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THE STUDY OF GREEN BUILDING APPLICATION AWARENESS

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Graphical abstract

Abstract

The Green Building, or known as Environmentally Friendly Building is not only closely examined in terms of its design, but also the capacity of the building and its surrounding in reducing the impact to the environment, saving energy, water, safeguarding the internal air quality, and further mitigating the number of health problems to the inhabitants. The study involves 80 respondents, whereby 20 respondents are developers/contractors; 20 respondents are consultants; 20 respondents from the Local Authority and 20 respondents are academicians in the northern part of the Peninsula. Through the technique of *principal axis factoring*, 10 items had successfully been placed in the screening analysis. Two components that had been formed are namely i) main issue and ii) government's effort. It is anticipated that the key players (the developers, consultants, contractors, and academicians) understood and realised the importance of the environment and what is going around them in the world today.

Keywords: Green building, environmental, technology awareness, construction

Abstrak

Bangunan Hijau juga dikenali sebagai Bangunan Mesra Alam bukan sahaja diteliti dari sudut reka bentuknya malahan keupayaan bangunan dan sekitarnya mengurangkan impak kepada alam sekitar, menjimatkan tenaga, air, memelihara kualiti udara dalaman yang seterusnya mengurangkan masalah kesihatan kepada penghuni. Kajian melibatkan seramai 80 responden, iaitu 20 respondennya adalah pemaju/kontraktor, 20 responden perunding, 20 responden Pihak Berkuasa Tempatan (PBT) dan 20 responden ahli akademik di kawasan utara semenanjung. Menerusi teknik *principal axis factoring* sejumlah 10 item telah berjaya melalui saringan analisis. Dua komponen yang telah terbentuk ini dinamakan sebagai i) isu utama dan ii) usaha kerajaan. Adalah dijangkakan peneraju utama (pemaju, perunding, kontraktor dan ahli akademik) memahami dan juga sedar akan peri pentingnya alam sekeliling dan juga mereka faham apa yang berlaku di dunia masa kini.

Kata kunci: Bangunan hijau, persekitaran, kesedaran teknologi, pembinaan

1.0 INTRODUCTION

The structure of property buildings are said to be the reason behind the declining quality of air, as it contributes to the global green house effects. It is estimated that 35% of the carbon dioxide gas released came from buildings, whereas the remaining originates from sulphur dioxide (49%), nitrus oxide (25%), and 10% from the dust brought about by human activities [16]. This is strengthened by Riley

who stated that 54% of energy uses in the United States were from the buildings and their constructions, and this approaches 30% of the world's usage of energy resources [11]. In fact, according to Roaf *et al.* the construction sector served as the main contributor to the emission of CO_2 in modern communities today [12], [17].

In Malaysia, the concept of sustainable building is still at its infancy. Based on the Budget report in 2008, there had been flexibility and incentive would be given to the developers who build structures with a green concept, by way of granting it tax waives. This aim to develop the concept of sustainability in the construction that took place in Malaysia that becomes the backbone to the concept of maintaining the natural environment.

Among the benefits of the green building includes it save energy, controls the ecosystem, increases the property value, and reduces the number of health issues to the inhabitants [15]. According to Shiers, the usages of energy in buildings have produced 50% of carbon dioxide in the United Kingdom that has an impact to the Green House, whilst the process of producing construction materials have led to the energy use of 29% in the construction industry [14]. Therefore, in realising sustainable property development, proper assessments need to be carried out bearing in mind various perspectives of issues, such as: the effect of heat, the thinning of the ozone layer, biodiversity, consumption lifespan, and recycling.

As far as is concerned, the factors of attitude among the key leaders are vital in order to render this sustainable property development a success. The key leaders are the developers, consultants, and the Local Authority. Human are always looking for the best approach to address the issues of the use of environmental resources.

Various alternatives have been explored. Discussions and initiatives at the global level have been frequently held. Developed countries have been blaming the developing countries for the impact and the issue. Nonetheless, an absolute solution is yet to be achieved. Thus, the green building concept is introduced to increase the efficiency in resource consumption such as energy, water, and construction materials, other than as an attempt to reduce the impact of the construction for the consumers' health. With this in mind, it is a need for a survey to be done on the aspect of property development and its impact to the environment by referring to the key players in realising the concept of green buildings.

1.1 Problems Statement

The application of the green building practices among the key players are ineffective due to several factors that have become a series of challenges to this effort. Therefore, this paper will identify and analyse the factors that challenges the effectiveness of the application its practice of the green building concept.

1.2 Factors of Challenges

What are the factors of challenges? Challenges are something that challenges ones or an organization's capability and patience. While, the meaning of factor implies the element or reason that contribute towards a product [4], whereas according to Hawkin, the factors also served to produce [6]. To challenge means to state a doubt on the validity or brevity of something, to question or to dispute [4]. The factor means the element or reason that contributes towards an outcome [4]. The usages of both words; factors and challenges should be able to explain the meanings intended in the study.

