

## The Current Barriers of Implementation of Green Building Concept in Malaysia

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**Abstract:** The incorporation of green building concepts into the construction sector is gaining traction as a viable solution to meeting public demand for environmentally responsible and sustainable structures. However, the implementation of green building innovations may not be observable due to the obstacles of high capital expenditures, extra work for approval and clearances, and a lack of resources and expertise. The problem to implement the green building in creating sustainable buildings is lack of knowledge, understanding and high cost. Therefore, the objective of this research is to identify the level of awareness, investigate the current barriers that affect the implementation of green building and strategy to increase the implementation of green building concept in Malaysia. The target respondents for this research is G7 contractors in Kuala Lumpur. This research will use quantitative methods to collect data for this research and it is distributing questionnaires through Google Forms to respondent to get accurate data. The research population is 214 person, sample of respondents is 140 person and respond by 90 person with the respond rate is 64%. As a result of data collection and analysis, the findings in this study revealed the green building concept add more to the construction industry in the future. Furthermore, the level of awareness of the green building concept for G7 contractor was high. However, the main current barrier were mostly high cost to construct. Hence, the government and contractors should play a significant role in increasing the implementation of the green building concept with the effective strategy to bring the green building to the construction industry.

**Keywords:** Current Barriers, Green Building Concept, Implementation

## 1. Introduction

The basis of sustainable construction development is green building (Samari *et al.*, 2013). Buildings and structures aided humanity in satisfying social needs for housing, economic needs for investment, and business objective. Green buildings are a relative concept since it is impossible for a building to be completely green because the construction of any building, even a green building, would use more resources from the earth than the building will ever return to nature (Bakhoum *et al.*, 2015).

However, satisfaction normally will come at a high cost for example irreparable damage to the environment. With the continuous improvement of living standards, people's requirements for the construction industry are also increasingly high, the early construction industry only needs to provide people with shelter, however, now is increasingly focused on the comfort of housing construction. People's knowledge and participation, as well as an appreciation of the implications of individual acts, are essential for the building of a sustainable future. The construction sector has long been connected with negative environmental consequences (Abidin, 2010). This study will investigate the barriers that affect the implementation of green buildings in Malaysia; to investigate the level of awareness of the green building concept in Malaysia; to investigate the strategies to increase the influence of the green building concept in Malaysia.

Green buildings are described as a focus on improving the efficiency of the use of resources like energy, water, and materials while reducing the impact on human health and the environment throughout its lifecycle, according to the Malaysia Institute of Architects' (PAM) Green Building Index (GBI, 2020). The lack of understanding, which is sometimes caused by inadequate marketing by developers, is one of the obstacles to greater awareness and implementation of green buildings, according to PAM president Lillian Tay. Not only that, the incorporation of green building concepts into the construction sector is gaining traction as a viable solution to meeting public demand for environmentally responsible and sustainable structures. However, the implementation of green building innovations may not be observable due to the obstacles of high capital expenditures, extra work for approval and clearances, and a lack of resources and expertise, which hinders the widespread adoption of green building technology (Nordin *et al.*, 2018). In this research, we will emphasize the importance of the green building concept to the G7 contractor to increase the level of awareness in effective ways. There are many constructions player in the construction sector who are aware of the concepts of sustainability, but just a few have put it into practice (Ong ., 2021).

The changing economies of South East Asia over the years have accelerated urbanization and led to the growth of the real estate sector in full bloom in the region. Many non-renewable energy sources have been consumed in large quantities, interfering with the natural cycles of the ecosystem (Green Building Index). Green buildings are described as a focus on improving the efficiency of the use of resources like energy, water, and materials while reducing the impact on human health and the environment throughout its lifecycle, according to the Malaysia Institute of Architects' (PAM) Green Building Index (GBI, 2020). The lack of understanding, which is sometimes caused by inadequate marketing by developers, is one of the obstacles to greater awareness and implementation of green buildings, according to PAM president Lillian Tay. Less than 40% (36 out of 100) selected 'an energy-efficient home' as their description of a green home. The remaining respondents chose the second choice, "house with plenty of plants," in response to the research question. It shows that the respondents do not know the definition and function of a green home and the exposure to green buildings is still low in Malaysia (Lim *et al.*, 2018).

The enthusiasm of architects and designers is not high because most of the policy and economical support is for developers in the United States (Zhang *et al.*, 2019). Green building practice awareness is based on an individual's comprehension of activities, search for education, complete engagement, and dedication to the principles (Abolore, 2012). Moreover, a lack of awareness of the existing incentives is also the main barrier for green building development (Wong *et al.*, 2021). The most

significant barrier was identified as low market demand for green construction and this appears to suggest that the supply chain agent respondents depended on customer demand to deliver the green buildings (Wong *et al.*, 2021). Furthermore, high cost is one of the barriers to green building development because the residential think about green building requires high capital and high maintenance costs. It will make an impression on the developer that residents could not afford the cost of green buildings and look for affordable property prices (Wong *et al.*, 2021). The high initial cost of green technologies and systems used in green building (Ahmad *et al.*, 2019).

