

## Barriers in Implementing Sustainable Construction among Contractor

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### Abstract

The construction industry is developing rapidly and become one of the backbones of the country. At the same time, building and sustainability are often highlighted important and connected to one another. Even the country has come out with a momentous milestone of the Twelfth Malaysia Plan (2021-2025) with 14 game-changers, where one of them is focusing on advancing green growth for sustainability and resilience. Hence, Green Building Index (GBI) is introduced in Malaysia as a rating system that aims to promote the use of energy efficient. Sustainable construction in building development have been shown to have a clear positive impact on the environment, it has been highlighted as the current trend in environmental protection. However, different advantages and disadvantages are enticing and discouraging the contractors from implementing sustainable construction in their projects. Therefore, this study is conducted to determine the barriers in implementing sustainable construction among contractors in Malaysia. In attaining the objectives of this study, quantitative approach is adopted, where quantitative data is utilised in the methodology phase via questionnaire survey. The data collected were analysed using SPSS Software and presented in the form of descriptive analysis of mean, standard deviation and ranks. The findings of the study found that the main critical barrier faced among contractors in the application of sustainable construction in Malaysia is the sustainable construction requires more time and cost investment ranked as number 1 with the mean of 4.94 and standard deviation 0.243. Thus, this study has provided the initiative to overcoming the barriers in sustainable construction is significant to ensure the contractor can acquire the benefits from implementing sustainable construction. From the study, it is suggested that further research should be made in identifying initiatives to promote the application of sustainable construction among contractors in Malaysia to adapt sustainable lifestyle in the country.

**Keywords:** Barriers, Contractors, Sustainable, Sustainable Construction.

**Research Background**

The concept of sustainable development has been introduced by the government since 1996 in Malaysia after realizing that problems with pollution have spread all over the country. Few campaigns have been introduced such as 'Cintailah Sungai Kita' and 'Kempen Kitar Semula'. Most of the campaigns are focusing on the natural resources such as rivers, forests and air quality involving environmental sustainability. Sustainable development is a simple idea of ensuring a better quality of life for everyone, now and for generations to come. It means achieving social, economic and environmental objectives at the same time. The construction industry has a huge contribution to fulfil our quality of life. Construction, building materials and associated professional services together account for some 10% of Gross Domestic Product and provide employment for around 1.5 million people (Raynsford, 2000). Building and structures change the nature, function and appearance of our towns and countryside. Although sustainable development has been the 'buzzword' since 1980s, but the concept is not new for Malaysia because it has been applied in Malaysian Developed Plan since 1970s. The concern for sustainable development has been echoed by subsequence five years plans (Ibrahim & Abdullah, 2001). How our construction industry is developed, planned, designed, constructed, and used will largely determine our quality of life. A well planned and designed built environment will consider the natural environment and validate it as intrinsically important and also necessary to our own well-being. Green building rating systems can influence the development of green buildings to a great extent. Many assessment methods have been developed to assist in the design, construction, operation, repair, maintenance and demolition of green buildings in accordance with the green grading system (Ebekozien et al., 2021). However, in order for a building to be classified as green building it need to fulfil a certain criterion (Bahaudin et al., 2012).

In Malaysia, the green movement is still in its infancy. Sustainable projects are mostly at the pioneer stage (Abidin, 2010). However, there are several challenges in adopting technologies in the Malaysia construction industry (Sim and Putuhena, 2015). The cost is the main priority of sustainable development (Lim, 2015). The construction companies will face the problem of the higher initial cost and obstacles to find material that fulfils the green criteria or sustainable construction.

According to Lim (2015) the government concern about sustainable construction in Malaysia, therefore the government has been promoting sustainability initiatives since year 2000. According to Sim and Putuhena (2015), the government which are the Association of Consulting Engineers Malaysia (ACEM) and Pertubuhan Arkitek Malaysia (PAM) has been develop Green Building Index to promote sustainability in built environment. However, there is still lack of incentives given. This is because the incentive that the government provided does not attract construction practitioners to develop sustainable buildings. Chan et al. (2014), stated that when the government and private sector share a same concern and goal, Malaysia's construction industry may advance and become more sustainable. This shows that both private and governments need to cooperate in order to adopt green technology in construction industry.

Furthermore, there is also lack of understanding, awareness and application about sustainable construction concepts in the construction industry (Lim, 2015). Hence, the

construction practitioners need to attend a lot of seminars independently, either local or international, showing how important to sustain our environment, economic and social for our future generations especially in promoting the sustainable construction concepts to the contractors. Hence, this study will be carried out in order to determine the application of sustainable construction criteria among contractors in Malaysia.

