of the building, the cost of construction and operation cost will be reduced through the dependency on mechanical exhaust and enhance the productivity of building users due to a better indoor environment.

Climate suitability, window orientation, and windows system are the essential factors in designing natural ventilation in a building. Such as the allowance of cross-ventilation through the window by making use of wind chimneys to stimulate stack ventilation. Furthermore, using water evaporation systems in hot dry climates to stimulate air movement.

2.7.4 Market Factor

The market factor is one of the driving forces leading the green building concept to get more acceptable by the public. According to Gundogan (2012), The awareness of the green building

concept is rising among the public. The Green Building Certification standard and systems such as LEED, BREEAM, Green Building Index (GBI), etc. are developed and applied in various countries. This revolution of the design concept in the property industry will cause to get media attention as well as turn into the main topic of conferences. Besides that, developers or building providers can marketize their build by offering more sustainable buildings to building users.

2.7.5 Organization Factor

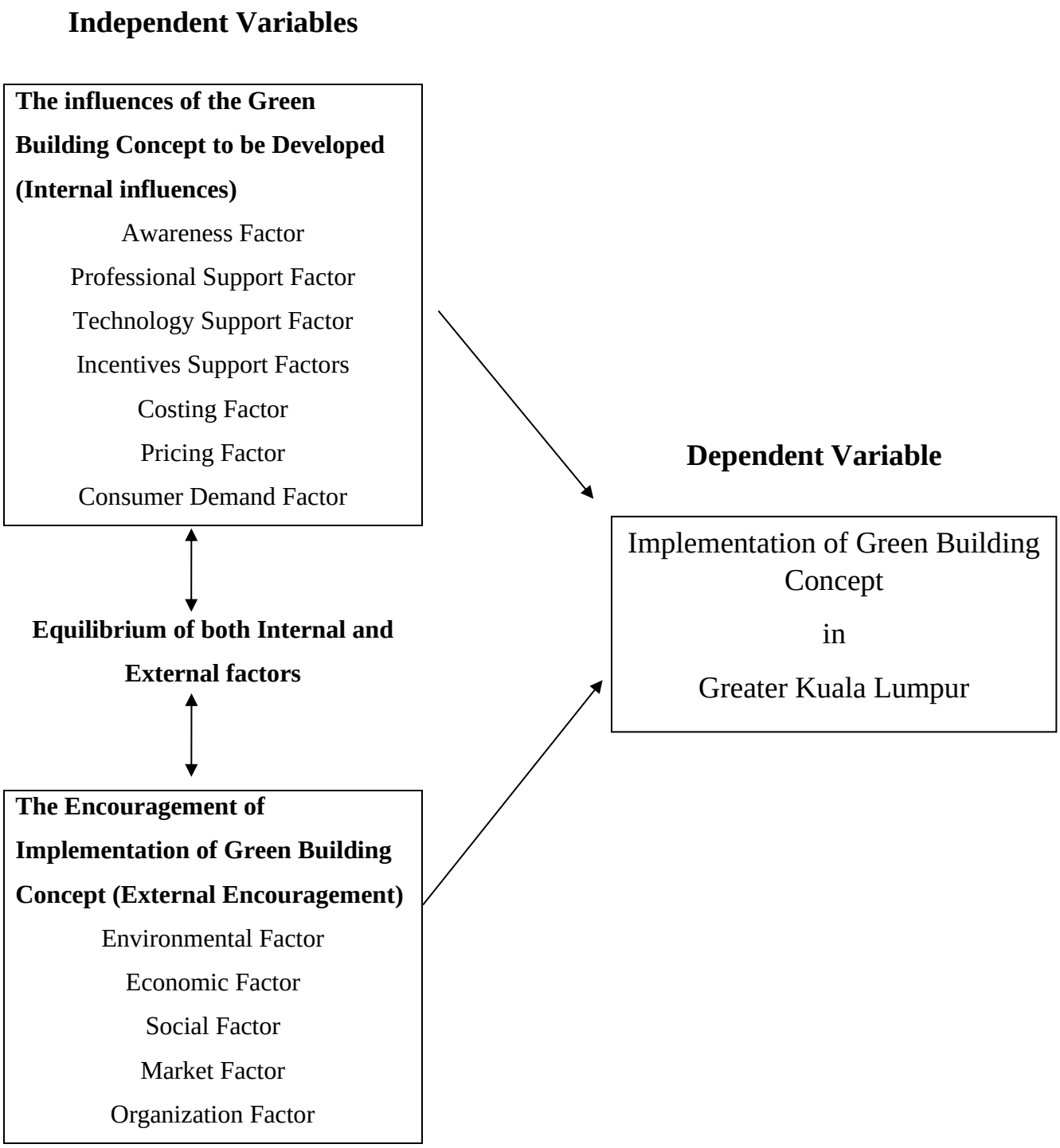
Multiple researchers (Gundogan, 2012; Assylbekov et al., 2021) had mentioned in studies, that organizational factors can lead to green building concept development in the future.

The organization of property or construction, and the implementation of green concepts into their projects might lead to a revolution in organizational culture. Organizations that adopt green concepts into their strategic plans are to be expected to develop the new green building. Furthermore, gaining a competitive advantage compared to other developers building conventional buildings by offering Corporate Social Responsibility (CSR). This CSR is included ecological responsiveness, and environmental protection, (Gundogan, 2012). When the organization receives green certification or award, the image of the organization will be enhanced among the industry or the public.

2.8 Proposed Conceptual Framework

The framework for this study will be based on the research of another scholar. The purpose of this study is to identify the barriers to implementing the Green Building Concept in Greater Kuala Lumpur. This will involve evaluating factors that influence the Green Building Concept among industry players, as well as factors that encourage its implementation, as depicted in Figure 2.10..

Figure 2.10 Proposed Conceptual Framework for Identifying the Barriers to Implementing Green Building Concept in Greater Kuala Lumpur



The barrier to implementing the green building concept in greater Kuala Lumpur can be determined awareness factor, professional support factor, technology support factor, incentives support factors, costing factor, pricing factor, and consumer demand factor.

The industry player is trying to equilibrium both internal factors and external factors to generate a better outcome through the resources on hand. Although the green building concept offers plenty of benefits, wrongly applied green building concepts might cause wastage in cost and material. As the result, the philosophy of the green building concept is different from what it proposed. As an example, a developer trying to implement a green building concept into their projects to achieve a revolution of the image of the organization by providing a more sustainable building to the public. However, when the technical sector, such as contractors, architects, engineers, etc. are having limited knowledge of the method of the contract for the construction of the green building, it might cause these parties to overdesign or wrongly apply green material during the construction stage. As a result, the material is wasted and caused unnecessary costs to occur. Hence, the right technical knowledge is important while proposing the green building concept.

Besides that, a developer trying to adapt the green building concept to gain market share, compared to other developers. Due to, external factors such as part of the consumer being aware of the benefit delivered by the green building concept, the global warming issue is getting serious, and the low consumption of electricity. Hence, property developers are trying to implement green building concepts in the public to create a better image for the public and as a part of the organization's CSR.

2.9 Hypothesis Developed

The barrier to implementing the green building concept in greater Kuala Lumpur would be decided by the type of factor, which is caused by the internal and external environment. Both of these factors will impact or push the implementation of green building concept development. Some researchers argue that the internal factor is the main cause due to, constructing a building is depending on the technical, cost, technology, and demand. Developers will highly control the budget of each project and are afraid the outcome might not be acceptable to the public.

Whereas the external factor shapes the benefit of the green building concept delivered to the public, and the public saw the pros are more than the cons. To support both arguments, a hypothesis is formulated to examine the relationship between internal and external factors concerning the implementation of the Green Building Concept in Greater Kuala Lumpur. The hypothesis is constructed as follows:

H0: There is a negative relationship between the internal factor of industry players' barriers to implementing green building concepts in greater Kuala Lumpur.

H1: There is a positive relationship between the internal factor of industry players' barriers to implementing green building concepts in greater Kuala Lumpur.

H0: There is a negative relationship between the external factor of industry players' barrier to implementing green building concepts in greater Kuala Lumpur.

H2: There is a positive relationship between the external factor of industry players' barriers to implementing green building concepts in greater Kuala Lumpur.

2.10 Chapter's Conclusion

This chapter indicates the literature review of the factor of barriers to implementing the green building concept in greater Kuala Lumpur. The study attempts to research and fill the gap between the internal factor and external factors of industry players and the barrier to implementing green building concepts in Greater Kuala Lumpur to deliver wide-ranging proof of green building concept development. Despite the green building concept is still new in the country; the green building concept development still stays far behind compared to other developed nations, such as the United Kingdom, and Singapore as mentioned above the topics.

The report will start by giving a survey questionnaire to the respondent, to further identify the hypothesis developed above, and the methodology will be discussed in the chapter.

CHAPTER III

METHODOLOGY

3.0 Introduction

Chapter 3 of the research paper will focus on the methodology of the study, which involves various aspects such as research design, data collection method, sampling design, research instrument, constructs measurements, data processing, and data analysis. The methodology comprises five stages, including literature review, questionnaire designation, data collection, data analysis, and results and findings (See Figure 3.1).

The first stage, literature review, aims to review relevant literature to develop a framework for the identification of internal and external factors influencing barriers to implementing green building concepts in Greater Kuala Lumpur. This stage is crucial in establishing a solid foundation for the research, which will inform the research questions, hypotheses, and data analysis methods. The output of this stage will be the establishment of a framework and the identification of the relevant factors, which will be used to guide subsequent stages of the study.