The implementation of green construction gives benefits to consumers and the environment that are completely validated by prior research publications. Previous China research studies said that green construction should be produced as part of a sustainable development plan to preserve resources, minimise pollution, and reduce energy consumption (Gao *et al.*, 2020). According to Chua and Oh (2011), the National Green Technology Policy (NGTP2009) is an essential policy in Malaysia for "becoming green." The introduction of the NGTP in 2009 was a watershed moment in the country's green growth. The NGTP 2009 purpose is to promote current advances and improvements in important areas such as energy, buildings, water and waste management, transportation, and research and development (R&D), innovation, and commercialization through local and worldwide cooperation. However, the level of awareness about the green building concepts still in status of low-moderate (Nordin *et al.*, 2017). Furthermore, the way of implementation of green building through providing education and training to the construction participant can contribute to the success of the green building implementation (Lop *et al.*, 2016). Improvement of the green building market mechanisms through the transparency of market information is a critical protection for the promotion of green building operation evaluation (Ding *et al.*, 2018). Therefore, education and training can apply in the practical of the construction industry and the government needs to cooperate with the G7 contractor to develop the green building in Malaysia. Therefore, this research is being carried out to achieve specific objectives, which are as follows, (i) To identify the level of awareness of implementing the green building concept among G7 contractor in Malaysia, (ii) To investigate the current barriers that affect the implementation of green buildings in Malaysia and (iii) To investigate the ways to increase the implementation of the green building concept in Malaysia.

In this study, the focus will be on the green building concept for residential design in Kuala Lumpur. The study selected Kuala Lumpur because GBI certified projects in Kuala Lumpur are the #1 ranked state among other states in Malaysia (GBI, 2021). This study will be used quantitatively as the green building project that has been evaluated in Kuala Lumpur is a huge number (GBI, 2021). The survey subjects of this study are units operating in the construction field such as G7 contractors through a survey questionnaire to ensure that the results are accurate and meet the research objectives.

## 2. Literature Review

### 2.1 Green Building

Throughout the life of a building, such as during its design, construction, operation, maintenance, and retrofit, resource-efficient and ecologically responsible procedures and building structures are used (Olubunmi *et al.*, 2016). The planning, design, construction, and operation of buildings with a number of central, main factors, including energy consumption, water use, interior environmental quality, material selection, and the project's impacts on its location, are typically seen as constituting green building (U.S. Green Building Council, 2014). Most countries have adopted the idea of "green construction" to reduce the negative effects of structures on both the environment and public health. In Japan, the term "green building" is sometimes referred to as "environmental co-habitual architecture," "ecological building," or "sustainable building," in Europe, and "Green Building" in North American nations (Mallawarachchi *et al.*, 2013). According to research conducted in Australia and New Zealand,

green buildings generate 33% less greenhouse gases, require 33% less electricity and water, and recycle around 96% of demolition trash (Economics, 2014). Another study found that Green Buildings might help to mitigate the risks associated by increasing urbanisation, energy consumption, and pollution (Dean *et al.*, 2016). The number of Green Buildings is growing, and the phrase "Green Building" is becoming increasingly attractive across the world. Many industrialised countries developed Green Building standards, such as LEED (in the United States), BREAM (in the United Kingdom), Green Star (in Australia), and Greenmark (Singapore). These nations also helped to establish the Green Building trend. Furthermore, developing nations have prioritised Green Building development, as seen by their Green Building standards and the quantity of Green Buildings in these countries (Analytics, 2018). Green Building standards were created to apply to a variety of building types, including residential, commercial, and industrial structures. So, regardless of the type of structure, the word Green Buildings refers to one that fulfills Green Building requirements.

### 2.1.1 Previous Studies on Green Building in Malaysia

Prior to 2011, the early literature on the development of green buildings in Malaysia concentrated on defining the idea of green building evaluation methodology. During this time period, research was mostly focused on particular aspects of establishing green building evaluation tools such as criteria, sub-criteria, weightage, certification procedure (Gou *et al.*, 2013). Between 2011 and 2015, additional analytically based studies that provided information on the attitudes and problems faced by Malaysian building stakeholders when designing green buildings were added to the research environment. The research discussed the important parties' responsibilities in promoting the adoption of green construction, including the government and developers (Helgeson & Lippiatt, 2009). The steps Malaysia is taking to encourage the construction of green buildings have been detailed. They have identified potential components that might aid in overcoming difficulties and obstructions to the adoption of green practises (Fellows & Liu, 2021). They have identified potential components that might aid in removing obstacles and stumbling blocks to the adoption of green practises. Later, in order to better understand the factors influencing increased green practises in Malaysia, the literature was expanded to cover a variety of contexts such as comparison studies and assessment standards (Hsieh & Shannon, 2005). After 2016, new lines of inquiry began to emerge as more empirical investigations enhanced understanding of green building development (i.e., performance measures and outcomes). According to Illankoon *et al.*, (2019), as one of the green elements in green buildings, assessed daylight and visual performance. Measures and techniques for enhancing energy efficiency in the building industry were explored (Change, 2014). According to Zalejska-Jonsson (2012), the study showed that green building have achieved the economic benefits of reduced energy use as a result of green construction practises. However, there is still a lack of information about how green buildings affect industrial behaviour and organisational commitments to green practises.

