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A study on the challenges of implementing green building concept in Sarawak, Malaysia

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Abstract. Malaysia is looking forward in achieving developed country status which drives several strategic plans in construction, as it plays a vital role in country‟s economic growth and development. Construction Industry Transformation Programme (CITP) has been introduced to boost its performance with sustainable construction. However, most of the construction industry players are not involved in sustainable construction especially on green building concept and thus decelerating the development. Therefore, this study is conducted to identify the drivers and challenges faced by the construction industry players through questionnaire survey where the market demand from stakeholders is placed primarily in implementing green building. The findings showed that awareness and understanding of the stakeholders about green building concept are lacked due to unforeseen circumstances. Detail explanations or descriptions on the benefits and contributions from green building application are needed to be delivered to stakeholders. A framework is proposed for future implementation by improving the education and delivered information, as well as providing the mechanism of promoting the green building concept among the stakeholders.

1. Introduction

During the last 20 years, the average contribution of services, manufacturing, agriculture and construction industries in gross domestic product (GDP) were 48.3%, 28.2%, 9.3% and 4.1% respectively [1]. Being the top 4 GDP contributors, construction industry provides significant developments to the country. As one of the strategic planning, Construction Industry Transformation Programme (CITP) has been introduced to boost its performance with sustainable features. However, most construction industry players are not involved in this transformation and thus decelerating the development. There are four strategic thrust that has been highlighted in the programme. One of the four strategic thrusts is Environmental Sustainability. In order for the environmental sustainability policy to be achieved, green building is one of the current practice approached by Malaysia‟s government to implement in the construction industry.

Green building, also known as sustainable building, is the method of building structures using environmental- friendly and resource- efficient processes throughout the life cycle of a building, starting with design, construction, operation, maintenance, renovation and deconstruction [2]. The "green movement" started around 1960‟s where people have the impression that Earth‟s resources

were being salvage rather than smartly exploited. Moreover, the increases of oil prices in 1970"s contributed the factor which a lot of research and activity has been conducted to improve energy efficiency and finding renewable energy sources.

Different organizations from all over the world have set up their own codes and rating systems to evaluate a building towards sustainability. These are some examples of green building rating guidelines: BREEAM (United Kingdom), CASBEE (Japan), LEED (United States), Green Star (Australia) and Green Mark (Singapore). In Malaysia, Green Building Index is set up as a rating tool for green building. Green Building Index (GBI) is developed in 2009 by Pertubuhan Arkitek Malaysia (PAM) and the Association of Consulting Engineers Malaysia (ACEM). Recently in 2015, Malaysian Carbon Reduction and Environmental Sustainability Tool (MYCREST) has been developed to manoeuvre, support, quantify, and therefore decreasing the impact of the built environment in terms of carbon emissions and environmental impact, and taking consideration for a comprehensive perspective of the built environment through the life cycle.

There is a rapid development in the capital of Sarawak, Kuching. It was found that there is a low application of green building in Kuching. Therefore, this paper addresses the perceptions and opinions from the industry players on the implementation of green building concept in their construction practices. The obtained information should be useful to assist in adapting the green building practices in their construction work. A framework of solution is proposed to the relevant organization such as the state government and public sector in finding the alternatives for construction players to implement the green building concept and thus, promoting the Malaysia national agenda in achieving sustainable construction.

2. Questionnaire Survey

Quantitative method was applied for data collection. According to [3], quantitative data collection concentrates on surveys, statistics and measurement, pre-existing data and questionnaires. When analysing quantitative research, validity and reliability are necessary in order to evaluate theories, developed facts and state the relationship between the variables [4]. The data for this research use both primary and secondary data to achieve the objective. Primary data was obtained by from questionnaire survey. The questionnaires have been distributed electronically and manually to the developers in Kuching area. Secondary data was collected based on the literature review of the past studies, journals and articles. Data analysis was performed by data collection from the questionnaire survey.

