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APPLICATION OF GREEN TECHNOLOGY AMONG THE CONTRACTORS IN CENTRAL REGION OF SARAWAK

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ABSTRACT

In recent years, human activities especially in construction industry are causing negative impacts towards the environment. Construction industry currently faces challenges towards the implementation of sustainable development worldwide where we need to enhance and protect our natural environment without damage and destruction. Hence, the responsibilities of construction industry towards sustainable development are vital to be taken by implementing green technology into their project. Applications of green technology have been implemented internationally in order to reduce negative impacts to the environment. However, the use of green technology in Malaysian construction industry especially in Sarawak is one of the crucial issues since it is still at the low level of application. Hence, the aim of this research paper is to identify the adoption of green technology among the contractor in Central Region of Sarawak, Malaysia. This paper presents the result by using distribution of questionnaire as a main research method. About 200 respondents of construction player in Sarawak has been participated with have a strong experienced in the said issues highlighted. The survey however, has identified that most of construction player in Sarawak were refuse to use the existing green technology and choose to stick with the conventional types of projects due to their limited knowledge and expertise.

Keywords: Green Technology; Sustainable Development; Sarawak Development

INTRODUCTION

Nowadays, most of the countries around the world are more concerning on global warming. Recently, great concerns have been aroused due to increase in environmental issues (Hossein, Ashnani, Johari, & Hashim, 2014). Consequently, construction industry have gained attention to this situation due to its environmentally unfriendly industry. There are speculations that construction activities caused environmental negative impacts due to the inefficient of construction waste management and utilization of natural resources without conservation and preservation (Nguyen, Skitmore, Gray, & Zhang, 2017). As we know, construction industry is significantly the largest contributor towards the economy and create more employment to local people. The enormous growth of demand for development in Malaysia have added to concerns which may affected the environment (Bin et al., 2017).

For instance, the demand of infrastructure development in Malaysia as a needs has led to several impacts such as pollution, flood and disturbance of ecosystem (Azmi, Musa, Abdullah, Othman, & Fam, 2017). Hence, to meet the demand in the growing of infrastructure development in Malaysia without harmful the environment, the construction practitioners needs to practice sustainable development. (Bin et al., 2017) has noted that sustainable development is the key to balance the economy, social and environment for present and future generations. Sustainable

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development can be defined as the ability to meet the needs without compromising the ability of future generations (Darko, Chan, Owusu-manu, & Ameyaw, 2017). By adopting sustainable development, Malaysian government has encourage the construction practitioners to implement green technology into development. Therefore, this research will make a contribution to the existing body of knowledge on implementing green technology in development of Sarawak, which is important for reducing environmental impacts and at same time to navigate Sarawak state into a modern and technology savvy when it comes to developing the state.

GREEN TECHNOLOGY

Green technology is one of environmental application to conserve and preserve the natural resources in order to minimize the impacts towards the environment (Nguyen et al., 2017). (Darko et al., 2017) added green technology is a sustainable product that incorporated into design of building which concerns on performance of building. Green technology brings a lot of advantages in construction development as it is one of the key element to achieve sustainable development (Hossein et al., 2014). Many researchers believed green technology plays an important role as environmental application to protect the environment. According to (Darko et al., 2017), the solution for impacts towards environment was by applying green technology in development project. (Azmi et al., 2017) also stated that green practices is necessary to ensure the sustainability can be achieve.

In recent years, many countries has try to implement green technology to further proceed for sustainable development (Sim, Putuhena, Sim, & Putuhena, 2015). As in other parts of the world, Malaysia also become one of the country that concerns with the environment for future generations by introduced green technology (Rezai, Kit, Mohamed, & Nasir, 2013). Introduction of green technology in Malaysia shows the government response towards the environmental issues nowadays (Hossein et al., 2014). Study conducted by (Aini, Awang, & Iranmanesh, 2017) indicated that traditional construction methods has led to serious environmental problems which contribute to global warming. Hence, the comparison existed between implementation of traditional technology and green technology in construction project will be investigated in this research.