### **Literature Review**

Abidin (2010), stated that sustainable construction dubbed 'green construction' explains the responsibility of the construction industry in achieving sustainability. The term of sustainability has been adopted as an effective remedy for change development. The concepts of sustainability must be applied into the construction industry to influence the way a project is carried out to achieve a balance between preserving the environment and maintaining prosperity in development. Sustainability is a new concept in developing countries, including Malaysia. Most of the industry stakeholders such as contractors and developers do not understand the benefits to implement sustainable construction. Hence, the implementation in the sustainable building is limited. According to Abidin (2009), the criteria of sustainability in building and construction that focused on issues of limited resources in particular energy and on how to minimise the impacts on the natural environment with emphasis on technological issues such as materials, building components, construction technology and design principles related to energy. The criteria of sustainable construction govern three main pillars which is environmental protection, social well-being and economic prosperity.

Green Building Index (GBI) is developed by Pertubuhan Arkitek Malaysia (PAM) and the Association of Consulting Engineers Malaysia (ACEM). This association is an initiative to lead the construction industry towards environment- friendly concepts. Sustainable buildings are designed to reduce the negative impacts on the environment while increasing the occupant's health by forwarding these five categories, sustainable site planning, safeguarding water and water efficiency, energy efficiency, conservation and the reuse of materials and improved health and indoor environmental quality. According to Shafiei et al (2013) the Green Building Index where a rating system is applicable for all buildings. There are six criteria rated by GBI in all the building which are Energy Efficiency, Indoor Environmental Quality, Sustainable site and Management, Material and resources, Water Efficiency and Innovation.

The sustainable construction provides benefits to the environment, social and economics. In terms of environmental benefits, sustainable development means meeting needs in ways which deliver social progress, protection of the environment, better resource use, economic growth and employment (Raynsford, 2000). The Malaysian economic growth can be rise by adapting sustainable construction and even better making sure the environment is well conserve. Sustainable development is a simple idea of ensuring a better quality of life for everyone, now and for generations to come. It means achieving social, economic and environmental objectives at the same time. Meanwhile, according to Yudelson, (2008), the benefits of the green building is minimize the use of non-renewable construction material and other resources. For examples energy and water through design and construction and effective recycling of construction waste. While, according to (Raynford, 2000), conserving resources. In order to conserve the resources, the construction practitioners should maximize the use of the recycled materials, renewable, sustainable

managed and bio-based materials in a manner that allow for the use of fewer materials and employ the processes that use less raw materials. Meanwhile, Water efficiency refers to the use of water supplies in a way that conserves water and ensures a secure supply of clean water for current and future generations. This means using rainwater and non-potable water for the plant irrigation and washing that can save amount portable water and it increases cost of saving for green building (Shafiei et al., 2013). In Malaysian, GBI is aware about the need of green building because of green buildings make efficient uses of resources, have cost operation savings and improve the quality of human life (Ismail et al., 2015).

Other than that, according to Shafiei et al (2013), there are social benefits from implementing the sustainable development which is minimizing strain on local infrastructure, heightening aesthetic qualities, improving overall quality of life, having healthier lifestyles and recreation and enhancing occupant comfort and health. Those who is working in green built properties will better concentrate on their job and become more efficient because they have clean air to breathe, natural light to look and energy resources that are put to good use. According to Tokbolat et al (2020), the social benefit from the implementing green building consists of enhance health and safety, collaborative working environment and secure industry. Besides, our environment has a major effect on our wellbeing when it comes to our quality of life. Hence, the occupants living or working in the green buildings have noticed an important change in their quality of life because of an improved lighting resources and improved air quality.

The application of the green building also have benefits towards the economy. According to Smit & du Toit (2015), the application of the green building will lower the operating cost. This is because the electricity and water usage are the main contributors to the operation in each building. Energy and water saving has become economic advantages in applying sustainable development (Shafiei et al., 2013). This is because the green buildings on range are 25% to 30% more efficient in term of energy use (Smit & du Toit, 2015). Shafiei et al (2013), stated that the implementation on sustainable development will improved employee attendance and increased employee productivity. Thus, an eco-friendly workplace generates positive energy, while natural resources improve the health of those who work in the green building. Employee will remain happy and eager to go to work every day.