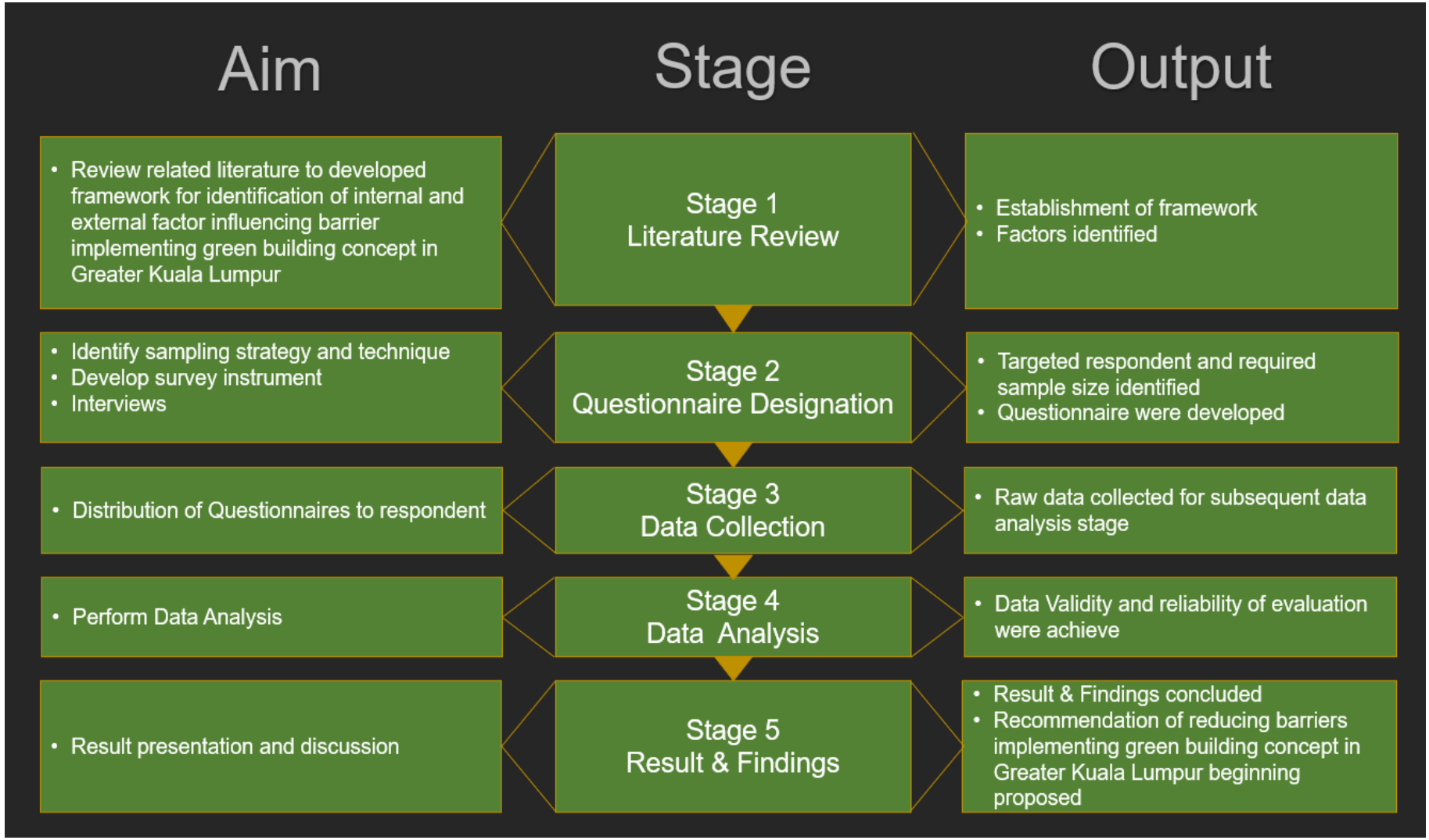
In the second stage, questionnaire designation, the aims are to identify the sampling strategy and technique, develop the survey instrument, and conduct interviews. This stage is important for selecting the appropriate sample of respondents and developing the questionnaire or survey instrument that will be used to collect data. The output of this stage will be the identification of the targeted respondents and required sample size and the development of questionnaires, which will be used to collect data in the subsequent stage.

The third stage, data collection, will involve the distribution of questionnaires to the respondents. This stage is critical in ensuring that the data collected is representative of the target population and is of sufficient quality to be used for analysis. The output of this stage will be the collection of raw data for subsequent analysis.

The fourth stage, data analysis, aims to perform data analysis to achieve the validity and reliability of the evaluation. This stage is essential for testing the hypotheses and research questions and identifying patterns and trends in the data. The output of this stage will be the achievement of the data validity and reliability of the evaluation, which will be used to draw conclusions and make recommendations.

The fifth and final stage, results & findings, aims to present and discuss the results. This stage is significant for drawing conclusions and making recommendations based on the data analysis. The output of this stage will be the conclusion of the results and findings and the recommendation for reducing barriers to implementing green building concepts in Greater Kuala Lumpur, which will be proposed based on the findings of the study.

Figure 3.1: Research Flow Chart for barriers implementing green building concept in Greater Kuala Lumpur



Source: Research Developed (2022)

Stage 1: Literature Review

A comprehensive literature review will be conducted to evaluate the related concept, theory, and model. The focus will be placed on studies relating to green building concept implementation, design, factor influences, and factor that encourages implementation in Barriers to Implementing the Green Building Concept in Greater Kuala Lumpur. The purpose of the literature evaluation was to choose the best research methodology for this topic. The goal is to reduce the accuracy of one's design process, which has not been validated and is not reliable by other researchers.

Stage 2: Questionnaire Designation

Stage 2, it is aimed to design a reliable and valid survey instrument that will be used for data collection. It is consisting of various steps to proceed. It begins with question drafting through secondary data, identification, then questionnaire development, and a pilot test of the validity of the question.

Stage 3: Data Collection

In this stage, a raw set of data will be obtained via questionnaire distribution to the respondent. The collected raw data will be further compounded and prepared for the subsequent data analysis stage.

Stage 4: Data Analysis

In stage 4, the compounded data will be analyzed through the factor of influencing, challenges identification, and strategy implementation of green building concept development in Greater Kuala Lumpur. Hence the data validity and reliability of the evaluation were achieved.

Stage 5: Result & Finding

After a series of evaluations, analyses, and interpretations of the collected data from the targeted respondent. A set of recommendations for reducing the barriers to implementing green building concepts in greater Kuala Lumpur is proposed.

3.1 Research design

The research design is the framework that outlines the research method employed to investigate a problem and how to produce results. It involves using formal and computerized data analysis to generate qualitative interview data. According to Aberdeen (2013), the research design aims to prevent irrelevant evidence from being used to answer the research question. Rani (2004) defines research design as a procedural approach to solve a research problem. Quantitative, qualitative, and mixed methods are the three research methods typically used in research (Edmondson & Zuzul, 2016).

This research will use the quantitative research method to identify the internal and external factors influencing industry players and the barriers to implementing the Green Building Concept in Greater Kuala Lumpur. Data will be collected through a questionnaire given to respondents in the developer or construction industry in Greater Kuala Lumpur.

The quantitative research method is a deductive approach used to measure and identify variables, including the relationship between independent and dependent variables. It is designed to recognize correlations between variables.

3.2 Data Collection Method

Data collection is the process of gathering and analyzing multiple sources of information obtained through various means, with the goal of answering the research question (Paradis, O'Brien, Nimmon, Bandiera, & Martimianakis, 2016).

3.2.1 Primary Data Collection

Primary data refers to information that is collected directly by the researchers from the source, which can include individuals, groups, or a panel of respondents who are specifically selected for the research. For this study, primary data will be gathered through a survey questionnaire that will be given to targeted respondents who work in the construction or development industry in Greater Kuala Lumpur.

3.2.2 Secondary Data

Whereas secondary data are obtained through company records, journals, research papers, newsletters, industry analysis, government publications, and documents from the government sector (Johnston, 2017).

In this study, the secondary input; journals, articles, government websites, and government documents will be used as the main source of the citation.

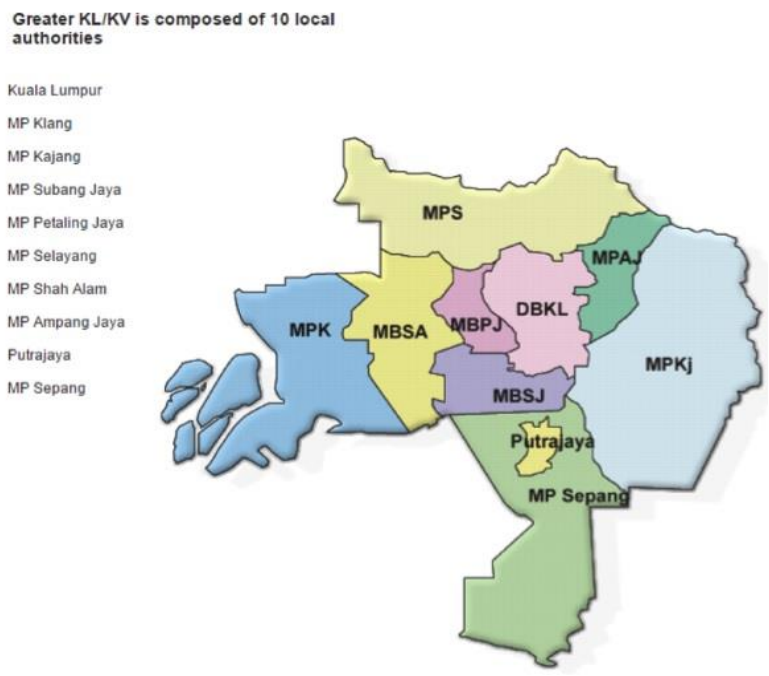
3.3 Sampling Design

Sampling design is a technique that involves selecting a group of individuals from a larger population for research purposes. The characteristics of the selected group will then be analyzed to infer information about the population as a whole. The population size will be determined using sample statistics, and the sampling method chosen will be either probability or non-probability sampling. To ensure the validity of the results, this research will use probability sampling techniques, which will aid in statistical inference and the formation of conclusions.

3.3.1 Target Population

The population being targeted refers to the group of individuals from which the sample size will be drawn.

Figure 3.2 Map of Greater Kuala Lumpur



Source: Naeema (2016)

In this research, the target population will be the person who is involved in property or construction field work in Greater Kuala Lumpur. Such as Developer, Architect, Engineer,

Quantity Surveyor, Property Sales & Marketing, and Contractor. The reason for choosing people who are involved in the property or construction field in greater Kuala Lumpur is these parties are familiar with and have experience with the property market and have their perception towards Greater Kuala Lumpur producer and consumer behaviour. Figure 3.1 above shows, the coverage area of Greater Kuala Lumpur. Greater Kuala Lumpur (see Figure 3.2) is included multiple municipal councils which are: Kuala Lumpur, Klang Municipal Council, Kajang Municipal Council, Subang Jaya Municipal Council, Petaling Jaya Municipal Council, Selayang Municipal Council, Shah Alam Municipal Council, Ampang Jaya Municipal Council, Sepang Municipal Council, and Putrajaya. According to Construction Industry Development Board (CIDB) data in the area of Greater Kuala Lumpur, there is a total number of 31,274 active construction companies ranging from Grade G1 to Grade G7.

3.3.2 Sampling Size

In Figure 3.3, the Taro Yamane formula will be applied in this research to identify the sample size from the selected population. Taro Yamane formula are:

Figure 3.3 Taro Yamane Formula

$$n = \frac{N}{1 + N * (e)^2}$$

n = sample size N = Selected Population e = Margin error

Source: Taro, (1967)

When the lowest expected variation is made less significant, the required sample size to achieve statistical significance increases. This limitation is often based on clinical knowledge or opinion of the issue being investigated. For example, if a study aims to compare the accuracy of a basic diagnostic method with a new, possibly more accurate method, and the investigator considers a 10% improvement clinically significant, the minimum expected difference would be set at 10%. A formula can then be used to estimate the required sample size based on a confidence level of 89% or more and a population proportion of 10%. In this study, the target population is 31,274 companies, and the maximum sample size will be 10% of the target population. The Taro Yamane Formula will be used for cluster sampling to randomly select participants from the target population.