INITIATIVES OF GREEN TECHNOLOGY IN MALAYSIA

In 1979, Malaysia introduced National Energy Policy to provide environmentally energy supply for future generations (Hossein et al., 2014). Furthermore, this policy intends to ensure the sustainability of energy, environment, economy and social respectively by application of green innovation (Azmi et al., 2017). The impacts towards the demand of infrastructure development consequently enforced the implementation of green technology to meet the sustainable development. For a start, Construction Industry Development Board (CIDB) was established to carry out duties related to the construction industry in Malaysia. Since 1999, Construction Industry Development Board (CIDB) had initialized the Green Technology programme to focus on environmental development. In line with that, Technical Committee of Good Environmental Practices (TC9) was established. As continuation of that, CIDB has established Technical

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Committee of Best Green Technology Practices in construction industry (Osman, Udin, & Salleh, 2012).

Besides that, Ministry of Energy, Green Technology and Water (KeTTHA) was established on 9 April 2009 to formulate policies and legal framework related to green technologies. This ministry responsible to encourage application of green technology and environmentally product to promote sustainable development by conduct a training and advertise in media (Rezai et al., 2013). Furthermore, the government also encourage all industries to practice 3R approach which are Reduce, Reuse and Recycle (Nguyen et al., 2017). Hence, in year 2009, the Ministry of Energy, Green Technology and Water (KeTTHA) had introduced and launched National Green Technology Policy which promoted four major areas of green technology which are energy, building, water and waste management. This policy formulated to encourage the adoption of green technology towards sustainable development (Nguyen et al., 2017). In addition, Malaysian government has also introduced Green Technology Financing Scheme (GTFS) to encourage green technology application involvement. Besides that, the Ministry of Housing and Local Government directed to promote application of green technology in construction industry (Aini et al., 2017).

In spite of that, Green Building Index (GBI) was launched in April 2009 to provide a guidelines and opportunity for construction stakeholder to involve in construction of sustainable green building (Bin et al., 2017). A number of developed countries also been established green rating tool for buildings to promote sustainability development such as Australia (Green Star), Singapore (Green Mark) and United Kingdom (Building Research Establishment Environmental Assessment Method) (Wimala, Akmalah, & Sururi, 2016). However, the consideration from construction stakeholder is necessary in order to implement green technology effectively (Darko et al., 2017).

GREEN TECHNOLOGY APPLICATION IN SARAWAK

The Malaysian government has shown response towards sustainable development by implementing green technology as a key driver (Rezai et al., 2013). However, the level of green technology application in Malaysia especially in Sarawak is still at the infancy level due to lack of awareness on important roles of green technology into development (Osman et al., 2012). (Sim et al., 2015) added that application of green technology in Malaysian construction industry remained low. The focus of this research is on adoption of green technology in development of Sarawak. The first green building in Sarawak is Menara Sarawak Energy and the second green building is University College of Technology Sarawak. In 1 April 2013, University College of Technology Sarawak was successfully built as energy-efficient campus as the first university to achieve a GBI "Platinum Index" rating in Malaysia. UCST is completely applied green technology to preserve energy and protect the environment. Unfortunately, there are only two green building being constructed in Sarawak compared than peninsular Malaysia. Hence, there is need to identify the important of adoption green technology in development of Sarawak.

Application of green technology is expected to mitigate the environmental issues (Nguyen et al., 2017). However, according to (Osman et al., 2012), the application of green technology in Malaysian construction industry still at moderate level in recent years. Hence, to encourage the adoption of green technology in construction industry, a better understanding on application and benefits of green technology are required (Darko et al., 2017). (Osman et al., 2012) added improvement in term of initiatives are needed to attract construction practitioners adopting green

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technology in their project. In recent years, green practices is the crucial issue since the statistics of application is still at moderate level (Birchi, 2015). Therefore, it is necessary to increase awareness toward environmental friendly issues (Nguyen et al., 2017). According to (Aini et al., 2017), construction activities contribute to large amount of waste and utilize energy consumption which significantly give impacts towards environment. Based on study conducted by (Aini et al., 2017), construction industry exploited approximately up to 67.5% natural resources to run the development. Moreover, up to 40% of energy consumed caused by construction activities (Kamar & Hamid, n.d.). Hence, the aim of green technology application is to address these environmental issues.