### 2.2 Level of Awareness

The development of sustainable construction is being limited by the lack of awareness and knowledge. A study demonstrates that the desire of the construction company to incorporate sustainable building in the projects would be negatively impacted if top management does not have the necessary knowledge and understanding. The implementation of green construction strategies is said to be fundamentally hampered by the lack of public awareness (Ibrahim & Raji, 2018). Lack of public knowledge is one of the biggest barriers to the growth of green buildings in the nation, according to a research (Lim *et al.*, 2018). The research found that although senior management is concerned about environmental issues, they do not have a deep knowledge of sustainable development (Wright & Wilton, 2012). Awareness provides information on how to operate and maintain the building's green components to the general public, the building design team, stakeholders, and the construction team (Zigenfus, 2008). By leveraging global green building certification systems, it may be utilised to inform the general public and the project team about the significance of green building. In addition, the report

shows that Malaysian developer knowledge is still low to moderate (Nordin *et al.*, 2017). The significance of healthy living and environmental stewardship should be understood by many parties. When sustainable enterprises are formed, the effect on demand for green buildings will increase. Therefore, awareness should be promoted and pressure should be put on the design team and corporations to carry out sustainable operations (Yudelson, 2012). The lack of knowledge and education has restricted the development of green buildings (Yee *et al.*, 2020).

However, according to a research the level of consumer awareness and care for the environment was shown to have a beneficial and substantial connection with the practice of green building consumerism. Despite the fact that environmental concerns are at a high level, low consumption practices are being followed (Sabar *et al.*, 2018). Green Construction Industry stakeholders have a high degree of awareness and understanding regarding the use of Green Building Concepts, but there is no equivalent level of implementation of the principles (Anzagira *et al.*, 2021). Awareness brings current biodiversity challenges to the attention of influential organizations with the ability to influence outcomes. Awareness is an useful plan-setting and marketing activity that helps people embrace exactly what and why this is a critical issue, the objectives for the targets, and what is and can be done to achieve all of these (Umar & Khamidi, 2012). The professional's information gained at university or college affected their degree of awareness and resulted in an encouraging potential. The workers who had previously worked on green construction projects had gained expertise, although this varied depending on their level of education (Sichali & Banda, 2017).

### 2.3 Current Barriers to Green Buildings

The variables that limit an organization's path toward success are referred to as the barriers. The two sorts of obstacles are physical and social ones (Hoffman and Henn, 2008). Green building integration into construction projects continues to be a barrier for sustainable development despite its benefits to the environment and human health. The implementation of green buildings will be difficult for the construction industry, and the hurdles fall into five categories: economic issues, market attitudes, management issues, government issues, product knowledge and sourcing issues, and technology and training issues (Darko *et al.*, 2017). Table 1 highlights the current barriers of green building.

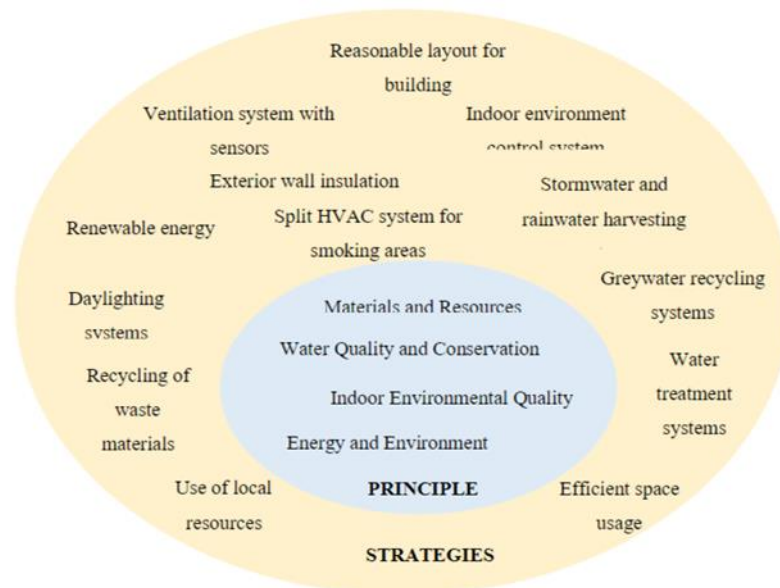
**Table 1: The current barriers to green building**