Figure 3.4 Calculation Number of Target Respondent

$$n = N/ (1 + N(e)^2)$$

$$n = 31,274 / (1+ 31,274 (0.10) ^ 2)$$

$$n = 31,274 / (1 + (312.74))$$

$$n = 99.68$$

Based on the calculation above by adopting the Taro Yamane formula, the generated result will be 99.68 (See Figure 3.4). As a result, the number is close to 100, and 100 questionnaires will be planned to be distributed to the target population.

3.3.3 Sampling Location

Furthermore, Greater Kuala Lumpur is also home to a significant concentration of property and construction companies. Many major players in the industry have their headquarters or regional offices located in this area, making it a hub for real estate and construction activities. This concentration of property and construction companies in Greater Kuala Lumpur further adds to the significance of this area as a prime location for the research. The presence of these companies indicates the level of investment and development happening in the region, with numerous ongoing projects and planned infrastructure developments, such as Merdeka 118, Tun Razak Exchange, Pavilion 2 and 3, Mass Rapid Transit 3, Light Rail Transit 3, and Sungai Besi – Ulu Klang Expressway, attracting attention from investors and researchers alike. This makes Greater Kuala Lumpur a compelling and relevant sampling location for the research, as it offers a unique context to study the impacts and implications of property and construction activities on the environment, economy, and society. (Ng, Lum, & Tan, 2017). Additionally, the concentration of property and construction companies in Greater Kuala Lumpur provides ample opportunities for collaboration and engagement with industry stakeholders, which can enrich the research findings and enhance their practical applications in the real estate and construction sectors. Overall, selecting Greater Kuala Lumpur as the sampling location for the research is justified due to its significance as the most populated area in Malaysia, its numerous ongoing and planned property and construction projects and the concentration of property and construction companies in the region.

3.3.4 Sampling Element

In this research, the sampling element refers to the number of individuals in the population that will be assessed. The population being assessed is comprised of individuals aged 21 to 65 years old who are employed in the property or construction industry within the Greater Kuala Lumpur region.

3.3.5 Sampling Technique

The sampling technique gave an identical probability of representation without not biased toward the total population.

According to Lohr, (2021), there is various sampling technique, which is: random sampling method, stratified sampling, systematic sampling, and cluster sampling. Simple random sampling is required randomly generated numbers to select the sample, stratified sampling is separating the selected population into a certain group with the same characteristics, systematic sampling is separating the selected population into “K”th criteria, and cluster sampling is separating the selected population into cluster or group.

A cluster sampling technique will be applied in this research. This sampling technique, allowed all the criteria in the targeted population to have an identical chance to be selected, people who are working in the property or construction field will be given a chance to be surveyed and responses are obtained.

In this research, the selected population is working from various backgrounds in the property or construction field, and respondents' opinions might be different regarding the barrier to implementing the green building concept in Greater Kuala Lumpur in the designated questionnaire. Therefore, in this research systematic sampling will be applied to choose the sample size for this research to correspond to the group being identified.

3.4 Research Instrument

The survey questionnaire will be a self-administered questionnaire structure, giving open-ended questions and close-ended questions delivered to the respondent without any intervention from the researcher (Burns et al., 2008). The survey questionnaire will be distributed through email via Google form for data collection. The online, respondents will have time to consider and choose their most appropriate answer based on their self-perception,

and the targeted respondent will stay anonymous to each other. Hence, the method will enhance the reliability of the results.

3.4.1 Questionnaire Design

The Questionnaire design for this research is divided into 5 sections (See Table 3.1). Section A will be having 8 questions focusing on the demographic background of the respondent, section B will be identifying the respondent's perception of the factor influencing green building concept development in Greater Kuala Lumpur. Furthermore, section C will be identifying the challenges of implementing green building concept development in Greater Kuala Lumpur. Whereas section D will be the strategy for implementing green building concept development in Greater Kuala Lumpur. Lastly, section E is the open session for respondents on sharing their thought on how green buildings able to be more generalized to be developed in the future. Section B to Section D will be using a 1 to 5 Likert scale to collect respondent data.

Table 3.1 Five-Point Likert Scale

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

Source: Losby and Wetmore (2012)

3.4.2 Pilot test

The pilot test is a preliminary study used to identify or test a research study before performing indeed. The pilot test aims to test multiple aspects of the method planned for a better confirmatory investigation (Lowe, 2019).

Sekaran (2016) highlighted a sample size of more than 30 and less than 500 is most suitable for most of the research. Whereas in the study of Pilot studies made by Connelly (2008), the present literature indicates that a pilot study sample should be 10% of the sample project for the larger parent study. However, Isaac and Michael (1995) suggested 10 – 30 participants. Hence, the rate of increased precision of the result is not linear. Therefore, 20 numbers of representative of participants from the population meet the minimal requirement for the pilot test, and the preliminary survey is developed.

3.4.3 Measurement of Constructs

Morgado et al. (2017) explain that constructing a measurement involves the empirical measurement of a theoretical construct by combining multiple scales at an appropriate level. The quality of the scale can be evaluated by considering the reliability and validity ratios.

3.4.3.1 Nominal Scale

A nominal scale is a qualitative measurement used to measure or determine items. In Section A there will be one question using the nominal scale to collect data. Hence, multiple choice question is given to the targeted respondent as shown in Figure 3.5 below:

Figure 3.5: Nominal Scale, Section A

8) Did your company involved in any green development before?

☐ Yes ☐ No

Source: Research Developed (2022)

3.4.3.2 Likert Scale

Likert scale is the type of question to determine variables in importance, satisfaction, and frequency. Furthermore, this scaling method is also used to identify the behaviour of the respondent. The scale is usually categorized into 5 levels, starting from Strongly Disagree,

Disagree, Neutral, Agree, and lastly Strongly Agree. In Sections B, C, and D Likert scale will be applied to collect data as shown in Figure 3.6 below:

Figure 3.6: Likert Scale, Sections B, C, and D

Section B: Factors Influencing Green Building Concept Development in Greater Kuala Lumpur.

Answer all: Please Circle (O) the following question as, the scale will be listed in the following structure:

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

1) Green Building Concept is important in the Property or Construction industry.

1	2	3	4	5

Source: Research Developed (2022)

3.4.3.3 Personal Opinion Sharing

Personal opinion sharing is to determine further respondent thoughts, opinions, and recommendations which the answer is not provided in Sections B, C, and D. In Section E, will be the personal opinion sharing section as shown in figure 3.7 below:

Figure 3.7: Personal Opinion Sharing, Section E

Section E: Personal Opinion Sharing

How Green Building Concept able to be more generalized to be developed in the future?

……

Source: Research Developed (2022)

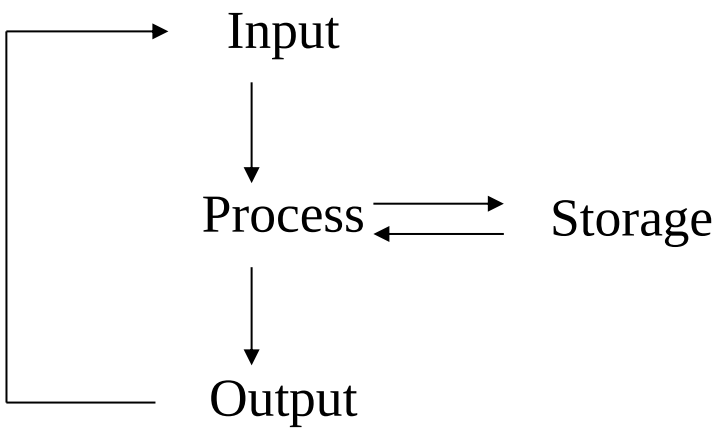
3.5 Data Processing

The process of collecting and transforming a dataset into meaningful information, such as graphs or charts, is known as data processing. In this research, the objective of data processing is to eliminate duplicate data and convert irrelevant data into meaningful information.

3.5.1 Data Processing Steps Diagram

Figure 3.8 depicts data processing as a procedure for gathering and transforming data sets into valuable information. Justice et al. (2002) describe the data processing cycle, which begins with data collection and preparation by extracting raw information from survey questionnaires and eliminating incorrect, unnecessary, or incomplete data to format it suitably for further analysis. The processed data are classified based on quantitative data to adhere to the requirements of the Statistical Package for the Social Sciences (SPSS) application for data entry. A variety of techniques, including multiple regression analysis, will be employed to analyze these data and evaluate both internal and external factors that impact the implementation of the Green Building Concept in Greater Kuala Lumpur. The findings will be presented in tables, diagrams, and vectors. Finally, the data will be stored for future use.

Figure 3.8: Data processing cycle



Source: Justice & etc (2002)

3.5.2 Field Validating and Data Checking

After the data collection stage, the information gathered will be processed in three steps. The first step is to determine the data sample. In this step, a subset of the collected data is selected for validation, rather than checking the entire collection. This is done to make the data-checking process smoother and more efficient. An appropriate amount of data is inputted, and data errors are either corrected or removed entirely.

The second step is to validate the database. In this step, all the data collected is organized into sequences to identify the amount of data points collected and evaluate the source and target data fields. This is important to ensure that all the data collected is accurate, complete, and consistent with the research objectives.

The third and final step is to validate the data format. It involves modifying the data to comply with the required data format. This step is crucial in ensuring that the data is in a usable format for analysis. Modifications will be made to redundant data, irreconcilable or inadequate amounts, faulty formats, and insignificant field data. This will ensure that the data is reliable and valid and that it can be used to draw accurate conclusions and make appropriate recommendations based on the research objectives.

In summary, the three steps of data processing include selecting a subset of the data for validation, organizing the data into sequences for validation, and modifying the data to comply with the required format. These steps are essential for ensuring that the data collected is accurate, reliable, and valid for analysis, which is crucial for drawing valid conclusions and making sound recommendations.

3.6 Data Analysis

Content analysis is a technique used to systematically identify communication patterns in both primary and secondary sources and is commonly used for media analysis. To ensure reliability, at least two independent coders should analyze a portion of the data, and Krippendorff's alpha

may be used to measure inter-rater reliability. Researchers often use color coding to organize information and identify relationships between causes and contributing factors. The data for content analysis may come in various forms, including written, oral, and visual, and will be converted into a text format for citation.

3.6.1 Descriptive Analysis

Frequency analysis is a statistical technique used to analyze the distribution of a particular variable in a data set. It involves counting how often each value of the variable occurs and then presenting the results in the form of a frequency distribution table or graph. Frequency analysis is commonly used to identify patterns or relationships between variables and to determine the most common or frequent values in a data set. For example, in a study on customer satisfaction, frequency analysis can be used to determine the frequency of responses to a particular question, such as "How satisfied are you with our customer service?" (Bryman, 2016).