Reffat, stated that the current challenge is how to produce green building with minimal energy usage, minimal pollution, low labour costs, improved comfort, provide safe and healthy working environment for the people [10]. This explains the actual meaning for the factors of challenges, which is the reason for the production of something, will challenge and test the capability of those involved. In the scope of this study, the factors that pose a challenge to the green building practice would be incurred by the key players aforementioned- the developers, consultants, local authority, and academicians.

2.0 METHODOLOGY

This section discusses the methodology adopted in this study. Apart from that, other aspects that will be discussed includes the method of sampling determination namely study sampling, the instrument used for data collection, the variable measurement that is used which is the questionnaire in the interview session, and also the method of analysis that will be used in the processing of data and the study outcome.

2.1 Data Collection

80 respondents will be selected from experts who involved in the construction industry; 20 respondents are developers/contractors, 20 respondents are consultants, 20 respondents are from the Local Authority and 20 respondents are academicians in the northern part of the Peninsula. A set of questionnaire is based on the Likert Scale, with the scale from 1 to 5 has been employed. The techniques that will be used in the research are conversations with relevant experts. work review in various fields, informal interview and questionnaire consensus.

El-Rafey and Naoum have applied a number of similar techniques in their research in housing design needs by means via questionnaire consensus through

standardization, ethnographical observations, and informal interviews [5, 8]. The data compiled will be in the form of quantitative and qualitative statements. Using this technique, this paper will be able to unravel research issues holistically and gather robust information. The statistical tests using the SPSS programme package will be applied in order to validate the data that have been obtained. These data can be tested based on non-parameter and parameter inferences. Between two tests, bib parameter inferences are the main one.

3.0 DATA ANALYSIS

Reliability data are a measurement or test which can have its consistency tested, in order for the data analysed to be able to be deemed reliable to explain the test results [1]. This analysis applied the data in the alpha coefficient SPSS that serve as the statistical measurement tool based on the Cronbach's formula. This alpha model is thought to be suitable to be a measurement tool which uses the multiple-choiced answer format as suggested by Likert [1]. The alpha coefficient value that had been obtained depicts the average of correlation between the items of the study. According to Sekaran, the acceptable alpha reliability coefficient value is more than 0.7[13], whereas for exploratory research, the alpha value would be already be deemed sufficient if it exceeds 0.5 [9]. Therefore, this study will be using the alpha value which is more than 0.5. It is found that the alpha coefficient value for this study is high, which is 0.935 that is close to the value of 1.

3.1 Mean Score

The mean score is labeled based on the importance of every variable. The mean score value which is more than 4.00 was assigned as 'Very Important' whereas more than 3.00 would be perceived as 'Important'. The mean value obtained was 3.5625 to 4.250. Nonetheless, Cheung and Yeung have asserted that the mean score of 2.5 can still be accepted [2].

For the component of 'main issue' (factor 1), there is the mean score of 'Very important for environmental issues' (mean =4.250) and 'The impact of pollution from building construction materials also construction activities' (mean = -4.0125). The mean value of less than 4.00 is considered important in this study.

3.2 Factor Analysis

Based on the procedure of this analysis, 10 items had successfully undergoes for the factor analysis screening with the *principal axis factoring* method. Table 1 illustrates the final solution with the clustering of two factors. The factor loading value for five clusters are between 0.634 - 0.904. There had been no removal of item as all had passed the 0.3 limit. According to de Vaus, the lowest factor loading proposed is 0.3[3]. The KMO value was 0.882. The Barlett test also passed satisfactorily because the Chi-square test was 691.113 with the significance of = 0.000.

Two factor analysis cluster with each component having the percentage of component one 41.358% and component two 30.028%, is named, i) main issue; and ii) government's effort.

Factor 1 is labeled the 'main issue' with the factor value between 0.689 - 0.904 comprising of six factor loading whereas factor 2 is labeled 'government's effort' with the factor value between 0.634 - 0.890 comprising of four factors loading. The division/clustering of these two factors loading are almost the same.