### **Research Methodology**

The method of data collection used for this research is by using the quantitative approach. The process of collecting data is done by distributing questionnaire to 313 targeted respondents which is contractor Grade 7 at Petaling, Selangor, Malaysia. The five items Likert Scale is used in the questionnaire survey. According to Kya et al (2015), the 5-point Likert scale is the most common scale. The 5-point Likert scale used ranging from 1=strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree. The Likert scale was chosen in this study because the Likert scale is the most effective method in identifying the respondents' choices. The sampling list is obtained from the list of contractors registered with Construction Industry Development Board (CIDB). There were 1711 construction companies in Petaling, Selangor according to the CIDB (2022). The questionnaires were sent out via email due to the restriction of SOP since Pandemic Covid-19 occurred. For this study, the sample size for the population of 1700 is 313 (Krejcie & Morgan, 1970). Meanwhile, Lindemann (2019) stated that the average response rate for the overall survey type in 2019 is 33% while for an email survey

is 30%. However, the minimum response rate was set at 60% to make sure enough data received for successful research. As a result, this survey received 87% response rate equivalent to 271 respondents from 313 questionnaires distributed in this survey. Then, the data is analysed by using SPSS 27.0 in the forms of descriptive analysis of mean and standard deviation. The information gathered was analysed in the form of a table.

### Analysis and Discussion

Table 1 shows the results of mean and standard deviation according to the ranking from the questionnaire survey, which is on the barriers faced among the contractors in the application of sustainable construction in Malaysia. From the analysis, it can be concluded that the barriers faced among the contractors in the application of sustainable construction in Malaysia is the sustainable construction requires more time and cost investment. It means that the sustainable construction requires more time and cost investment is the most challenging barriers faced among the contractors in Malaysia. This can be analyse from the highest ranking of mean score which is 4.94 with the standard deviation 0.243 for the barriers of the sustainable construction requires more time and cost investment. Followed by the barriers of high initial cost for sustainable construction in rank 2 with the mean score of 4.91 and the barriers of contractor's lack of knowledge about the sustainable construction will affect the project in rank 3 with the mean score of 4.88. Meanwhile, the lowest which is in rank 9 is the barrier of the demand of the green building is considered new in Malaysia with the mean score of 4.26.

Table 1

*The barriers in implementing sustainable construction*

Barriers in Implementing Sustainable Construction	Mean	Standard Deviation	Rank
The sustainable construction requires more time and cost investment.	4.94	0.243	1
Initial cost for sustainable construction is high.	4.91	0.289	2
Contractor's lack of knowledge about the sustainable construction will affect the project.	4.88	0.359	3
Unfamiliar with the performances of sustainable technologies will affect the performance of the sustainable construction.	4.88	0.323	4
Unfamiliar with the performances of sustainable technologies will affect the performance of the sustainable construction.	4.88	0.363	5
Many construction practitioners are not qualified in the sustainable issues and practices.	4.85	0.410	6
7Limited support and incentives from government has slow down the sustainable construction.	4.70	0.546	7

Lack of regulatory from the government has decreased the sustainable construction.	4.64	0.586	8
The demand of the green building is considered new in Malaysia.	4.26	0.985	9

From Table 1, the sustainable construction requires more time and cost investment is mostly agree by the respondents, this is also supported by Chan (2014), mentioned that implementing sustainable construction need significant amount of time and cost investment. Lim (2015) also stated that cost is the main priority in sustainable development.

### Conclusion

As for the conclusion, the research objectives of the study which are to identify the barriers faced among the contractors in the application of sustainable construction in Malaysia has been achieved by rank of mean for each barriers listed. Thus, this can be concluded that the main 3 barriers in implementing sustainable construction among contractors in Malaysia are because of the need of significant amount of time and cost investment in implementing sustainable construction, high initial cost for sustainable construction and the contractor's lack of knowledge about sustainable construction. This research analysis revealed that the sustainable construction requires more time and cost investment are the critical barriers that need to be highlighted in implementing sustainable construction in Malaysia. The result was consistent with the previous study, as mentioned by Chan (2014) that implementing sustainable construction need significant amount of time and cost investment. Therefore, it convinces that the contractors are having problems to implement sustainable construction due to the increase in time and cost in the execution of sustainable construction. Based on the findings and analysis that have been made, the significance of the study to the contractors in Malaysian construction industry are:

- To inspire contractors in Malaysia to apply the sustainable constructions concepts by referring to the application of the sustainable construction concepts in these studies.
- To ensure the contractors can acquire the benefits from implementing sustainable construction in Malaysia.
- To establish more knowledge on the Malaysian sustainable construction .

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