On the other hand, mean and standard deviation are statistical measures that provide information about the central tendency and variability of a data set. The mean is the average value of a set of numbers, and the standard deviation is a measure of the spread of the data around the mean. Mean and standard deviation are frequently used to describe the basic information about the variables in a data set. For example, in a study on the height of a population, mean and standard deviation can be used to describe the average height and the range of heights in the population (Field, 2013).

Overall, frequency analysis and mean and standard deviation are essential tools in data analysis, as they provide valuable insights into the characteristics of a data set. These measures help to identify trends, patterns, and relationships within the data and can guide further analysis and decision-making processes. By employing these techniques, researchers and analysts can make informed decisions and draw valid conclusions from the data they collect.

3.6.2 Reliability Analysis

The consistency of a research study or test can be determined by examining the correlation among its various sets of data. The coefficient alpha, which is also known as Cronbach's alpha, is used to assess the internal consistency of the items. An alpha value of.70 or higher indicates that the instrument is reliable. To ensure the reliability of the results, they must be tested repeatedly and compared to each other. If the ratings are similar, then the evaluation has good inter-rater reliability, as stated by Heale and Twycross (2015).

3.6.3.1 Relative Importance Index (RII)

Relative Importance Index (RII) is a statistical tool used to determine the importance of different factors or variables in a given dataset or study. RII calculates the relative importance of each factor by comparing the mean scores of each factor and dividing them by the sum of all mean scores. The resulting value ranges from 0 to 1, with a higher value indicating greater importance. RII is widely used in research studies to identify the most significant factors that influence a particular outcome or phenomenon. According to the study conducted by Kumar et al. (2018), "RII is a widely used statistical tool that helps researchers to identify the most critical factors in a dataset and prioritize them for further analysis."

Figure 3.9: Relative Importance Formula (RII)

$$RII = \frac{\sum W}{(A \times N)}$$

Source: Kumar et al. (2018)

3.6.3.2 Correlation Analysis

The use of statistical analysis is crucial in determining the relationship and connections between two variables. A strong correlation between two variables is typically considered when the r value (correlation coefficient) falls between 0.90 and 1.0, indicating a perfect correlation.

When the r value falls between 0.4 and 0.69, it suggests a moderate connection, while a value between 0.70 and 0.89 indicates a substantial association. In the case of the implementation of green building concepts in Greater Kuala Lumpur, a positive correlation between internal and external factors could lead to a quicker adoption of these concepts. Therefore, correlation analysis was employed in this study to explore the relationship between internal and external factors and the implementation of green building concepts in Greater Kuala Lumpur.

3.7 Chapter's Conclusion

In this chapter, a comprehensive range of data designs was covered, which are commonly used to collect data through survey questionnaires. It focused on important aspects such as sample design, sample size, questionnaire design, and analysis. The target respondents for this research are professionals employed in the real estate industry in Greater Kuala Lumpur, and they will be selected using the systematic sample technique.

Initially, the population size was estimated to be 100 using Taro Yamane's formula, but it was later determined by Huaman, Krishna, and Ortiz (2002) that a population size of 50 would suffice to obtain accurate and relevant results. The survey questionnaire is composed of five sections, with Section A comprising multiple choice questions and Sections B to D using Likert scales. Section A gathers information about respondents' demographics and their previous participation in any green projects. Factors that influence the development of green building concepts in Greater Kuala Lumpur are discussed in Section B, while challenges to the implementation of such concepts are covered in Section C. Section D focuses on the strategies for implementing green building concepts in Greater Kuala Lumpur. The final section is dedicated to the sharing of personal opinions.

The next chapter will be using SPSS computer application to analyze respondent comments and continue the discussion.

CHAPTER IV

RESULT AND FINDING

4.0 Introduction

Chapter 4 provides an overview of the results obtained from running the questionnaire on SPSS v22. The chapter begins with a detailed explanation and presentation of the findings obtained from the pilot test conducted. This is important as the pilot test provides insight into the potential challenges and issues that could be encountered in the main survey.

Following the presentation of the pilot test findings, the chapter proceeds to explore the statistical results and findings from SPSS. This includes descriptive analysis and statistics, as well as the inferential analysis of the data. Descriptive statistics include measures such as means, standard deviations, and frequencies, which provide an overview of the data collected. The inferential analysis involves testing hypotheses and making inferences about the population based on the sample data collected.

To ensure a clear understanding of the statistical results, examples would be presented in detail. This would provide a step-by-step guide on how the statistical tests were conducted, and how the results were interpreted.

Finally, the chapter concludes with a summary of the key findings obtained from the statistical analysis. These findings would be further discussed and analyzed in the next chapter, which would provide a detailed interpretation of the results obtained.

4.1 Pilot Study

A pilot test is important to remove any impediments, errors, and issues with the method and instruments used in the study (Kallio *et al.*, 2016). For this research, a total of 20 representatives of the participants from the population participated in the pilot study. For the pilot study, random sampling from the pool of the population was approached with the instrument.

4.1.1 Cronbach Analysis

In this research, 20 respondents were selected to perform a pilot test to assess the reliability of the instruments. Cronbach's alpha internal consistency approach was used to measure the reliability of the instruments. The conducted pilot test with respondents from the pool of the population. According to (Hee and Abidin, 2016), Cronbach's Alpha of 0.6 is categorized as poor, 0.7 as acceptable, and 0.8 is considered good. (Taber, 2018) reported that Cronbach's Alpha of below 0.6 was poor, 0.6 to < 0.7 as moderate, 0.7 to < 0.8 as good, 0.8 to < 0.9 as very good, and ≥ 0.9 as excellent. In Table 4.1, the Cronbach's Alpha reliability test results are shown in Factors Influencing Green Building Concept Development exhibited Cronbach's Alpha value of above 0.963. Hence, these constructs' reliability is considered excellent. Conversely, Challenges of Implementing Green Building Concept constructs' Cronbach's Alpha value was 0.982, therefore these were considered very good and reliable. Moreover, the Strategy Implementing the Green Building Concept constructs Cronbach's Alpha value as 0.967, being very good and excellent. As a final reliability result, the Overall reliability results were 0.988. Therefore, these items required no modifications and were administered for the real study.

Table 4.1: Reliability Statistics

	Cronbach's Alpha	N of Items
(i) Factors Influencing Green Building Concept Development	0.963	6
(ii) Challenges of Implementing Green Building Concept	0.982	7
(iii) Strategy Implementing the Green Building Concept	0.967	6
(iv) Overall reliability	0.988	19

4.2 Construct Validity

The original questionnaire was validated by subject matter experts. In this study, the researcher recommended content validity to measure the validity of the instrument. According to (Cohen, Manion, and Morrison, 2011) content validity refers to how well the issues covered in the study are covered by the scales in the instrument. Therefore, for the current research, the content validity was judged by this researcher and the supervisor, encompassing Green Building Concept Development. Furthermore, the validity of the construct is further strengthened by the extensive literature review that had been performed in Chapter Two. In addition, the results from the pilot test where the Cronbach Alpha validity test indicated results above .90 further validate the strength of the constructs used in the study.

4.3 Descriptive Statistics

This section describes the descriptive statistics of the study. First, the demographic findings of the respondents would be presented. Next, an exploration of the background of the respondents would be depicted. Furthermore, the findings from the questions directly related to Green Building Concept Development in Greater Kuala Lumpur would be postulated.

4.3.1 Demographic Findings

In Table 4.2, a total of 100 responses were received from the participants in the study. As for the age range, the respondents were predominantly in the 20-29 age bracket (42%) and 30-39 (39%). There were only a few who are in the 40-49 (14%) and those above 50 (5%).

Interestingly, 3 of the respondents refused to answer the question on gender, hence a response from 100 respondents was noted. However, this is in line with ethical practice in data collection where the mandatory answer for gender is made redundant, and respondents are free to choose not to answer the question. Nevertheless, the gender ratio is skewed toward male respondents, with over 63% being males and 37% being female respondents.

Next, on the question of ethnicity, the predominant respondents were of Chinese ethnicity at 75% followed by Malays at 15% and Indians at 10%. The skewed respondents, favoring Chinese respondents might not reflect the demographic profile of Malaysia. However, the construction and home development industry had long seen a large presence of the Chinese community in Malaysia, hence the ethnicity of the respondents represents the reality.

Table 4.2: Numbers of Respondents Age, Gender, Ethnicity

Category	Item	Frequency	Percentage (%)
Age	20-29	39	39
	30-39	14	14
	40-49	42	42
	50 and above	5	5
	TOTAL	**100**	**100**
Gender	Male	37	37
	Female	63	63
	TOTAL	**100**	**100**
Ethnicity	Malay	15	15
	Chinese	75	75
	Indian	10	10
	Others	0	0
	TOTAL	**100**	**100**

4.3.2 Background of Respondents

As for the background of respondents (See Table 4.3), a large portion of them, 75% had a degree and 17% had a Master`s or a Doctorate qualification. A large proportion of respondents having tertiary education is relevant here as it represents a professional team at the decision-making level in the construction industry.

This corresponds with the next question which looks into the roles played by the respondents. Over 31% of them were architects and 16% were engineers and 29% are quantity surveyors. This is followed by those in the property sales and marketing sector who made up 12% of the respondents. The large proportion of architects, engineers, and quantity surveyors as respondents in this research is important as it contributes to the element of validation, where the findings would reflect the opinions of the actual decision-makers and those who are involved in the design of green building initiatives.

Following, the duration of working experiences among the respondents indicates a more equitable profile. Over 25% had worked in the industry for more than 9 years while those who had worked for 6-9 years represent 26% while a slight majority of respondents (33%) had worked in the property and construction field for 3-6 years. The level playing field in the industry is vital as the idea of green initiatives in construction is only catching up. Also, the presence of an older, more experienced workforce is important to indicate how the more established workforce would respond to the changes occurring in the industry.

The final question in this category looks into the previous involvement of the companies in Green Building Concept Development. Expectedly, the Green Building Concept-based construction industry and development is quite novel in Malaysia and is slowly catching up. Out of 100 responses, only 9 respondents had prior experience in green development initiatives. Most companies, at 91 companies, have had no prior involvement in green development.

Table 4.3: Numbers of Respondents

Academic level, Job Role, Working Experience, Classify, Involvement

Category	Item	Frequency	Percentage (%)
Academic level	Lower than SPM	0	0
	O-Level/SPM	3	3
	A-Level/STPM/Certificate/Diploma	5	5
	Bachelor's Degree	75	75
	Master/Doctorate	17	17
	TOTAL	**100**	**100**
Job role	Architect	31	31
	Engineer	16	16
	Quantity Surveyor	29	29
	Contractor	9	9
	Developer	3	3
	Property Sales & Marketing	12	12
	TOTAL	**100**	**100**
Working Experience	Less than 3 years	16	16
	3 to 6 years	33	33
	6 to 9 years	26	26
	9 years and above	25	25
	TOTAL	**100**	**100**
Role Classification	Director/CEO	8	8
	Senior GM/Manager	3	3
	Manager/Assistant Manager	15	15
	Senior Executive/Executive	74	74
	TOTAL	**100**	**100**
Candidates involve in green building	Yes	9	9
	No	91	91
	TOTAL	**100**	**100**

4.4. Factors Influencing Green Building Concept Development in Greater Kuala Lumpur

The paragraph discusses the results of a survey conducted in Greater Kuala Lumpur about the importance of green building concepts in the property sector. The survey found that a majority of respondents (over 72%) agree that green building concepts are important, and an overwhelming majority (over 91%) believe that they can reduce the damaging impact on the environment while enhancing human life quality.