The questionnaire were categorized into 3 parts, namely
- Part A: Respondent Background (Demography)
- Part B: Drivers Contributing In Implementation of Green Building
- Part C: The Challenges in Implementing Green Building Concept.

Part A provided the general background information about the respondents and their organization. Part B and C were focusing on the research questions in this study. For part B, it was to identify the drivers contributing to implementation of green building concept among the developers. For part C, the question aimed to identify the challenges by the developer in order to implement green building concept in their construction project.

As recommended by [5], the Likert scale of five points (i.e. 1= strong disagreement, 2= disagreement, 3= neutral, 4= agreed and 5= strongly agreed) was used in Part B and C. Likert scale used to determine the respondents" level of agreement on the variables. The population of this research study were the developers certified under the Sarawak Housing and Real Estate Developers" Association, SHEDA. There were 154 of developer companies located in Kuching, Sarawak which registered under SHEDA. Based on [6], the population was 160, and needed 113 responses.

3. Data Analysis

3.1. Demographic analysis

The respondents were developers companies specifically located in Kuching, Sarawak. A total of 160 forms has been distributed to the developers. The number of returned questionnaire was 114 and making the response rate of 71.2%. For the role/position of respondents, 32 or 28% of the respondents were civil engineers, 19 or 17% were quantity surveyors, 14 or 12% were general manager, 12 or 11% were sales manager and 10% for architects, 10 or 9% were admin, 9 or 8 % were project manager and the 6 or 5% were secretary.

For the respondent"s level of education, 68% owned a Bachelor Degree, 30% possessed a Diploma and 2% had a Master Degree. Their knowledge and education on Green Building also have been assessed in this questionnaire where 51% answered no while 49% answered yes. For the respondent"s experience aspect in construction industry, 34% have 7 to 9 years of experience, 28% have 10 years and above, while 21% have 4 to 6 years of experience, and 17% have 1 to 3 years of experience in the industry.

In the aspects of the company"s experience, 42% companies have been established 11 to 15 years, 31% which established between 16 years and above, 19% operated between 6 to 10 years and 8% have been run for 0 to 5 years. The respondents also have been asked on their involvement in green building project where 89% not involved in, while 11% involved in green building project.

3.2. Drivers

Based on the descriptive analysis, the result in Table 1 shows that the market demands have the highest mean value (4.66) among the other drivers. The lowest mean value was identified for the educational programs (4.25).

<div align="center">Table 1 Drivers in implementing green building concept</div>

Variable	Mean	Rank	Means of Responses*
Market Demand	4.66	1	Very Imp.
Economic Incentives from Government	4.50	2	Very Imp.
Establishment of Green Organization	4.30	3	Imp
Enforcement of Environmental and Sustainable Legislation	4.27	4	Imp
Educational Programs	4.25	5	Imp

(Note: *mean 1.0 to 1.49 = unimportant, 1.5 to 2.49 = less important, 2.5 to 3.49 = moderately important, 3.5 to 4.49 = important, 4.5 to 5.0 = very important)

3.2.1. Market demands

There was 71.1 % of respondents strongly agree that the market demand is one of the drivers for construction industry player to implement the green building which is quite a big number compared to the others drivers. There is also 0.9 % of the respondent felt disagree on the statement yet the number not affecting the mean value much as the drivers of market demands scored the highest, 4.66. The market demand mostly contributed by the investment of stakeholders in implementing the green building project. Anyone interested in the process or outcome of a project is a stakeholder. Respondent believed that the strong marketability of green building which contributed by the stakeholders investment in construction market can attracted the involvement of construction industry players in green development project.

3.2.2. Economic incentives from government

Based on the analysis, 59.6 % strongly agree the economic incentive from government is a driver for implementing green building. Moreover, 9.6% remains neutral as they were not sure on it. The final mean value of this variable was 4.50. High cost is needed in implementing green building project due

to the limited resources of green technology and materials. With the sufficient amount of incentives and financial support such as tax exemption as a driver, the risk of loss can be lowered to the developers, hence boosting the confidence of developers in implementing the green construction as they will not bear the high cost of green development.

