

The Execution of the Green Building Project in Klang Valley, Malaysia: A Pilot Study

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ABSTRACT

Execution of the green building project specifically among the housing developers in Malaysia is still at its infancy. As of August 2016, there are only 16 housing projects certified by the Green Building Index (GBI) under the category of Residential New Construction (RNC) since the assessment systems established in 2010. The authors address this issue in the context of the factors affecting the execution of the green building project among the housing developers in Klang Valley. A pilot study by using questionnaire survey was conducted among 30 housing developers from 10 different zones divided by the Ministry of Housing and Local Government, Malaysia. This paper aimed to report the results of the reliability test of the designed questionnaire. The results based on the Cronbach's Alpha analysis showed that the items used in the questionnaire were reliable and obtained an acceptable level of internal consistency, which were relevant for the main study. The pilot study revealed that only 9 out of 30 respondents had the completed or ongoing green building projects. The findings exposed the level of knowledge, emotion, value, attitude, behavior and the potential factors affecting the execution of the green building projects among the housing developers in Klang Valley.

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INTRODUCTION

Green building is a building that exhibits energy efficiency, resource depletion and protection of health and the environment. Green building has proven in contributing toward sustainability as it can reduce 30% to

80% of carbon dioxide (CO₂) emission due to energy efficient consumption (Lutzkendorf & Lorenz, 2006). Rapid urban development in Malaysia has contributed to the increasing of CO₂ emission. The future trend in residential energy consumption and carbon emission in 2020 will be 4397 kilotons of oil equivalent (ktoe) with the CO₂ emission of 11,689,308 tonnes (Ministry of Energy, Green Technology and Water [MEGTW], 2011). Housing is one of the fastest growth sectors in Malaysia due to the rapid increase in population and increasing demand of houses. Most housing developers in Malaysia had their main offices located in Klang Valley, in which a main metropolitan area of Malaysia (Isa et al., 2018). The green housing development is the solution to fulfill the housing demand, while, protecting the environment. The fact is, currently, the green housing projects are not a popular choice among the housing developers of the country. As of August 2016, there are only 16 housing projects certified by the Green Building Index (GBI) under the category of Residential New Construction (RNC) since the assessment systems established in 2010. This fact showed that the number of the green housing projects was at a low level compared to a total of 818 housing projects delivered in Klang Valley since 2010 (Ministry of Housing and Local Government [MHLG], 2016). Even though Klang Valley had the highest number of registered green projects (GBI, 2017; Isa et al., 2018), however more than 50% of them had less than five years work experience on the green housing projects (Isa et al., 2018).

This study dedicated for testing the internal consistency of the proposed items and reliability of the design instrument, was a set of questionnaire for the main study. The authors aim to contribute to the theory and practice in the development of the green housing project through identifying the factors affecting the execution of the green building project among the housing developers. The authors provide an extended review of the literature on the factors affecting the green housing project execution based on the pro-environmental behavior (PEB) theories and provide analytical framework that views research from the perspective of the housing developers in order to provide basis for further research and practice on housing developers' capabilities.

Pro-Environmental Behaviour Theories

A number of studies revealed that the PEB theories as a tool to influence change and behavior to a more sustainable manner. PEB is defined to minimize the negative impact of one's action on the nature. Several internal and external factors were highlighted as significant antecedents of PEB as follows:

Internal Factors. The variables of internal attribution of PEB are knowledge, emotion, value and attitude (Kollmuss & Agyeman, 2002). What people know about the environment, how they feel about it, and what action they take that may help or harm the environment are critical for establishing a sustainable community. The old model of PEB emphasizes

that a linear progression of environmental knowledge leading to environmental awareness and attitudes which lead to pro-environmental behavior. The knowledge of green building and the benefit gained from the development of the project are crucial for the developers as a starting point to change their attitude, value and behavior towards executing the green project. The industry begins to realize that green buildings benefit on the functionality, flexibility, accessibility, as well as economic, environmental and productivity performances (Isa et al., 2014a). By having more knowledge concerning the green building and environmental protection, it will increase the implementation of the green building in the industry.

Emotion is another internal factor of the green building implementation among developers. Emotion is often intertwined with mood, temperature, personality, disposition, and motivations. It is also linked to behavioral tendency and driving the force behind motivation, positive or negatives. Ekman (1992) stated, there were six basic emotion measurements, which were anger, disgust, fear, happiness, sadness and surprise. Emotional involvement is very important in shaping human beliefs, values, and attitudes towards the environment (Kollmuss & Agyeman, 2002). In the meantime, values are responsible for shaping a human intrinsic motivation. The environmental values are based on one's life experience that has shaped the beliefs and value of active environmentalists. Schwartz (2012) stated that values had a positive influence on environmental behavior in openness to change and universalism. Meanwhile, attitude is the enduring positive or negative feeling about some person, object or issue. Attitude can directly influence the developers' behavior together with their beliefs and values concerning the benefits of the green building practices. Attitude is the predictors of behavior and behavioral intentions (Ajzen, 1991). The knowledge of green building may affect the developers' emotional, value, and attitude towards the implementation of the project. It may also encourage developers to value the importance of the implementation of the green building project.