Author (Years)	Country	Current Barriers
Guribie <i>et al.</i> , 2021	Ghana	<ul style="list-style-type: none"> <li>- Ineffective advertisement</li> <li>- Perceived cost of implementation</li> <li>- Lack of expertise</li> <li>- Lack of financial incentives</li> <li>- Illiterate construction market risk and uncertainties.</li> </ul>
Hwang <i>et al.</i> , 2017	Lidya	<ul style="list-style-type: none"> <li>- Price increases</li> <li>- Shortage of green goods</li> <li>- Lack of green resources</li> <li>- Lack of knowledge</li> <li>- Government incentives</li> <li>- Desirable subsidies</li> </ul>
Mohamed <i>et al.</i> , 2020		
Hwang <i>et al.</i> , 2017	Singapore	<ul style="list-style-type: none"> <li>- Employees' expertise</li> <li>- Accessible technology</li> <li>- Planning</li> </ul>
Yee <i>et al.</i> , 2020	Malaysia	<ul style="list-style-type: none"> <li>- Financial constraint</li> </ul>

		<ul style="list-style-type: none"> <li>- Lack of understanding with green ideas and techniques</li> <li>- Market situation</li> </ul>
Wong <i>et al.</i> , 2021	Malaysia	<ul style="list-style-type: none"> <li>- Lack of customer demand for buildings with green elements</li> <li>- High cost</li> <li>- Stakeholder not have the interest to invest</li> </ul>

## 2.4 Ways of implementation of Green Buildings

Increasing green building education is one of the elements encouraging important industry players to incorporate green building concepts into their projects. Furthermore, these key participants are interested in learning more about green-building-related topics in order to have a better awareness of the topic (Omran *et al.*, 2015). The study's conclusions indicate that outstanding execution across all project phases should be the most important factor in the design of sustainable standards. Four more crucial success factors emerge from the factor study, including "goal determination," "project team commitment," "establishing owners' project demand," and "customer satisfaction" (Ismail *et al.*, 2015). Figure 1. Illustrates the concepts and methods used in the design of green buildings. The basic tenets of green building design, as shown in the picture, are minimising the use of non-renewable building materials, protecting water quality, maintaining a healthy indoor atmosphere, consuming less energy, and minimising the negative environmental effects of the building sector.



**Figure 1: Strategies of green building design (Pauzi *et al.*, 2021)**

### (a) Resources and Materials

Non-renewable building materials should be avoided and substituted with effective engineering design and waste material reuse. It is also advised to prioritize materials with the least environmental effect, such as recycling content materials, efficiently employing contemporary designed materials, and implementing systems that promote the usage of composite type materials. The ideal answer for creating a sustainable green building is based mostly on human ingenuity, and we can use our vast labor force

to make it happen (Umar *et al.*, 2012; Mohd Wira & Mohd Shafiei *et al.*, 2017). As a result, we should avoid focusing on solutions that take the least amount of effort. The usage and optimization of currently designed materials such as engineered composite materials, insulated concrete materials, and others should be emphasized since they have been shown to provide higher strength and durability than traditional materials.

(b) Water Conservation and Quality

To imitate a green and sustainable structure, the natural water cycle must be preserved. To begin, the focus should be moved toward building a near "replica" of the natural system by enabling stormwater retention and on-site infiltration. Aside from that, the recycling and reuse of rainfall, runoff, and greywater, as well as the reduction of unnecessary potable water usage, should be greatly stressed (Cheng, 2003; Weinrich *et al.*, 2012). The building's design is critical in both constructing an efficient stormwater management system and enhancing the land's existing natural flows.

(c) Environmental Quality Indoor

A productive, clean, and healthy atmosphere is also crucial for the tenants of the facility. As a result, the design of the building should have an ideal condition that is accessible and open to high air quality, ventilation, a low noise pollution environment, and adequate sunshine with natural airflow (Siew *et al.*, 2011; Gou *et al.*, 2012; Tong, 2017). To allow for natural circulation, the building should have a sufficient number of windows and natural ventilation. Ventilation systems should be strategically distributed throughout the structure to offer an effective heating and cooling function. Furthermore, the ventilation system should operate as a filtration system, providing fresh clean make-up air to all building inhabitants by efficiently eliminating indoor air pollutants. Control sensors may be installed on ventilation systems to automatically react to abnormal circumstances when indoor air quality falls outside of the ideal range (Gou *et al.*, 2012; Tong, 2017; Mohd Wira Mohd Shafiei *et al.*, 2017).

### 3. Research Methodology

The research technique employed for this study will be addressed in depth in this chapter, as will how the research will be done in order to fulfil the research objectives. "Research Methodology is a complete approach that defines our selection and use of various methodologies in relation to the expected outcome" (Crotty, 1998). In layman's terms, research technique is a process for methodically solving research issues. The method utilised to collect data and the course of the research would be explained in research methodology. As a result, the study designs, methodological selection, research philosophies, and research technique are reviewed first. It is then followed by the data collecting technique, study plan, questionnaire preparation, sample design, pilot test, and conclusion.

#### 3.1 Research Design

Research design can be referred as the coherent and logical integration of different components in the research with the overall strategy chosen to ensure that the research problems are effectively addressed where it can be considered as the framework or blueprint of data collection, measurement and analysis (de Vaus, 2001; Trochim, 2002). In this research, descriptive research was chosen as focuses on describing the present state of events (Salkind, 2012). The objectives that need to be achieved in this research are to identify the level of awareness of implementing the green building concept among G7 contractors in Malaysia, investigate the current barriers that affect the implementation of green buildings, and the ways to increase the implementation of the green building concept in Malaysia.