3.2.3. Establishment of green organisation

There is no respondent chose the strongly disagree in this option of driver. Respondents mostly chose strongly agree with contribution of 47.4 % from 114 respondents. Even though the number of strongly agree is high, there is also some respondent which was 1.8 % disagree for the establishment of green organization to be one of the drivers that help in green building implementation.

3.2.4. Enforcement of environmental and sustainable legislation

For the Enforcement of Environmental and Sustainable Legislation variable as the drivers of green building implementation, the result chosen by respondents showed 2.6% for level 2 agreement and 44.7% for level 5 agreement. The majority chose strongly agree while minority chose to disagree on the statement. The mean value still considered high with mean value of 4.27. The legislation established by government are considered to be the first step to trigger construction industry players and sending a clear illustration that government is moving towards sustainable development. Hence, most of the respondents believed that this variable is one of the important drivers for green development in Kuching.

3.2.5. Educational program

By referring to the result analysis, the mean value is 4.25. Majority of the respondents which is 45.6 % chose agreed that educational programs as the drivers of green building implementation. The lowest percentage chooses by the respondent is neutral with 14.9 %. This driver tends to educate and introduce people about the green building concept which is important to boost the market demands.

3.3. Challenges

Based on the descriptive analysis, the results in Table 2 showed that the lack of market demands had the highest mean value of 4.40. Meanwhile, the lowest mean value, 3.20, is the challenge of time consuming variable. Nine out of the ten variables obtained mean value range between from 3.5 to 4.49 which can be denoted as an „important" variable. Only one variable scored mean value in the range of 2.5 to 3.49 which is time consuming variable. Hence, the variable is denoted as „moderately important" in the challenges aspect.

Table 2 Challenges in implementing green building concept

Variable	Mean	Rank	Means of Responses*
Lack of Demand from Stakeholders	4.40	1	Imp.
Lack of Public Awareness	4.35	2	Imp.
Lack of Incentives	4.31	3	Imp
Lack of Building Codes and Regulations	4.27	4	Imp
Lack of Technology	4.27	5	Imp
Lack of Expertise and Professional Knowledge	4.26	6	Imp
Higher Final Product Price	4.08	7	Imp
Higher Investment Cost	4.01	8	Imp
Risk of Investment	3.65	9	Imp
Time Consuming	3.20	10	Moderately Imp.

(Note: *mean 1.0 to 1.49 = unimportant, 1.5 to 2.49 = less important, 2.5 to 3.49 = moderately important, 3.5 to 4.49 = important, 4.5 to 5.0 = very important)

3.3.1. Lack of demand from stakeholders

There was 49.1 % strongly agree that the lack of market demand from stakeholder is one of the challenges for construction industry player to implement the green building. There was also 1.8 % of the respondent disagreed on this challenge statement but the highest value of 4.40 agreed with this challenge. The results also were corresponding to the top most driver which is market demand for implementing green building concept by the respondents. In other words, the demand from the market is considered as top most important criteria to implement green building concept in Kuching Sarawak. Sharif et al. [7] stated that the practices of sustainable development in Asia is caused by the lack of demand and it is proven the validity of the obtained data.

3.3.2. Lack of public awareness

Based on the analysis, 49.1 % was obtained from „agree" for the variable of lack of public awareness. Moreover, 1.8% remained disagree that the buyer awareness about green building is still lacking. The final mean value of this variable is 4.35. A lot of researchers agreed that public awareness related closely to demand. Said et al. [8]; Sharif et al. [7]; Zainordin et al. [9] found that public awareness about green development can drive and create demand for the construction industry. Sharif et al., [7] stated that public should be educated and informed on the importance of green building to the environment in order to create a surge of demands of green building development in Malaysia. From developers" view, without these demands from the public, the implementation may decelerate.