External Factors. The external factors of PEB consist of institutional or political, economic, social and cultural aspects. The enforcement of the green building policies and regulation will improve the housing developers' involvement in the green building projects. Promoting of the green building product is a part of support from the government in creating a capable and viable local construction sector. There are many efforts by the government and the professional bodies to encourage the development of the green building among developers in Malaysia (Isa et al., 2014a). The government has provided tax exemption equivalent to 100% of the additional capital expenditure to get the GBI certificate and Green Technology Financing Scheme, which are worth of RM1.5 billion as a part of soft loan to use green technology and materials for the developers and owners (Elias & Lin, 2015).

Social and culture play a very important role in shaping a person's behavior. The provision of proper education concerning the economically viable of a green building development for the developers and buyers will improve the interest of execution and demand of the green project. The government and private sectors and public engagement are important in leading the green building market. Education and public awareness of the green building are essential to drive clients demand, tenants' satisfaction, and reduce the environmental problems by generating a sense of social responsibility (Albahori et al., 2017; Safee et al., 2015). Economical factors have a strong influence on a person's decision and behavior (Kollmuss & Agyeman, 2002). Developers and buyers are affected by the economic incentives to behave environmentally. They intent to choose green building if the payback time for the energy saved is reasonable (Albahori et al., 2017).

Based on the literature review discussed above, the internal and external factors of the green building execution were identified. A questionnaire was designed according to the objectives of identifying the factors affecting the execution of the green building development among housing developers. Then, this paper identified the reliability of the questionnaire used during the pilot study to confirm the usefulness of the research tool for the main study.

METHODS

The sampling method used for this study was non-probability convenience sampling. This method was selected because it was convenient and often used during preliminary research efforts to get a gross estimate of the results, without incurring cost or time required to select a random sample. This method was significant for a pilot study as it was highly recommended by many scholars and researchers when the time was short and where the information was needed fast (Sekaran, 2000). Sample size calculations are not required for some pilot studies as long as they are enough to provide useful information about the aspects that are being assessed for feasibility (Thabane et al. 2010). For this research, the pilot study was done involving a total of 30 respondents. The respondents were randomly picked based on the list of developers obtained from the MHLG (MHLG, 2016). The developers were located in 10 different zones of housing projects in Klang Valley. Three (3) committed respondents were selected to involve in the survey representing the developers of each zone.

One set of structured questionnaire survey questions was designed for the piloting purposes. The questionnaire was divided into seven sections. Section A involves 11 questions that cover gender, working position, level of education, working experience and their involvement in green building project. Based on the Likert scale, the respondents were required to choose within the scale of agreement (i.e. 1= strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree, and 5= strongly agree, for question 1 (section B),

question 4 (section C), question 6 (section D), question 8 and 9 (section E)). Meanwhile, question 2 (section B) is based on the scale of emotion (i.e. 1=angry, 2=fear, 3=tender, 4=happy, and 5=excited). Question 3 (section C) is based on a scale of importance (i.e. 1=not important at all, 2=not important, 3=neutral, 4=important, 5=very important). The other two questions are about the implementation of the green building principles based on knowledge, emotion, value, and attitude, political, economic, social and cultural factors. The final part of this questionnaire asks the respondents to give their opinion and suggestion on four open-ended questions. The first and second column of Table 1 shows the distribution of the items according to the variables.

Analysis of the data was undertaken using Statistical Package for the Social Sciences (SPSS). Cronbach's Alpha analysis was used to measure the internal consistency of the items used for the questionnaire and indicates how well the items in the set were correlated to one another. For the purpose of describing and indicating the weighting value of each item, the data was analyzed using descriptive statistic and Relative Importance Index (RII) methods. The mean score was divided into three levels: high (0.00-0.249), moderate (2.50-3.49) and low (3.50-5.00) as suggested by Chua (2012). In addition, by using the mean values, the resulted RII value was transformed into three important levels: high ($0.8 \leq RII \leq 1$), medium ($0.5 \leq RII \leq 0.8$) and low ($0 \leq RII \leq 0.5$) (Tam et al, 2007). The RII ranges are from zero to one and the factors will be ranked based on the biggest value (Isa et al., 2014b).

RESULTS AND DISCUSSION

The following subsections discuss the analysis results on the factors affecting the execution of the green building project among the housing developers. The respondents were dominated by males, which is (73.3%) than females (26.7%). The disproportionate of genders showed that males tend to work in the construction industry of the country. Majority of the respondents (46.7%) were from the engineering background, 30% from the architecture and the rest was from the building surveying or other background. About 77% of the respondents had less than five years' experience in green building projects, 20% had six to ten years of experience in green building projects, while the rest of the respondents (3%) had experience of eleven to fifteen years in green building projects. Minority of the respondents (9 out of 30) had several ongoing green building projects. Table 1 summarizes the results with specific factors categorized into three aspects, internal and external factors and the barriers, their reliability test, mean score and weight within and across the categories.