Basically, methodological choices are classified into three types, namely, quantitative, qualitative and mixed methods which narrow down the procedures for data collection, analysis and interpretation (Creswell, 2014). In this research, the quantitative method is used. Quantitative research can be

summarised as a research method that utilises number or numerical data in measuring the relationship between the variables where the data collected could be analyzed using statistical procedures (Creswell, 2014).

### 3.2 Data Collection

In essence, data collecting is split into two categories: primary data and secondary data. Both primary and secondary data are required for a more thorough grasp of the study issue.

### 3.3 Data Analysis

Following the collection of data from the questionnaire, the researcher will conduct data and results analysis. Data analysis is the systematic use of statistical and theoretical techniques to develop, illustrate, and evaluate data. When doing data analysis, researchers should be aware of the issues of reliability and validity of acquired data since incorrect assumptions may damage the validity of the results (Brandt, 2014). While quantitative data analysis may incorporate statistical processes, descriptive statistics will be utilised to establish the mean, median, mode, frequency, lowest and maximum value, and percentage of data that is connected to study goals.

The researcher will analyse two kinds of data in this study: primary data and secondary data. In this study, primary data is gathered using a questionnaire, while secondary data is acquired through the evaluation of books, journals, and other sources as a support statement for the collected main data, allowing researchers to fulfil their research goals. Following that, Statistical Packages for Social Sciences version 29 (SPSS) will be utilised in this study to analyse respondents' demographic, multiple choice questions and scale-question responses, while Microsoft Words will be used as the programme to analyse data in words and tables.

**Table 2: Method of data analysis**

Research Objectives	Research Methodology	Data Analysis
To identify the level of awareness of implementing the green building concept among G7 contractors in Malaysia.	Questionnaire	Analyse primary data in SPSS method and secondary data act as a support statement for primary data.
To investigate the current barriers that affect the implementation of green buildings in Malaysia.	Questionnaire	Analyse primary data in SPSS method and secondary data act as a support statement for primary data.
To investigate the strategies to increase the implementation of the green building concept in Malaysia.	Questionnaire	Analyse primary data in SPSS method and secondary data act as a support statement for primary data.

## 4. Result and Discussion

This part examined on the respondents' subtleties including their segment subtleties, and the ongoing hindrances and furthermore technique that influencing the execution of green structure idea.

### 4.1. Respondents' details

There are 90 substantial reactions were gotten, which is 100 percent of the respondents G7 project worker (90). 35.6% of respondent was associated with green structure project among 6 to 8 years, 31.1% of respondents was over 8 years, 27.8% was around 3 to 5 years and 5.6% of respondents was just involved under 2 years. This appears to suggest that respondents with various degrees of involvement might give more knowledge into their perspectives at various phases of work insight in green structures.



In terms of number of project of the participants' involvements in green building, 36.7% of the respondents had about 9 projects, 27.8% involved 7 to 9 projects, 25.6% involved 4 to 6 projects, but out of these number of respondents, only 10% of them identified their involvement in green project was not more than three projects in green building project.

For the knowledge related with green building, majority of the respondents learn the knowledge from courses which is 76 respondents (84.4%). 10% of the respondent were learned from company colleagues which is 9 respondents (10%) and 5 of respondents (5.6%) were learned from Internet.

#### 4.2 Level of Awareness of Implementation of Green Building Concept among G7 Contractors in Malaysia

In this section, the first objective of this research will be analysed to identify the awareness of implementing the green building concept among G7 contractor. The data collected was analysed and intended to find out the current level awareness of green building concept in construction industry from the target respondents. There are ten questions in this section and the results are as below.

**Table 3: Level of awareness of implementation of green building concept among G7 contractors in Malaysia**

Level of Awareness of Implementation of Green Building Concept ( General Information )	Category	Mean	Rank
Information about the Green Building	Yes	1.00	1
A building that is built with energy-saving, environmentally friendly materials that can be recycled and do not harm human health is called a green building	Yes	1.03	2
The buildings defined as green buildings contribute to future generations because they emit less carbon dioxide to nature	Yes	1.09	3
Level of Awareness of Implementation of Green Building Concept ( relationship between level of awareness on green building )	Category	Mean	Rank
Global warming is not an issue that should be handled by a group of developers in Malaysia	Agree	4.19	1
States should undertake a more active role in promoting green innovation	Agree	4.13	2
Companies spend money to design a green building if it's able to raise good green environment	Agree	4.13	2
The Government has done its best efforts to raise awareness about green innovation	Agree	4.12	4

The Government has implemented an active effort to address environmental issues	Agree	4.08	5
Multinational companies in Malaysia have a program to eliminate toxic waste	Neutral	3.97	6
Type of buildings should be “green”	Neutral	3.59	7

For the discussion of the level of awareness of implementation of green building concept among G7 Contractors in Malaysia, Table 3 has been separated into two categories to depict the general information and the questionnaire about relationship between levels of awareness on green building within the respondents. It can be seen that general information about the green building for G7 contractor is understand. Moreover, G7 contractors agree that a building that is built with energy-saving, environmentally friendly materials that can be recycled and do not harm human health is called a green building. It seen that G7 recognize with this statement. According to Kibert (2012), characterized again the Green Building as a facility that is healthy, designed and built with ecological principles, and uses resources effectively. G7 contractors consider that the buildings defined as green buildings contribute to future generations because they emit less carbon dioxide to nature is being recognized.