RESEARCH METHODOLOGY

In brief, the study area is located in Central Region of Sarawak which are focused closely in Mukah, Sibu and Bintulu district. Research methodology is used to achieving the aim and objectives of research. In this research, in spite of theoretical framework, quantitative research design was adopted as a main method to gather the data collection. The methodology was conducted in two stages as follows:

i) Stage One : Theoretical Framework

A body of knowledge on the implementation of green technology in development of Sarawak was explored. Theoretical framework on the application of green technology was investigated and identified in details.

ii) Stage Two: Quantitative Research Design (Questionnaire)

This second stage was addressed aim of the research. The quantitative data and findings was contextualised and triangulated with literature review to address the research objectives. Samples was selected based on construction practitioners involved in development of Sarawak. Sampling frame of the target group was identified before the actual data collections take place. Due to the nature of quantitative research, the data was collected until saturation point is achieved.

RESULTS AND DISCUSSION

Both primary and secondary source has been used as research methodology in order to achieve clearly picture and understanding of the results. The primary source consist a set of questionnaire survey while the secondary source obtain from the desk stop study. Literature review resources obtain from the form of journal, research paper and articles; relevant references books, newspaper and electronic data which also known as desktop study. In order to conduct this research, desktop study is important to obtain the sources to support the literature review.

The questionnaire has been designed to achieve the finding of results to capture the potential contractors' perception towards implementing green technology concept in Malaysia particularly in Sarawak. However, this research having its limitation where the research area coverage only at Central Region of Sarawak. The rationales by choosing these three areas are

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because of the functioning of each areas contributing to the movement of Sarawak's development. About 200 numbers of respondents responded to the questionnaire. The data collections for the study was go through the structured questionnaire which send to 200 respondents which are consists of those who having a good profession because the result from this group will affect the level of accuracy of the data collection.

The structured questionnaire scale on answer limited to 'yes' and 'no' answer expecting from the respondents. Furthermore, the analysing of the data is based on the frequency or by percentage analysis. The highest percentage indicates the higher indicator or momentum to the point of description tested to the respective respondents.

Figure 1: Percentage of respondents' basic knowledge on the concept of Green Technology

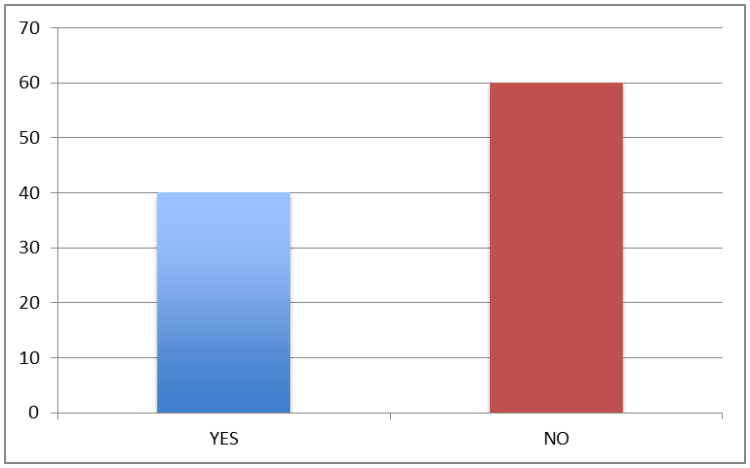
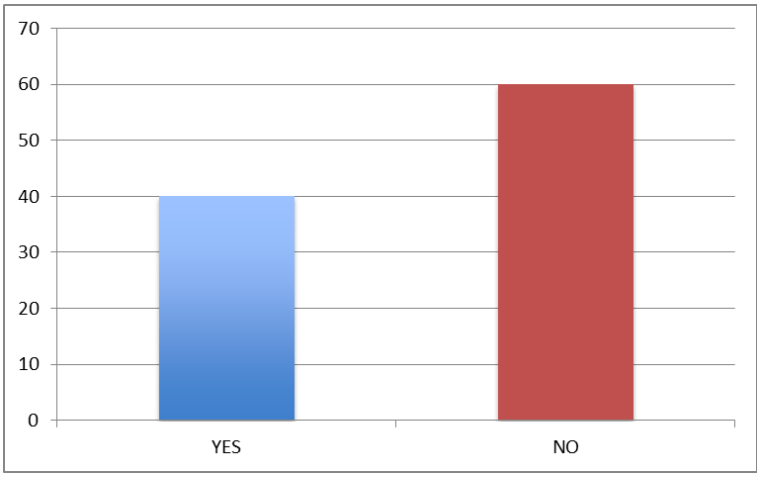


Figure 1 showed the percentage results of the respondent's knowledge about the concept of Green Technology. 60% of respondents said 'No' and 40% of respondents said 'Yes' on this statement. It's clear shown that the construction practitioner itself do not really know what is the green technology concept all about.