However, the survey also found that there is a lack of government support in promoting green building concepts in Greater Kuala Lumpur, with over 54% of respondents disagreeing with the statement that the government is incentivizing the industry, and a large percentage (18.8%) remaining neutral.

Additionally, the survey included some descriptive analysis of the respondents' opinions about green building concepts. The mean score for the link between green building concepts and their importance to the industry was 3.76, with a standard deviation of 0.878. The mean score for the link between green building concepts and human living quality was 4.06, with a lower standard deviation of 0.544, indicating that respondents had a more consistent opinion about this link.

The survey also found that most respondents had a similar opinion about the belief that green building concepts would develop a better organizational culture in protecting the environment, but opinions were more varied, with a high standard deviation of 0.934 and a mean score of 3.74.

In terms of internal factors, the survey found that the respondents believe that the green building concept is important in the property or construction industry, with a relative importance index of 0.752 and ranking number 1. Green building concept systems are also seen as very important in all development in Greater Kuala Lumpur, with a relative importance index of 0.75 and ranking number 2. However, the respondents did not see

incentive support by the government as being well in promoting the green building concept in Greater Kuala Lumpur, with a relative importance index of 0.462 and ranking number 3.

Whereas external factors, these findings suggest that respondents in the survey believe that green building concepts can have a positive impact on both the environment and human living quality and that implementing these concepts can lead to a better organizational culture for protecting the environment. These factors are seen as important, with a high relative importance index and ranking number. It is worth noting that the relative importance index for the external factors is higher than the index for the internal factors related to government support for promoting green building concepts. This suggests that respondents may believe that external factors, such as the impact on the environment and human well-being, are more important in promoting the use of green building concepts than internal factors such as government incentives.

Table 4.4: Data of Factors Influencing Green Building Concept Development in Greater Kuala Lumpur

Category	Item	Frequency	Percentage (%)
Green Building Concept is important in the Property or Construction industry.	Strongly disagree	3	3
	Disagree	10	10
	Neutral	5	5
	Agree	72	72
	Strongly Agree	10	10
	TOTAL	**100**	**100**
Green Building Concept can reduce the damaging impact on our environment.	Strongly disagree	1	1
	Disagree	1	1
	Neutral	6	6
	Agree	81	81
	Strongly Agree	11	11
	TOTAL	**100**	**100**
Green Building Concept can enhance human living quality.	Strongly disagree	1	1
	Disagree	0	0
	Neutral	6	6
	Agree	78	78
	Strongly Agree	15	15
	TOTAL	**100**	**100**
Incentive support by the government is well in promoting Green Building Concept in Greater Kuala Lumpur.	Strongly disagree	15	15
	Disagree	54	54
	Neutral	19	19
	Agree	9	9
	Strongly Agree	3	3
	TOTAL	**100**	**100**
Green Building Concept systems are very important in all development in Greater Kuala Lumpur.	Strongly disagree	3	3
	Disagree	10	10
	Neutral	7	7
	Agree	69	69

	Strongly Agree	11	11
	TOTAL	**100**	**100**
Green Building Concept will develop a better organizational culture in protecting our environment.	Strongly disagree	3	3
	Disagree	11	11
	Neutral	8	8
	Agree	65	65
	Strongly Agree	13	13
	TOTAL	**100**	**100**

Table 4.5: Descriptive Statistics of Factors Influencing Green Building Concept Development in Greater Kuala Lumpur

	N	Min.	Max.	Mean	Std. Deviation	RII	Rank
Internal Factor							
Incentive support by the government is well in promoting Green Building Concept in Greater Kuala Lumpur.	100	1	5	2.31	.935	0.462	3
Green Building Concept systems are very important in all development in Greater Kuala Lumpur.	100	1	5	3.75	.888	0.75	2
Green Building Concept is important in the Property or Construction industry.	100	1	5	3.76	.878	0.752	1
External factor							
Green Building Concept will develop a better organizational culture in protecting our environment.	100	1	5	3.74	.934	0.748	3
Green Building Concept can reduce the damaging impact on our environment.	100	1	5	4.00	.548	0.8	2
Green Building Concept can enhance human living quality.	100	1	5	4.06	.544	0.812	1

4.5. The Challenges of Implementing Green Building Concept in Greater Kuala Lumpur

The paragraph discusses the results of a survey conducted in Greater Kuala Lumpur about the factors inhibiting the development of green building concepts in the region (See Table 4.6). The survey found that respondents generally agreed that a lack of consumer awareness, professional support, technological support, and incentive support had affected the development of green building concepts in Greater Kuala Lumpur. Additionally, respondents identified the high cost associated with the concept, pricing factors, and low consumer demand as inhibiting factors.

For the descriptive analysis, the lack of consumer awareness and lack of consumer demand received high mean scores of 4.54 and 4.65, respectively, indicating that respondents viewed these factors as having a significant impact on the development of green building concepts. However, these factors also had a high standard deviation, indicating a wide range of opinions among the respondents.

In terms of internal factors, the survey found that respondents believed that a lack of consumer demand was the most important factor inhibiting the development of green building concepts, with a high relative importance index of 0.936. The lack of incentive support was also seen as a significant factor, with a relative importance index of 0.934.

External factors such as high cost and pricing factors were also identified as important inhibiting factors, with high relative importance indices of 0.946 and 0.936, respectively. Lack of consumer awareness was also seen as an important external factor, with a relative importance index of 0.908.

Overall, the survey results indicate that there are various factors inhibiting the development of green building concepts in Greater Kuala Lumpur, including both internal and external factors. Addressing these factors will be important in promoting the adoption and development of sustainable building practices in the region.

Table 4.6: Data of The Challenges of Implementing Green Building Concept in Greater Kuala Lumpur

Category	Item	Frequency	Percentage (%)
Lack of Consumer Awareness will affect the Green Building Concept development in Greater Kuala Lumpur.	Strongly disagree	1	1
	Disagree	0	0
	Neutral	0	0
	Agree	42	42
	Strongly Agree	57	57
	TOTAL	**100**	**100**
Lack of Professional Support will affect the Green Building Concept development in Greater Kuala Lumpur.	Strongly disagree	1	1
	Disagree	0	0
	Neutral	1	1
	Agree	35	35
	Strongly Agree	63	63
	TOTAL	**100**	**100**
Lack of Technology Support will affect the Green Building Concept development in Greater Kuala Lumpur.	Strongly disagree	1	1
	Disagree	0	0
	Neutral	0	0
	Agree	34	34
	Strongly Agree	65	65
	TOTAL	**100**	**100**
Lack of Incentive Support will affect the Green Building Concept development in Greater Kuala Lumpur.	Strongly disagree	1	1
	Disagree	0	0
	Neutral	0	0
	Agree	29	29
	Strongly Agree	70	70
	TOTAL	**100**	**100**
High Cost will affect the Green Building Concept development in Greater Kuala Lumpur.	Strongly disagree	1	1
	Disagree	0	0
	Neutral	0	0
	Agree	23	23
	Strongly Agree	76	76
	TOTAL	**100**	**100**

The pricing factor will affect the Green Building Concept development in Greater Kuala Lumpur.	Strongly disagree	1	1
	Disagree	0	0
	Neutral	1	1
	Agree	26	26
	Strongly Agree	72	72
	TOTAL	**100**	**100**
Lack of Consumer Demand will affect the Green Building Concept development in Greater Kuala Lumpur.	Strongly disagree	1	1
	Disagree	0	0
	Neutral	1	1
	Agree	31	31
	Strongly Agree	68	68
	TOTAL	**100**	**100**

Table 4.7: Descriptive Statistics of The Challenges of Implementing Green Building Concept in Greater Kuala Lumpur

	N	Min.	Max.	Mean	Std. Deviation	RII	Rank
Internal Factor							
Lack of Consumer Demand will affect the Green Building Concept development in Greater Kuala Lumpur.	100	1	5	4.65	0.592	0.936	1
Lack of Professional Support will affect the Green Building Concept development in Greater Kuala Lumpur.	100	1	5	4.59	0.619	0.918	4
Lack of Technology Support will affect the Green Building Concept development in Greater Kuala Lumpur.	100	1	5	4.62	0.601	0.924	3
Lack of Incentive Support will affect the Green Building Concept development in Greater Kuala Lumpur.	100	1	5	4.67	0.585	0.934	2
External factor							
Lack of Consumer Awareness will affect the Green Building Concept development in Greater Kuala Lumpur.	100	1	5	4.54	0.610	0.908	3
The pricing factor will affect the Green Building Concept development in Greater Kuala Lumpur.	100	1	5	4.68	0.601	0.936	2
High Cost will affect the Green Building Concept development in Greater Kuala Lumpur.	100	1	5	4.73	0.566	0.946	1

4.6. The Strategy Implementing Green Building Concept in Greater Kuala Lumpur

Table 4.8 suggests that while there are challenges to the development of the green building concept in Greater Kuala Lumpur, there is also optimism for its future growth. Respondents agreed that a lack of consumer awareness, professional support, technological support, and incentive support has affected the development of the green building concept, while high costs and low consumer demand are also factors inhibiting its growth.

In terms of specific factors, lack of consumer demand and lack of incentive support are seen as internal factors that will affect green building concept development, with relative importance indexes of 0.936 and 0.934, respectively (See table 4.9). Lack of technical support and lack of professional support is also important internal factors, with relative importance indexes of 0.924 and 0.918, respectively. On the external factors side, high cost and pricing factors are identified as important factors that inhibit the growth of the green building concept, with relative importance indexes of 0.946 and 0.936, respectively. Lack of consumer awareness is also an external factor that is seen as inhibiting green building concept development, with a relative importance index of 0.908.

Despite these challenges, the paragraph suggests that there is a positive outlook for the future of the green building concept in Greater Kuala Lumpur. Respondents indicated that technological support, more incentives from the government, lower green costs, and more affordable prices are all factors that would enhance the popularity of the green building concept. Respondents largely agree that consumer awareness enhances the green building concept, while results were mixed for the question of whether technology support enhances its popularity. On the choice of incentive support by the government to developers, respondents largely agree that it would enhance the popularity of the green building concept.