Global warming is not an issue that should be handled by a group of developers in Malaysia. This statement showed that G7 contractors consider issues of global warming not only handled by a group of developers but it should be handled by many sector players such as construction managers, general contractors, sub-contractors or specially contractors and also owner and client to overcome these environmental issues.

States ought to embrace a more dynamic job in advancing green development. States ought to embrace a more dynamic job in advancing green development. G7 workers for hire consider that State-possessed and non-state endeavors are resolved to green advancement Seeking after benefit is unique in relation to serving social government assistance objectives. Contrasted with non-state undertakings, state endeavors, their own organizations bear monetary and political obligations, however they likewise bear more political responsibilities regarding green turn of events (Yao *et al.*, 2021). They will focus on tackling the green development issue of state-claimed ventures, and it will be more straightforward to get government support for enormous scope green advancement projects that increment green speculation and green advancement (Wang and Zou, 2018).

Companies spend money to design a green building if it's able to raise a good green environment. According to Abidin (2010), the survey shows that only 10% of developers are really interested in green projects. This is because the environment needs to be protected by everyone and find out strategies to raise a good green environment and if the company is willing to spend more money to design a green building, it can make residents own their green building residential.

The Government has done its best efforts to raise awareness about green innovation. Malaysia introduced the National Green Technology Policy (NGTP) in July 2009, in line with the general trend towards adopting sustainable development practices. Intended to provide direction and motivation for Malaysians to continue to enjoy a high quality of life and a healthy environment by reducing their carbon footprint without sacrificing economic growth. Moreover, the Government has implemented an active effort to address environmental issues through meet the needs of the country and to meet the United Nations Framework Convention on Climate Change (UNFCCC) for climate change strategy to promote sustainable development.

Lastly, multinational companies in Malaysia have a program to eliminate toxic waste. It is because multinational company can set up a policy such banned/decrease the plastic to import from

foreign country. It also can cooperate with government to eliminate toxic waste and protect environment together.

#### 4.3. Current Barriers of Implementation of Green Building

In this section, the second objective of this research will be analysed to identify the current barriers of implementation of green building. The data collected was analysed and presented in bar chart. Index mean generated by SPSS will be used to determine the level of agreement among the respondents. There are fourteen questions in this section and the results are as below

**Table 4: Current barriers of implementation of green building**

Current Barriers of Implementation of Green Building ( Price )	Category	Mean	Ranking
Perceived cost of implementation is high	Agree	4.19	1
Financial constraint	Agree	4.11	2
Stakeholder not have the interest to invest	Agree	4.04	3
Illiterate construction market risk and uncertainties	Agree	4.01	4
Market condition	Neutral	3.99	5
Lack of financial incentives	Neutral	3.89	6
Current Barriers of Implementation of Green Building ( Government )	Category	Mean	Ranking
Desirable subsidies	Agree	4.13	1
Less enforcement of authority regulations and standard	Agree	4.09	2
Lack of education of green building	Agree	4.08	3
Government incentives	Agree	4.00	4
Current Barriers of Implementation of Green Building ( others )	Category	Mean	Ranking
Lack of expertise	Agree	4.16	1
Lack of accessible technology	Agree	4.13	2
Shortage of green goods	Agree	4.08	3
Lack of green resources	Neutral	3.92	4

According to Table 4, high perceived cost in current barriers of implementation of green building was listed by the G7 contractors as the top barrier. For example, according to a Global Green Building

Trends survey, 50% of over 1,000 respondents cite “high initial cost” as a barrier to green buildings. China and the US were above average at 60% and 70% respectively.

Second, G7 contractors agree that financial constraints is the current barriers of implementation of green building with a mean score 4.11. It is because without financial resources, the company faces the challenge of implementing sustainable construction. It also leaves developers or customers concerned about profitability as this will be a long-term profit margin.

Illiterate construction market risk and uncertainties will affect the implementation of green building. Construction companies face employee problems, workers are unfamiliar with new technology, workers are unable to handle and control environmentally friendly technology. This makes sustainable development more difficult to implement.

Economic situation likewise is a hindrance to be thought of. On the off chance that the market interest for green structures is low, the development business won't fabricate green structures. Public and client perspectives in this way impact the market to put resources into green structure improvement.

Lastly, lack of incentives will prevents investors from to start investments. Many construction firms in developed Asia also face lack of incentives. The lack of incentives reduces the motivation of construction companies to consider sustainable development as they do not receive incentives or support if their construction projects are energy efficient (Yee *et al.*, 2020).