Reliability Test

The results indicate that the items of the internal factors and external factors of the green building execution were reliable and consistent with the Cronbach's Alpha value of,

0.951 and 0.966 respectively (refer Table 1). In details, the Alpha reliability scale of the internal factors was 0.938 for the developers' knowledge of the green building principles, 0.674 for their emotion towards execution of the green principles, 0.925 for their value and 0.927 for the developers' attitude on the execution of the green principles for their projects. Meanwhile, the values of Cronbach's Alpha for the external factors are 0.940 for the political factors on affecting the developers' decision of executing green building projects, 0.926 for the social and cultural factors, and 0.913 for the economic factors of the green building execution among them. The overall coefficient values of Cronbach's Alpha are above 0.9, which is 0.962. This indicates the variables had excellent internal consistency and achieved high reliability values. There was only one variables achieved $0.6 \leq \alpha < 0.7$, however it is still acceptable as the unacceptable value of Cronbach's Alpha is < 0.5 (George & Mallery, 2003). Thus, the findings of the pilot study showed that the items used for the questionnaire were reliable and obtained an acceptable level of internal consistency. The authors conclude that the instrument was reliable and understandable. Each of the items would remain in the existing set of dimensions based on the literature review.

Table 1
Reliability test of the items

Factors affecting the execution of the green building development among housing developers (The items)	No. of items	Cronbach's Alpha
Internal factors	78	0.951
1. Developers knowledge of the green building principles	24	0.938
2. Developers emotion on implementing the green building principles	18	0.674
3. Developers value on green building principles	18	0.925
4. Developers attitude on executing green building principles	18	0.927
External Factors	48	0.966
5. Political factors affecting the green building implementation	17	0.940
6. Social and cultural factors affecting the green building implementation	19	0.926
7. Economic factors affecting the green building implementation	12	0.913
OVERALL	126	0.962

Descriptive Analysis and Establishing the Weight for the Factors

The results as illustrated in Table 2 revealed that most of the respondents agreed with 24 items of the principles of a green building as listed in the questionnaire with the mean score of 3.81. Other than acceptance of the items, the results also showed that the level of the developers' knowledge concerning the green building project was at a high level. Meanwhile, the level of the developers' positive emotion, value and attitude concerning the execution of the green building project were also high with the mean values of 3.68, 3.90 and 3.96 respectively.

Table 2
Descriptive and relative importance analysis

Groups	Factors affecting the execution of the green building development among housing developers (The items)	No. of items	Mean Score	Weight (RII)	Rank
Internal factors	Developers knowledge of green building principles	24	3.81	0.762	5
	Developers emotion on implementing the green building principles	18	3.68	0.736	7
	Developers value on green building principles	18	3.90	0.780	2
	Developers attitude on executing green building principles	18	3.96	0.792	1
External Factors	Political factors affecting the green building implementation	17	3.82	0.764	4
	Social and cultural factors affecting the green building implementation	19	3.83	0.766	3
	Economic factors affecting the green building implementation	12	3.75	0.750	6

Mean Score: 0.00-2.49 = low; 2.50-3.49 = moderate; 3.50-5.00 = high

It shows that most of the developers were happy to incorporate the green building principles for their future projects. They also valued the 24 listed items as important for delivering a green building and they were willing to execute the green principles into their future building projects. The findings of this study initially contradicted the old linear progression model of PEB, which claimed that environmental knowledge, awareness and concern lead to the pro-environmental behavior. The fact was, only 9 out of 30 respondents had the completed or ongoing green building projects. In term of the external factors, the results showed that most of the respondents highly agreed with all those 48 items of the factors affecting execution of the green building project among the housing developers in Malaysia. The factors grouped into the aspects of political, social and economic as listed in the questionnaire with the mean score of 3.82, 3.83 and 3.75 respectively.

The RII values of the internal factors group are within the range of 0.792 to 0.736 and the external factors are within the range of 0.766 and 0.750, which are above 0.8 representing a high level of importance.

CONCLUSION

This paper has revealed the results of a pilot study for testing the consistency of the items and reliability of the instrument. The results showed that the instrument was reliable for the main study. This paper also identifies the potential factors affecting the developers' decision on choosing the green building development for their housing projects. The results showed that the level of the developers' knowledge, positive emotion, value and attitude concerning the execution of the green building project were high and they were happy to incorporate

the green building principles for their future projects. Surprisingly, the execution of the green building project among the housing developers were still limited. To understand the situation, the main study of this research should be answering an important question; What are the exact factors affecting the green building project execution among the developers? In conclusion, the green building gives enormous impacts towards the sustainability of building, environment and human well-being. Developers should play an important role for the sustainability through the housing project execution.

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