Table 4.8: Data of The Strategy Implementing Green Building Concept in Greater Kuala Lumpur

Category	Item	Frequency	Percentage (%)
Consumer Awareness will enhance the Green Building Concept development in Greater Kuala Lumpur.	Strongly disagree	1	1
	Disagree	2	2
	Neutral	1	1
	Agree	51	51
	Strongly Agree	45	45
	TOTAL	**100**	**100**
The professional support to developers or contractors will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.	Strongly disagree	1	1
	Disagree	0	0
	Neutral	1	1
	Agree	58	58
	Strongly Agree	40	40
	TOTAL	**100**	**100**
The technical support to developers or contractors will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.	Strongly disagree	1	1
	Disagree	0	0
	Neutral	0	0
	Agree	59	59
	Strongly Agree	40	40
	TOTAL	**100**	**100**
The incentive support by the government to developers or contractors will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.	Strongly disagree	1	1
	Disagree	0	0
	Neutral	0	0
	Agree	50	50
	Strongly Agree	49	49
	TOTAL	**100**	**100**
The reduced cost of green materials will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.	Strongly disagree	1	1
	Disagree	0	0
	Neutral	3	3
	Agree	53	53
	Strongly Agree	43	43

	TOTAL	**100**	**100**
The more affordable price of green buildings will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.	Strongly disagree	1	1
	Disagree	0	0
	Neutral	1	1
	Agree	51	51
	Strongly Agree	47	47
	TOTAL	**100**	**100**

Table 4.9: Descriptive Statistics of The Strategy Implementing Green Building Concept in Greater Kuala Lumpur

	N	Min.	Max.	Mean	Std. Deviation	RII	Rank
Internal Factor							
The professional support to developers or contractors will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.	100	1	5	4.36	0.612	0.872	3
The technical support to developers or contractors will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.	100	1	5	4.37	0.595	0.874	2
The incentive support by the government to developers or contractors will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.	100	1	5	4.46	0.609	0.892	1
External factor							
Consumer Awareness will enhance the Green Building Concept development in Greater Kuala Lumpur.	100	1	5	4.37	0.703	0.874	2/3
The reduced cost of green materials will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.	100	1	5	4.38	0.646	0.874	2/3
The more affordable price of green buildings will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.	100	1	5	4.43	0.622	0.886	1

Table 4.10: Opinion of Respondents on how the Green Building Concept can be generalized to be developed in the future.

	Theme	Strategy	Number of Respondents	Percentage %
1	Government Initiative	Tax cuts, matching grants, R&D grants, priority government contracts.	33	32.7%
2	Consumer Awareness	Increase consumer awareness, and education on the importance of green buildings.	24	23.8%
3	Lower Commercial Cost	Lowering construction costs, imported green technology should be cheaper.	14	13.9%
4	Education for Architects	Include green building design technology as a mandatory subject for architects in universities.	6	5.9%
Total			77	76.24%

In Table 4.10 over 77 (76.24%) respondents answered the open question on the opinion of respondents on how green building concepts can be generalized and developed in the future. From a thematic analysis of the responses, the four main keywords can be determined from all the responses. Most of the respondents favored greater government incentives in the form of tax breaks, grants, and incentives for R&D. Meanwhile, many had also noted the importance of consumer awareness, along with the reduction of commercial costs. Interestingly, over 6 respondents mentioned the need for the introduction of green building concepts in architectural schools.

4.7 Correlation and Relationship Analysis Between Independent and Dependent Variables

Table 4.11: Internal Factor Correlations Analysis

Correlations

		the internal factor of industry players' barriers	implementing green building concepts
the internal factor of industry players' barriers	Pearson Correlation	1	.458**
	Sig. (2-tailed)		.000
	N	100	100
implementing green building concepts	Pearson Correlation	.458**	1
	Sig. (2-tailed)	.000	
	N	100	100

**. Correlation is significant at the 0.01 level (2-tailed).

The paragraph highlights the positive relationship between internal factors and the implementation of green building concepts in the Greater Kuala Lumpur area. The internal factors that were analyzed include consumer awareness, professional support, technological support, incentives, costing, pricing, and consumer demand. The Pearson correlation coefficient, which is a statistical measure of the strength and direction of the linear relationship between two variables, was calculated and found to be .458. (See Table 4.11) This indicates a moderate positive correlation between internal factors and the barriers faced by industry players in the implementation of green building concepts.

This suggests that industry players face challenges in implementing green building concepts due to internal factors such as a lack of awareness and support, as well as high costs and low consumer demand. However, the fact that there is a moderate positive correlation between these internal factors and the implementation of green building concepts means that progress can be made by addressing these barriers. For instance, raising awareness among consumers and providing incentives and technological support to industry players can go a long way in promoting the implementation of green building concepts.

In addition to these factors, there may be other internal barriers that were not analyzed in the study. For example, the lack of expertise and training in green building techniques among industry players may be another significant barrier. Additionally, regulatory hurdles and issues related to obtaining necessary permits and approvals may also be important internal factors that need to be addressed to promote the implementation of green building concepts.

Table 4.12: External Factor Correlations Analysis

Correlations

		external factor of industry players' barrier	implementing green building concepts
external factor of industry players' barrier	Pearson Correlation	1	.308**
	Sig. (2-tailed)		.002
	N	100	100
implementing green building concepts	Pearson Correlation	.308**	1
	Sig. (2-tailed)	.002	
	N	100	100

**. Correlation is significant at the 0.01 level (2-tailed).

The results suggest that external factors also play a role in the implementation of green building concepts in Greater Kuala Lumpur. Environmental factors, such as climate change and natural resource depletion, can increase the demand for green buildings, while economic factors, such as the cost of energy and materials, can affect the feasibility of implementing green building practices. Social factors, such as public awareness and demand for sustainable development, can also influence the adoption of green building concepts. The Pearson correlation coefficient, which is a statistical measure of the strength and direction of the linear relationship between two variables, was calculated and found to be .308. (See Table 4.12)

Furthermore, market factors, such as competition and demand from customers, can encourage developers and builders to adopt green building practices. Organizational factors, such as government policies and regulations, can also shape the incentives and barriers to implementing green building concepts.

Although the correlation between external factors and the implementation of green building concepts is weaker compared to internal factors, it is still significant. It indicates that external factors should not be ignored in the efforts to promote and implement green building practices in Greater Kuala Lumpur. Policymakers and industry players should consider both internal and external factors when designing strategies to overcome barriers and promote the adoption of green building concepts.

4.8 Chapter's Conclusion

The first category of findings presented in this chapter is descriptive analysis, which provides an overview of the opinions of the respondents on green building development in Greater Kuala Lumpur. The analysis was conducted using SPSS software, which helped to identify patterns and trends in the responses. The descriptive statistics provide an idea of the range of responses and the level of agreement among the respondents. The demographic profile of the respondents is also presented, which provides insights into the characteristics of the sample population.

The second category of findings is the thematic analysis of the responses, which led to the identification of four main keywords. Thematic analysis is a qualitative research method used to identify patterns and themes in textual data. The four main keywords identified in this study provide a clear picture of the key issues and concerns that the respondents have regarding green building development in Greater Kuala Lumpur. These keywords can serve as a basis for further research and policy development in this area.

To further elaborate on the findings, it is important to consider the limitations of the study. For example, the sample population may not be representative of the entire population of industry players in Greater Kuala Lumpur. Additionally, the study was conducted using a self-administered questionnaire, which may have led to biased responses. It is important to acknowledge these limitations and to use caution when interpreting the findings of the study. Nonetheless, the findings presented in this chapter provide valuable insights into the attitudes and perceptions of industry players towards green building development in Greater Kuala Lumpur.

CHAPTER V

DISCUSSIONS AND CONCLUSION

5.0 Introduction

This chapter extends the findings of the study by providing discussions. First, a general discussion of the findings of the research is presented. Next, the research questions are answered through analysis and further discussions. Then, the hypotheses of the research are tested. After that, an overview of the limitations of the study and prospects for future research are given before the research is concluded.

5.1 Summary of Statistical Analyses

The results of this study reveal that the stakeholders in the construction industry of Kuala Lumpur have a positive outlook toward the concept of green building. However, the implementation of such concepts in the design plans of buildings is not widespread. This highlights the need for the industry to focus on overcoming the barriers identified in this study to promote the development of green building concepts in Kuala Lumpur. The study findings suggest that the industry needs to increase its investment in internal factors to encourage the growth of green building concepts. While external factors play a role, the industry needs to take the lead in promoting green building concepts. By identifying and addressing the specific reasons for the industry's reluctance, policymakers and practitioners can work together to create a framework for the development of the green building industry in Malaysia.

5.2. Discussions of Major Findings

5.2.1 Discussion Objective One: To Determine the Main Internal Factors and External Factors That Influence the Green Building Concept Developed in Malaysia.

5.2.1.1 Internal factors

Discussions: From the findings of the research the internal and external factors influencing green building concept development in Malaysia can be unearthed. As discussed in the previous chapter, the relationship between internal industrial factors, which includes awareness, professional support, technological support, incentives, costing, pricing, and consumer demand with implementing green of green building concepts is positive. However, the relationship is more on a moderate scale. The results also indicate that a lack of internal motivating factors is one of the major inhibitors of green building concept development in Malaysia.

Several internal factors such as the lack of technological support are related to both cost and industrial culture in Malaysia. Abidin and Azizi, (2021) noted that in Malaysia, industrial tendency tends to be on the user front. Malaysia does not have an active Research and Design (R&D) culture. This is evident in the job scope of Malaysian employees, where practical and industrial-based training is preferred over fundamental sciences. Moreover, the lack of economic incentives, where the higher cost involved in R&D might not translate into profitability for the industry.

In the case of Malaysia, according to research by AllianceDBS Research, based on figures provided by the Construction Industry Development Board (CIDB), in 2015, foreign contractors secured 15.4 percent of the overall construction project value, which is equal to RM19 billion (Tuah, 2017). It was also said that the bulk of the projects in which these international contractors had a hand were worth an average of RM250 million, with the residential development with the greatest value coming in at RM3.6 billion. Accordingly, Chinese contractors are in the lead in terms of value, with a total of RM8 billion worth of contracts (distributed over 25 projects) (Tuah, 2017). As such, the involvement of foreign firms,

especially from China that can undertake R&D in China, with lower cost and a larger domestic market makes it redundant for Malaysian construction firms to invest so much in research when Malaysian construction players are not involved in the international market extensively.

Therefore, unless green building concepts are brought in by the international construction industry players, or if there are cheaper alternatives through academia and industrial collaborations, the internal incentives through technological support would still be left wanting. Moreover, the incentives for technology are also inhibited by cost factors. Malaysia, with a rudimentary research culture, faces issues in the buying or creation of new technological items. It can be argued that the government should pour in incentives for technological procurement, as a way to stimulate internal incentives. However, government involvement with public money had its limitations (Wong et al., 2021). Successful innovations such as SpaceX, Tesla, and other mega companies are reliant on private funding and not public coffers.