For category of government, the government should give the desirable subsidies to the specific sector of construction industry. However, some governments are not concerned about this issue and have not provided financial assistance or incentives to move the green building market, thus discouraging the application of green building technologies.

If governments have lack of awareness of the importance of environmental issues and green practices, neither does the construction industry. This is because there are no regulations or standards in place to enforce green practices locally.

Absence of instruction of green structure as an ongoing obstructions to carry out the green structure. A few organizations are hesitant to send their workers to preparing to get new green structure information and delicate abilities. This is on the grounds that they dread that subsequent to preparing, workers will move to one more organization looking for a more significant pay, bringing about a deficiency of ability and an exercise in futility and cost. Workers who do not participate in training are therefore unable to control and handle complex new technologies.

For other current barriers, the respondents agree that lack of expertise. Most green technologies are complex and require specialized knowledge to succeed. There are also guidelines and standards that must be met when implementing environmentally sound practices in construction projects. Stakeholders and customers lose confidence in green technology implementations when professional and technical staff are in short supply.

Absence of available innovation is the one of current obstructions to carry out the green structure. Notwithstanding, materials and innovation are as yet interesting, so it is a trouble for designers, project workers and subcontractors to get every one of the materials and innovation to construct green structures.

Shortage of green goods and lack of green resources also consider that the barriers of implementation of green building. The developers plan to take into account the incomplete guidelines on the available sources for green building implementation, because there is no precedent without which precedent can be consulted in the case of incident occurred. Instruction is always important to guide students. Without sufficient direction, partners and clients will stress over the expected dangers of this

new development technique. How much materials and gear required can't be estimated, which can prompt expanded squander.

#### 4.4. Strategy for Implementation of Green Building Concept in Malaysia

In this section, the third which is also the last objective of this research will be analysed to investigate the implementation of green building concept in Malaysia to promote green building. The data collected was analyzed and presented in bar chart. Index mean generated by SPSS will be used to determine the level of agreement among the respondents. There are nine questions in this section and the results are as below.

**Table 5: Strategy for implementation of green building concept in Malaysia**

Strategy for Implementation of Green Building Concept In Malaysia	Category	Mean	Ranking
Recycling content materials	Agree	4.18	1
Install Control sensor on ventilation systems to automatically react to abnormal circumstances	Agree	4.17	2
Implementing system that promote the usage of composite type materials	Agree	4.14	3
Optimize the insulated concrete materials	Agree	4.14	3
On-site infiltration	Agree	4.14	3
Install sufficient number of windows	Agree	4.13	6
Efficiently employing contemporary designed materials	Agree	4.10	7
Install sufficient number of natural ventilation	Agree	4.07	8
Enabling storm water retention	Neutral	3.99	9

According to Table 5, there were a strategy about recycling content materials was listed by G7 contractors as the top strategy just like building with recycled content is to help reduce amount of raw materials used in the production process. Another goal is to help solve the problem of what to do with the waste that has been generated (Balogh, 2007).

Install Control sensor on ventilation systems to automatically react to abnormal circumstances. The system provides means for continuous and automatic adjustment of the ventilation rate. Essentially, control is achieved by a sensor (or series of sensors) that responds to a change in utilization rate. The sensor output is applied to a "usually damper" control system that regulates the flow of outside air through the ventilation system, thus ensuring continuous maintenance of good air quality (Bhatia, 2014).

There were three strategy having similar mean score in the implementation of green building concepts. One of the methodology is carrying out framework that advance the utilization of composite kind materials. It is on the grounds that the composite materials will join mud and straw in a block, the properties of the two materials are likewise consolidated and get a block that is impervious to pressure, tearing or bowing simultaneously. All the more in fact, it has both great compressive and elasticity. So

it can forestall the wastage for the task. Other than that, upgrade the protected substantial materials was concurred by the G7 project workers to carry out the green structure. For instance, Protected Substantial Structure is fundamentally a formwork framework for substantial walls where the formwork is fixed set up. Structures are normally made of polystyrene froth protection into which the substantial is poured. ICF gives a protected underlying wall and, contingent upon the particular framework, allows mounting of exterior and interior wall panels without moderate to zero wall modification. Furthermore, G7 contractors consider that on-site infiltration as an effective strategy. The effectiveness of infiltration measures is related to maintaining the expected infiltration rate of the structure, which affects the soil's ability to remove pollutants (Pitt *et al.* 1996).

Strategy for install sufficient number of windows and install sufficient number of natural ventilation. The energy proficiency of vinyl windows and glass entryways implies less power is utilized to intensity and cool a home or building, which can assist with diminishing ozone harming substance outflows related with power plants coal all over the planet. Furthermore, the low-support prerequisites for vinyl windows and glass entryways dispose of the requirement for paint, stains, cleaners, and thinners that can adversely influence air quality.

Efficiently employing contemporary designed materials. Constrained by a lack of transportation and resources, the G7 contractors can adapt to a distinct strategy of using local materials. By analyzing projects that incorporated these green building features into their designs.