3.3.3. Lack of incentives

Majority of the respondents agreed that the lack of incentives barricade them from implementing green building with a percentage of 44.7%. The lowest value of 12.3% chose neutral. The mean value scored was 4.31. Respondents felt that the amount of incentives and support provided by the government are less as they are unable to cope the high price to construct green building. The results have been proven with [10] where they found that the current incentives are still inadequate to attract construction players to involve in green building project.

3.3.4. Lack of building codes and regulations

Based on the analysis, 53.5 % agreed towards the majority choice of lack of building codes and regulations. Moreover, 9.6% remained neutral as they were not sure about the challenge of implementation. The overall mean value of this variable was 4.27. Majority of the respondents agreed that current frameworks of regulations, standards or guidelines for green development established by authority are complicated to be complied. Construction players are still confused which codes and regulations needed to be applied as the guidelines are not being standardized. Current rules and regulations should be revised in order to support green construction development [10].

3.3.5. Lack of technology

For the lack of technology variable as the challenges of green building implementation, the results that have been chosen by respondents showed the range of 5.3 % and 48.2 %. The majority chose strongly agree while minority chose to disagree on this challenge. The mean value was 4.27. Most of the technology needed to be imported from the more developed and experienced countries. The

construction industry players believed that the need of the technology to be imported will potentially contribute to the increment of the logistic cost.

3.3.6. Lack of expertise and professional knowledge

By referring to the result analysis, the mean value for the total respondents was 4.26 for this variable. Majority of the respondents which was 50.9 % chose agree that construction industry has low number of experts in green building that can give them guidance throughout the green development project. The lowest percentage of 1.8% chose by the respondent was disagreed with this challenge. Green building project considered as complex which needed a proper planning and monitoring. Mistake made during the process will increase their cost. Hence, developers are afraid to implement the green development with the lacking of expertise and professional knowledge.

3.3.7. Higher final product price

The mean value for the total respondents answered was 4.08. Majority of the respondents which was 39.5 % chose agree that high selling price made the green building to be less popular among the public where buyers prefer a low and affordable price. The lowest percentage of 5.3% by the respondent was the option of disagree. The challenge is high selling price towards end user and reduces the interest of developers in the participation of green development project.

3.3.8. Higher investment cost

From the analysis, the mean value for the total respondents answered was 4.01. Majority of the respondents, 41.2 %, chose „agree" that higher investment cost as the challenges of green building implementation. The lowest percentage chose by the respondent was neutral with 21.1 %. To implement green practices in the construction project, it required huge amount of cost compared to the uses of conventional project [7]. Research of [11] found that the high financial of risk may cause a lot of construction industry players decided not to involve in green building project. To support the statement, study of [12] also proved that the construction industry players are not interested in sustainable construction as they are concern about the upfront cost.

3.3.9. Risk of investment

For the risk of investment variable as the challenges of green building implementation, the results chose by respondents showed a range of 0.9 % to 40.4 %. The majority chose agree while minority chose strongly disagree on this challenge. As the level of agreement is varies between strongly disagree to strongly agree, the mean value scored for this variable was 3.65. It is estimated that the initial capital costs are generally in the range of 1 to 25% more than the conventional building. Construction industry players refuse to bear the high initial investment costs [13].

3.3.10. Time consuming

The results chose by respondents showed from 7.0 % to 38.6 %. The majority chose neutral while minority chose to strongly disagree on this statement. As the level of agreement is various between strongly disagree to strongly agree, the mean value scored for this variable is low among others variables, which was 3.20. Green building construction in Malaysia required a lot of time as the industry is shortage of expertise and resources. In order to have an expert, it require the construction

player to send their staff for training which are time consuming as the company will have a shortage of hands to handle the project which lengthen the project time for completion.

4. Conclusions and recommendations

The drivers and challenges in implementing green building and faced by construction industry has been determined. The market demands and lack of market demand were identified as the number one drivers and challenges that needed to be overcome in order to promote sustainable construction in Kuching, Sarawak.

Some actions need to be initiated by solving the market demand problem. In order to solve this, level of awareness and understanding of the stakeholders must be boosted by improving the education, information and the mechanism of promoting the green building concept among the stakeholders.

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