Similarly, internal factors such as professional support are also lacking. Although the average relationship between such internal factors with support for green building concept development can be rationalized by the lack of sufficient support structure. Environmentally friendly, green concepts are quite new in Malaysia. As described by Olanrewaju and Chong, (2021), the concept is still seen as something fashionable and trendy. As such, green concepts are often seen from the perspective of post-construction or interior decoration. Therefore, the expertise and professional architects and designers are often co-opted in the interior design field and rarely the building concept.

Nevertheless, there are also experts in the field who try to inculcate green-based technology in the design and building of office blocks. There is the Malaysia Green Building Council that provides expertise to those who are interested, and there are over 17 certified green buildings in Malaysia in 2021 (Solla et al., 2022). However, the concept of green building here often extends only to green-based services, energy conservation, water wastage, and other related green-based incentives, and rarely do the services cover elements such as green initiatives in the building sector. Nevertheless, the prospect of having experts who are related to the field is a welcome addition.

Another internal factor that influences green building development in Malaysia is the price and cost. The higher prices related to green building materials are also a prohibitive factor. The higher cost, which Yeo, (2021), stated can increase the construction budget to upwards of 11% is related to the fact that many of the items, raw materials, recycled items, and technology used in such buildings are new or are imported. Although initial costs are high, green buildings have the potential to provide their occupants with energy savings of at least 30 to 40 percent as compared to the typical baseline building. Nevertheless, the benefits are mostly related to the end users or the building users. Hence, a cost increase in the construction of the building by the contractors would need to be transferred to house buyers. As such, green buildings become premium in price. Nevertheless, this can also be used as a marketing and branding strategy, especially with Green Building Index or the buildings can partake in competitions for awards. Therefore, there is also the incentive for marketing and branding, although the initial costs are high. However, most buildings are intended to be functionary, especially more medium-ranged shop lots, small office buildings, and even residential houses at the affordable range. It would be more practical for the industry to use cheaper regular material, that is more easily accessible to keep the costs down. Moreover, the smaller scale contractors and subcontractors often rely on smaller-sized suppliers, for whom construction materials are purchased at a more discounted rate and not reliant on technology. Therefore, cost remains a prohibitive factor for the more medium, and lower-range construction buildings. Green building costs are more readily absorbed by the more upmarket industry, office buildings, and residential projects. Hence, for the time being, it makes sense for the industry to concentrate on this sector first.

5.2.1.2 External factors

As for the external factors, the relationship between external industrial factors, which include environmental, economic, social, market, and organizational factors with implementing green of green building concepts is positive. However, a weaker relationship was noted between external factors and green building concepts.

Take environmental factors for instance, it can be argued that environmental awareness in Malaysia is slightly on the lower side (Ong et al., 2021). This is because the effects of climate change had not been felt in Malaysia, due to its more moderate temperature all year round. Moreover, environmental concerns often tend to be related to conservation efforts of the forest, animals, and other related efforts (Ong et al., 2021). The level of awareness or effort to link environmental concerns with green building materials is rudimentary at best. This extends to both the government and private sectors. The main incentive and point of consideration for buildings in Malaysia tend to be cost-saving measures and not environmental concerns. Nevertheless, buildings tend to include green decorative elements to the buildings, although these tend to be cursory at best. Hence, it is evident that environmental concerns do not influence green building concepts in Malaysia all that much.

Similarly, social factors are at play as well. According to Mustaffa et al., (2021), the tendency to pick green-based buildings in Malaysia is mostly relegated to the premium market. This includes premium buildings such as prestigious office buildings located at premium addresses such as Bangsar, and Golden Triangle in Kuala Lumpur, and exclusive residential homes, such as super condominiums and properties with prices above average. The premium cost associated with the building can often be transferred to the selling price of the units, and consumers are still drawn to the unit due to the marketing and branding opportunities available. Therefore, social factors do not play a significant role in green building development as the social demand is still exclusive and niche.

On another note, market and organizational factors and their relationship with green building development as external factors appear to have a weak relationship as well. This can be explained away by the other rational arguments previously. Being a new technology, a new movement, and a new appeal, the push for green building development remains rudimentary at best. The push by the government with tax breaks or other incentives is left wanting, with very few government involvements. Therefore, it is up to the private sector. One such organization, Green Building Index Sdn Bhd created its green building index that provides accreditation to construction companies that seek to attain a green building rating (Mustaffa et al., 2021). The indexing tools are internationally accredited. Companies can apply for accreditation, and the company would provide the tools and means for how each evaluation is done. This serves as a guide for organizations to conform to green building initiatives. Nevertheless, this is a corporate private endeavor by a company. Listing, and application to get into the index listing remain entirely voluntary. Arguably, the incentive for construction companies to get into this rating remains low and there are only 17 certified green buildings as of 2021 out of thousands of construction projects in Malaysia (Solla et al., 2022). Therefore, it can be argued that organization factors do exist, but the market for such listing, green building, and such remains rudimentary. Hence, it can be argued that the low level of relationship between the two is justified. While the organization is still trying to develop the index, the market demand is still left wanting.

5.2.2 Discussion Objective Two: To Evaluate the Most Challenges Internal Factors and External Factors That Influence the Green Building Concept Across Industry Players in Greater Kuala Lumpur, Malaysia

Green building Concepts have the potential to mitigate the impact of climate change and promote sustainable development. However, the adoption of these practices is still relatively low in some parts of the world, including Malaysia. In this study, one of the objectives is to evaluate the most challenging internal and external factors that influence the adoption of the Green Building Concept among industry players in Greater Kuala Lumpur.

Based on the conducted survey of industry players in the property and construction sectors. The survey covered various internal factors such as organizational culture, leadership, and resources, as well as external factors such as regulatory frameworks, market demand, and access to financing. The obtained result found that lack of consumer demand is a significant internal factor that affects the development of green building concepts in Greater Kuala Lumpur. This finding is consistent with previous studies that have identified consumer preferences as a key driver of green building adoption (Janda and Parikh, 2011). The lack of consumer demand refers to the fact that there is not enough interest or demand from consumers for green buildings in Greater Kuala Lumpur. This lack of demand can have a significant impact on the development of green building concepts in the region because developers and other industry players may be less motivated to invest in green building practices if they don't believe there is sufficient demand from consumers.

This lack of demand could be due to several factors. For example, consumers may not be aware of the benefits of green buildings, or they may prefer lower-cost options that do not incorporate green building practices. Therefore, there may be a need for education and awareness campaigns to increase consumer demand and highlight the benefits of green buildings. These campaigns could include information about the environmental benefits of green buildings, as well as information about how green buildings can be more cost-effective in the long run due to lower operating costs.

Overall, the lack of consumer demand is an important internal factor that can impact the development of green building concepts in Greater Kuala Lumpur. Addressing this factor may require a multi-faceted approach that includes education and awareness campaigns, as well as incentives for developers to invest in green building practices.

Furthermore, the results found that high cost is a significant external factor that affects the development of green building concepts in Greater Kuala Lumpur. This finding is consistent with previous studies that have identified high initial costs as a barrier to green building adoption (Dwaikat and Ali, 2017). The high cost of green building practices is an external factor that can significantly impact the development of green building concepts in Greater Kuala Lumpur. Green building practices often require specialized materials and technologies that can be more expensive than traditional building materials, and additional design and construction requirements can also increase costs.

This high cost can be a barrier for developers and other industry players who are considering investing in green building practices. If the costs of building green are significantly higher than traditional building practices, developers may be less likely to pursue green building projects. Additionally, consumers may also be less likely to purchase or rent green buildings if they are priced significantly higher than traditional buildings.

To address this external factor, incentives, and subsidies may be necessary to encourage the use of green building practices. For example, governments and other organizations could offer tax incentives, grants, or other financial incentives to developers who build green. Incentives could also be offered to consumers who purchase or rent green buildings, such as lower utility bills or tax breaks. These types of incentives can help to offset the additional costs of building green and make green building practices more accessible to developers and consumers alike.

In summary, the high cost of green building practices is an external factor that can impact the development of green building concepts in Greater Kuala Lumpur. Addressing this factor may

require the use of incentives and subsidies to encourage the use of green building practices and make them more accessible to developers and consumers.

5.2.3 Discussion Objective Three: To propose the strategies between internal factors and external factors to encourage industry players to adopt Green Building Concept in Malaysia.

Based on the responses, industry players had laid out several methods with which green building development in Malaysia can be accelerated. It is vital for the government in the first place to provide incentives.

First, the industrial push remains profit-oriented with minimal effort put into fundamental research. Therefore, the government can get the movement going by providing tax cuts for certain green building equipment that needs to be imported. This creates an incentive for the industry to bring in newer technology at lower rates. On another note, most large megaprojects are related to the government, hence, to spearhead the effort, government contract awards can be prioritized to companies that invest in green building incentives. Even with more premium pricing, the projects would set new barriers for the industry to follow. Apart from that, universities can be given research grants in green building studies. The industry can be given the option to create joint ventures with universities to study localized green-based efforts.

Secondly, consumers need to be aware of green buildings in Malaysia. Their understanding of green buildings can be expanded by including a green building showcase during the property expo. In addition, roadshows by the construction and property sector can include green elements beyond what is expected by buyers. The industry needs to spearhead efforts to introduce green incentives to the public.

Third, green building costs should become cheaper if the development of green buildings is to develop in Malaysia. Instead of just expecting the government to reduce tariffs and give tax incentives, the industry can also contribute by designing a building using recyclable materials or designing them in such a way that costs can be reduced. For example, instead of building

large, clustered halls, create the industry architect can create open space hallways with great ventilation, which in turn would save energy costs and reduce construction costs. The industry should also push suppliers to make more green-based construction materials available. As demand increases, costs naturally reduce.

Fourth, the industry itself needs to be re-energized. Architects who are still subscribing to the old school of thought should change their perceptions. While it is true that customer demand should shape the market, it is also in the hands of architects to create green-based buildings so that customer demand would increase. This can be done by creating a new batch of architects who do not see a green building as something new or vogue, but rather include it as a basic design philosophy. This can be attained by including green building syllabus in architectural schools. As more architectural students get exposed to green building concepts, it would eventually become a norm in the industry.

5.3 Testing the Hypotheses

The study aimed to examine the internal and external factors affecting the implementation of green building concepts across industry players in Greater Kuala Lumpur. The first hypothesis tested was that there is a negative relationship between the internal factor of industry players' barriers to implementing green building concepts in Greater Kuala Lumpur. This hypothesis was rejected, indicating that industry players' barriers to implementing green building concepts are not negatively related to the development of green building concepts in the region.