Table 1 The table of mean score and the loading of the awareness factor

Mean Score	Importance	Item	Component	
			Factor 1 (Main Issue)	Factor 2 (Government's Effort)
4.2500	Very Important	Environmental issues	.904	
3.8375	Important	Recycling	.766	
3.8375	Important	Open burning	.728	
3.9000	Important	Making the ennvironment green	.689	
3.9000	Important	The impact of pollution from building construction materials also construction activities	.844	
4.0125	Very Important	Global heating, as the result of Carbon Dioxide being released to the atmosphere	.672	
3.7875	Important	The provision of the legislation and Environmental Act		.634
3.5625	Important	Information obatined from the non-governmental organizations, the media, SAM and so on		.726
3.6625	Important	The sensitivity of the local community on the environment		.890
3.6125	Important	Campaigns on environmental destructions		.822

4.0 DISCUSSIONS

The data shows that statistically, the key leaders do have an awareness in the aspects of the questions that had been put forth, based on the high mean score value which exceeded 3.5 and the factor loading value more than 0.5[7]. The item of 'environmental issues' have the highest value for both values (factor loading=0.904, mean=4.2500). Other items that also have high value are 'The impact of pollution from building construction materials also construction activities' (factor loading=0.844, mean=3.900) and item 'The sensitivity of the local community on the environment' (factor loading=0.890, mean=3.6625). This clearly shows that key leaders have already had some degree of awareness on these three aspects, which are environmental issues, the impact of pollution from building construction materials and also construction activities and the sensitivity of the local community on the environment.

For the component of factor 1 named 'main issues' following the clustering of items that concentrates of item on the environmental issues (mean=4.250) which is the impact of pollution (mean=3.900), recycling (mean=3.8375), open burning (mean=3.8375), greening activities (mean=3.900). For the global heating with the mean value of 4.0125, the key players have shown a satisfactory level of awareness over global heating at the global level, as they understand the effect of the release of carbon into the atmosphere.

For component factor 2, four items had been clustered. This factor is given the name government's effort. The mean value is categorized as important in this study. The mean value of 3.7875 for law provisions, 3.5625 mean value for information acquisition, 3.6625 for the sensitivity of the community and 3.6125 recorded for the campaigns.

5.0 CONCLUSION

This paper is an analysis of the level of awareness of the key players on the effectiveness of the green building applications in Malaysia. The awareness is placed in order, according to the importance of the variables through the mean, and through the factor analysis clustering technique, as an effort to obtain findings empirically. The whole findings revolve around two main factors; which is the category of main issue and government's issue. In the first factor, the key leaders have already understood and realized how important in taking care of the environment and what is happening in the world today. The score value is high and is very welcoming. Under the second factor, or the government's effort, the government does work towards raising the awareness among the key players by placing an emphasis on the initiatives to launch campaigns, provide relevant legislations, and information from the NGO. The mean score and the mean, also point to a high value which is more than 3.5. This concludes that the degree of awareness among the key players has, indeed, been statistically high.

References

[1] Babbie, E. 1999. *The Basic of Social Research*. USA: Wardsworth Publishing Company.

[2] Cheung, S, Yeung, Y. 1998. The Effectiveness of the Dispute Resolution Advisor System: A Critical Appraisal. *International Journal of Project Management*. 16: 367-374.

[3] De Vaus, D. 2002. *Analysing Social Science Data*. UK: Sage Publications.

[4] Dewan Bahasa dan Pustaka. 2007. *Kamus Dewan*. Kuala Lumpur

[5] El-Rafey, M. 1992. Housing and Women Needs: Emerging Trends in the Middle East. *Architecture and Behavior*. 8: 181-196.

[6] Hawkins, J. M. 2004. *Kamus Dwibahasa Oxford Fajar*. Edisi Ke-3. Kuala Lumpur: Fajar Bakti.

[7] Hishamuddin Md. Som. 2005. *Panduan Mudah Analisis Data Menggunakan SPSS Windows*. Skudai: UTM.

[8] Naoum, S. G. 2007. *Dissertation Research and Writing for Construction Student*. Oxford: Elsevier.

[9] Nunnally, J. C. 1978. *Psychometrics Theory*. New York: McGraw Hill.

[10] Reffat, R. M. 2004. Sustainable of Building and Environment. *Second International Conference on Development and Environment* Assiut University, Egypt.

[11] Riley, D. R., Thatcher, C. E., Workman, E. A. 2006. Developing and Applying Green Building Technology in an Indigenous Community. *International Journal of Sustainability in Higher Education.* 7(2): 147-157.

[12] Roafs, *et al.* 2004. *Adapting Buildings and Cities for Climate Change*. Oxford: Elsevier.

[13] Sekaran, U. 1992. *Research Methodology for Bussiness: A Skill Building Approach*. Second Edition. New York: Wiley and Sons.

[14] Shier, D. E. 2000. Green Developments; Environmentally Responsible Building in the UK Commercial Property Sector. *Property Management Journal.* 18**:** 352-356.

[15] United States Green Building Council Website. 2007. Available at www.usbgc.org.

[16] http://www.usgbc.org/ 12/01/2009.

[17] USGBC. 1996. *Sustainable Building Technical Manual: Green Building Design, Construction, and Operation.* Public Technology Inc: USA.

[18] Ibrahim, S. H., Liew, A. A. H., Nawi M. N. M. & Yusoff, M. N. 2015. Reinventing Traditional Malay house for Sustainable Housing Design: Obstacle and Proposed Solution. *Journal Technology*. 72(1): 97-102.