Lastly, enabling storm water retention. By capturing and capturing runoff water, a humidification pond controls the quantity and quality of rainwater. The natural pond process then acts to remove the pollutants. Ponds should be surrounded by natural vegetation to improve shore stability and enhance aesthetic benefits. From a sanitary point of view, there is always the problem of standing water. This can be a drowning risk, especially with children. Ponds can also attract mosquitoes, which can contribute to the transmission of certain diseases.

#### 4.5 Discussion

The researcher could assert that every research objective listed in the literature review, including the level awareness, current barriers and strategies of implementation of green building concepts in Malaysia, was appropriate based on the data collection and analysis process. Each responder provided more opinion entries to support the previous researcher's assertion. The relationship between the literature review and the respondent data was identified by the researcher.

The idea "green structure" alludes to the drawn out practices of utilizing asset effective and ecologically capable cycles and building structures over the lifetime of the structure like plan, development, activity, support, and retrofit (Olubunmi *et al.*, 2016). Green structure mindfulness is characterized as the proper methodology and backing activities led to help individuals grasp the nuts and bolts and targets of points and the prerequisites in work fulfillment (Umar and Khamidi, 2012). A review showed that one of the main obstructions to the improvement of green structures in the nation is an absence of public mindfulness (Lim *et al.*, 2018). The degree of consciousness of execution of green structure is essential to help and advance the green structure idea carry out in development industry Malaysia. In this examination, G7 project worker showed that they know for the green structure idea, information and issue which influence the execution of green structure idea in execution of green structure in Malaysia.

Green building concepts was somewhat difficult to implement in full coverage since it was different with the traditional method of the building. This difficulties largely duo to lack of funds, perceived cost of implementation is high, lack of expertise, lack of accessible technology and desirable subsidies.

Strategy of implementation the green building concept showed that recycling content materials is the mostly agreed by respondents. Recycling content materials such as building materials derived from soil, bamboo, lightweight concrete, Sandbag and others. Recycling content material can make long service life, non-toxic, saving natural resources and friendly with the environment, and most important it can decrease cost of material to meet up the top current barrier that is high cost.

## 5. Conclusion

5.1 Research Objective 1: To identify the awareness of implementing the green building concept among G7 contractor

In light of the outcomes gathered, it very well may be presumed that each of the respondents figure out that the overall data of green structure. An Earth-wide temperature boost isn't an issue that ought to be dealt with by a gathering of engineers in Malaysia that generally regularly considered by project workers, trailed by states and non-states ought to participate in advancing execution of green structure. Larger part of the respondents have showed that elevated degree of mindfulness about green structure ideas. Furthermore, the public authority and privately owned business need require more work to constantly carry out the green structure idea in development industry. As indicated by an exploration the degree of shopper mindfulness and care for the climate was displayed to have a gainful and significant association with the act of green structure commercialization. In spite of the way that natural worries are at an undeniable level, low utilization rehearses are being followed (Sabar *et al.*, 2018).

5.2 Research Objective 2: To investigate the current barriers that affect the implementation of green buildings

Based on the results collected, the current barriers of implementation of green buildings in Malaysia construction industry were known. The top five barriers provided by the contractors in the research were perceived cost of implementation is high; desirable subsidies; lack of expertise; lack of accessible technology and financial constraint in implementation of green building in construction industry. According to Yee *et al.*, (2020), the construction industry in Malaysia is facing the same major barrier as in other places, which is a lack of funds. According Wong *et al.*, (2021), high cost was also identified as the most significant obstacle. Although it is evident that green building may assist to prevent climate change, its acceptance in the Malaysian construction sector will take some time. Similar studies in Singapore found that employees' expertise, accessible technology, and planning were the most important elements influencing green building construction projects (Hwang *et al.*, 2017). All these barriers affect the adoption and implementation among the contractors. In order to overcome the current barriers in implementation of green building projects, it is necessary to find ways to lessen the obstacles that contractors confront when identify and solve these problem.

5.3 Research Objective 3: To investigate the strategy to increase the implementation of the green building concept in Malaysia

The investigation on the investigate the strategy to increase the implementation of the green building concept in Malaysia that should be established to start with an effective process that can help in increasing of implementation of green building concept. When the problems were unable to solve, thus strategy to increase the implementation of the green building concept should have been determined. In this research, the top five strategy have been identified which are recycling content materials; install control sensor on ventilation systems to automatically react to abnormal circumstances; implementing system that promote the usage of composite type materials; optimize the insulated concrete materials and on-site infiltration. Sensors and control systems may be developed so that electrical lighting positioned in surrounding buildings can be turned off when enough daylight is available in working areas (Sun *et al.*, 2018; Wang & Yang, 2020). Furthermore, it is advised to prioritize materials with the

least environmental effect, such as recycling content materials, efficiently employing contemporary designed materials, and implementing systems that promote the usage of composite type materials (Umar *et al.*, 2012). These strategy obtained should be implemented into green building concept to ensure the innovation and transform the entire work flow in construction project.

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