The second hypothesis tested was that there is a positive relationship between the internal factor of industry players' barriers to implementing green building concepts in Greater Kuala Lumpur. This hypothesis was accepted, indicating that industry players' barriers to implementing green building concepts are positively related to the development of green building concepts in the region. This suggests that addressing internal barriers to implementing green building concepts, such as lack of knowledge and expertise, may be an important factor in promoting the development of green buildings in Greater Kuala Lumpur.

The third hypothesis tested was that there is a negative relationship between the external factor of industry players' barriers to implementing green building concepts in Greater Kuala Lumpur. This hypothesis was rejected, indicating that external barriers, such as high costs, are not negatively related to the development of green building concepts in the region.

Finally, the fourth hypothesis tested was that there is a positive relationship between the external factor of industry players' barriers to implementing green building concepts in Greater Kuala Lumpur. This hypothesis was accepted, indicating that external barriers to implementing green building concepts, such as high costs, are positively related to the development of green building concepts in the region. This suggests that addressing external barriers to implementing green building concepts, such as through incentives and subsidies, may be an important factor in promoting the development of green buildings in Greater Kuala Lumpur.

5.4 Implication of the Study

5.4.1 Managerial Implication

The findings of this study have significant implications for policymakers and practitioners in the green building industry in Malaysia. Specifically, the results suggest that policymakers should focus on addressing internal barriers to implementing green building concepts, such as by providing education and training programs for industry players (Tan, et al., 2020). This can help to improve the knowledge and expertise of industry players and, in turn, promote the development of green buildings.

Furthermore, practitioners in the green building industry should also focus on addressing internal barriers to implementing green building concepts, such as by investing in research and development to improve the efficiency and cost-effectiveness of green building technologies (Tan, et al., 2020).

In terms of external barriers, policymakers should consider providing incentives and subsidies to promote the adoption of green building concepts, particularly for small and medium-sized enterprises (SMEs) who may face higher costs in implementing green building technologies (Tan, et al., 2020). This can help to reduce the financial burden on SMEs and encourage greater adoption of green building concepts across the industry.

Overall, the results of this study suggest that a concerted effort is needed from both policymakers and industry players to promote the development of green buildings in Malaysia. By addressing both internal and external barriers to implementing green building concepts, the industry can move towards a more sustainable and environmentally friendly future (Tan, et al., 2020).

5.5 Limitations of the Study

The limitations of this study must be considered while interpreting the results. One of the main limitations is the sample size, as only 100 respondents were included in the study. Given the large size of the construction industry in the Klang Valley, this sample size may not be fully representative of the industry. Additionally, the research focused on major players in the industry, which may not reflect the views of smaller construction firms that engage in smaller projects. Therefore, the results may not generalize to the industry as a whole. Future research could benefit from expanding the sample size by collaborating with industry associations, such as the Real Estate and Housing Developers' Association (REHDA) Institute, to include a wider range of contacts in the construction industry. Moreover, the use of online tools may have also posed a limitation as it may have restricted the type of respondents to those who are more technologically inclined, while other groups may not have been reached. To address this limitation, future research may adopt a mixed-method approach that uses both online tools and physical questionnaires, which would increase the likelihood of reaching a more diverse group of respondents.

5.6 Recommendations for Future Research

Several opportunities are available to expand the research. Green building development isn’t confined to Klang Valley alone. The Penang metropolitan area and Johor Bharu see active construction of skyscrapers. Therefore, future research should include these areas before a larger study encompassing the whole of Malaysia can be considered.

Also, the research only hears the voices of those in the industry. This can be expanded to property owners and prospective buyers on their preferences. The study would then be able to understand the demand sentiments.

Another important point for future studies is the use of a mixed approach to data collection. While the current study used Google Forms for data collection, future studies could also

consider using physical questionnaires that can be distributed at construction and property-related events. This approach would enable researchers to reach a wider audience, including those who may not have access to the Internet or may not be comfortable filling out online surveys. By using both online and physical questionnaires, the study can increase the representativeness of the sample and reduce potential biases in the data. Additionally, physical questionnaires can provide an opportunity for researchers to engage with respondents and clarify any questions they may have. Therefore, a mixed approach to data collection can enhance the validity and reliability of the findings and provide a more comprehensive understanding of the factors that influence green building development in Malaysia.

5.7 Conclusion

The research highlights that the development of the green building industry in Malaysia is still facing several barriers. Despite the introduction of green-based buildings in the construction sector, various factors are creating a barrier to the industry's development. Therefore, the responsibility of promoting green building practices and encouraging the development of the industry should fall on all stakeholders in the construction industry.

Architects play a crucial role in the development of green buildings by designing green-friendly buildings that are environmentally sustainable. Property agents can encourage prospective buyers to opt for green buildings, and the government can provide incentives to the industry. Universities can also contribute to the development of the industry by including green building practices in their syllabus as a mandatory topic not only for architectural students but for students in other sectors such as marketing as well.

Customers can also play an essential role in the development of the green building industry by opening their minds to new innovative building practices and not shying away from new efforts. Therefore, by creating an ecosystem where all stakeholders work together, the development of the green building industry in Malaysia can be enhanced. This will not only promote a sustainable environment but also contribute to the country's economic growth.

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APPENDIX A

Approval for Ethical Clearance to Involve Human Subjects in Research

UNIVERSITI TUNKU ABDUL RAHMAN DU012(A)
Wholly owned by UTAR Education Foundation Co. No. 578227-M

Re: U/SERC/233/2022

4 November 2022

Sr Dr Elia Syarafina Binti Abdul Shakur
Department of Building & Property Management
Faculty of Accountancy and Management
Universiti Tunku Abdul Rahman
Jalan Sungai Long
Bandar Sungai Long
43000 Kajang, Selangor

Dear Sr Dr Elia Syarafina,

Ethical Approval For Research Project/Protocol

We refer to your application for ethical approval for your research project (Master student's project) and are pleased to inform you that your application has been approved under Expedited Review.

The details of your research project are as follows:

Research Title	Barriers in Implementing the Green Building Concept in Greater Kuala Lumpur
Investigator(s)	Sr Dr Elia Syarafina Binti Abdul Shakur Chew Li Wei (UTAR Postgraduate Student)
Research Area	Social Sciences
Research Location	Greater Kuala Lumpur
No of Participants	100 participants (Age: 20 - 70)
Research Costs	Self-funded
Approval Validity	4 November 2022 - 3 November 2023

The conduct of this research is subject to the following:

(1) The participants' informed consent be obtained prior to the commencement of the research,

(2) Confidentiality of participants' personal data must be maintained,

(3) Compliance with procedures set out in related policies of UTAR such as the UTAR Research Ethics and Code of Conduct, Code of Practice for Research Involving Humans and other related policies/guidelines; and

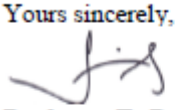
(4) Written consent be obtained from the institution(s)/company(ies) in which the physical or/and online survey will be carried out, prior to the commencement of the research.

Should you collect personal data of participants in your study, please have the participants sign the attached Personal Data Protection Statement for your records.

The University wishes you all the best in your research.

Thank you.

Yours sincerely,



Professor Ts Dr Faidz bin Abd Rahman
Chairman
UTAR Scientific and Ethical Review Committee

c.c Dean, Faculty of Accountancy and Management
Director, Institute of Postgraduate Studies and Research

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APPENDIX B

Survey Questionnaire

FACULTY OF ACCOUNTANCY AND MANAGEMENT

ACADEMIC YEAR 2022/2023

Survey of Barriers in Implementing the Green Building Concept In Greater Kuala Lumpur

Instruction: Please tick (/) in the box next to the answer of your choice or write in the space

Section A: Demographics

1) Age:

☐20 – 29 ☐30 – 39 ☐40 – 49 ☐50 and above

2) Gender:

☐Male ☐Female

3) Ethnicity:

☐ Malay ☐Chinese ☐Indian ☐Others

4) What is your highest academic level:

☐Lower than SPM ☐O-Level/SPM ☐A-Level/STPM/Certificate/Diploma

☐Bachelor's degree ☐Master/Doctorate ☐Others: _____

5) What is your role?

☐ Architect ☐ Engineer ☐ Quantity Surveyor

☐ Contractor ☐ Developer ☐ Property Sales & Marketing

6) Working experiences in the Developer or Construction field:

☐Less than 3 years ☐ 3 to 6 years ☐ 6 to 9 years ☐ 9 years and above

7) How would you classify your role?

☐ Director/CEO ☐ Senior GM/Manager ☐ Manager/Assistant Manager

☐ Senior Executive/Executive ☐ Others:_____

8) Did your company involved in any green development before?

☐ Yes ☐ No

Section B: Factors Influencing Green Building Concept Development In Greater Kuala Lumpur.

Answer all: Please Circle (O) the following question as, the scale will be listed in the following structure:

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

1) Green Building Concept is important in the Property or Construction industry.

1 2 3 4 5

2) Green Building Concept can reduce the damaging impact on our environment.

1 2 3 4 5

3) Green Building Concept can enhance human living quality.

1 2 3 4 5

4) Incentive support by the government is well in promoting Green Building Concept in Greater Kuala Lumpur.

1 2 3 4 5

5) Green Building Concept systems are very important in all development in Greater Kuala Lumpur.

1 2 3 4 5

6) Green Building Concept will develop a better organizational culture in protecting our environment.

1 2 3 4 5

Section C: The Challenges of Implementing Green Building Concept In Greater Kuala Lumpur

Answer all: Please Circle (O) the following question as, the scale will be listed in the following structure:

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

1) Lack of Consumer Awareness will affect the Green Building Concept development in Greater Kuala Lumpur.

1 2 3 4 5

2) Lack of Professional Support will affect the Green Building Concept development in Greater Kuala Lumpur.

1 2 3 4 5

3) Lack of Technology Support will affect the Green Building Concept development in Greater Kuala Lumpur.

1 2 3 4 5

4) Lack of Incentive Support will affect the Green Building Concept development in Greater Kuala Lumpur.

1 2 3 4 5

5) High Cost will affect the Green Building Concept development in Greater Kuala Lumpur.

1 2 3 4 5

6) Pricing factor will affect the Green Building Concept development in Greater Kuala Lumpur.

1 2 3 4 5

7) Lack of Consumer Demand will affect the Green Building Concept development in Greater Kuala Lumpur.

1 2 3 4 5

Section D: The Strategy Implementing the Green Building Concept In Greater Kuala Lumpur

1) Consumer Awareness will enhance the Green Building Concept development in Greater Kuala Lumpur.

1 2 3 4 5

2) The professional support to developers or contractors will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.

1 2 3 4 5

3) The technology support to developers or contractors will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.

1 2 3 4 5

4) The incentive support by the government to developers or contractors will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.

1 2 3 4 5

5) The reduced cost of green materials will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.

1 2 3 4 5

6) The more affordable price of green buildings will enhance the popularity of Green Building Concept development in Greater Kuala Lumpur.

1 2 3 4 5

Section E: Personal Opinion Sharing

How Green Building Concept able to be more generalized to be developed in the future?

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