Figure 2: Percentage of respondents knows the implementation of Green Technology



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By referring to the Figure 2, it is showed the percentage of respondents knows the implementation of green technology in development of Sarawak. 60% said 'No' and 40% said 'Yes' on this statement. It is clearly shown that the construction practitioner itself do not aware on the implementation of green technology in development of Sarawak, which most of the project in peninsular Malaysia already implemented it.

Figure 3: Respondents' insight in general in adopting green technology in development project

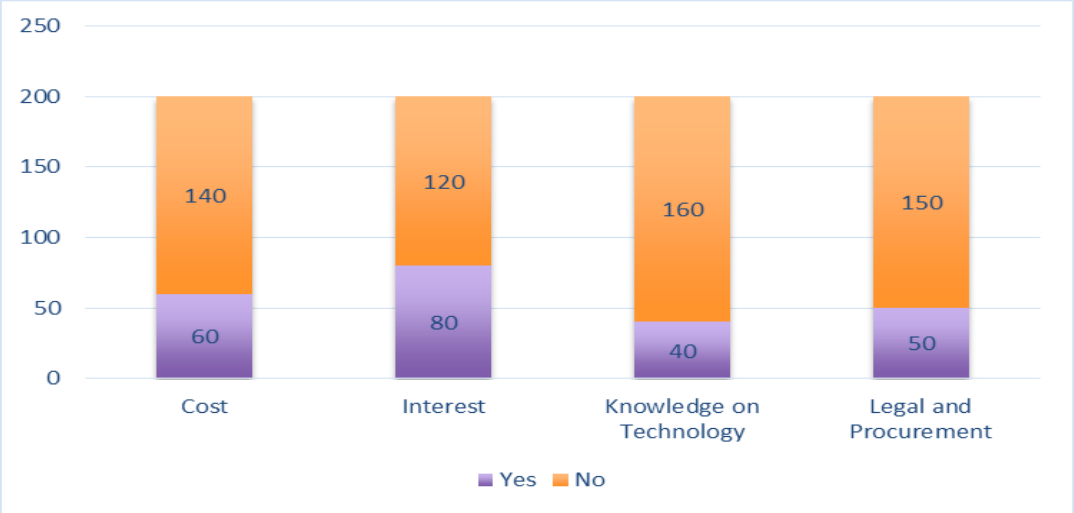
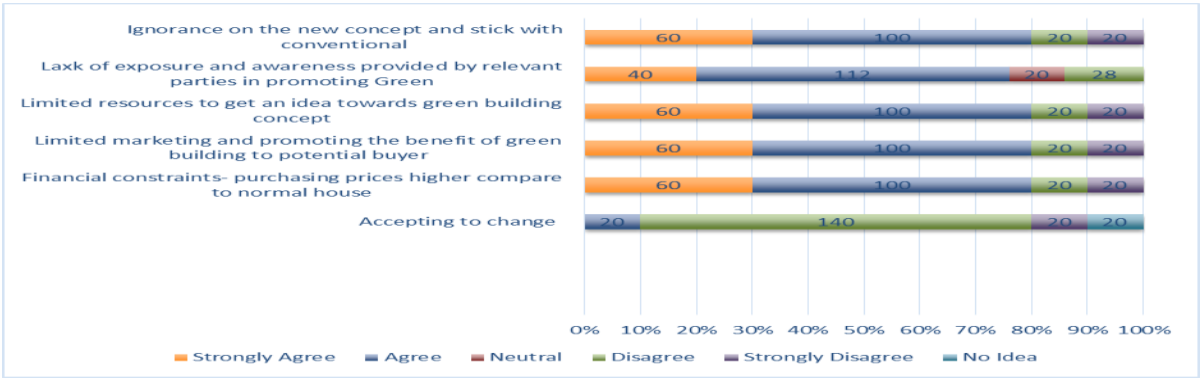


Figure 3 discussing on the respondent's insight in adopting green technology in development project based on four factors which are; cost, interest, knowledge on technology and legal and procurement. Most of the 140 respondents agreed that adoption of green technology in development project requires more cost and expensive compare than conventional project while only 60 respondents disagreed on this statement. 120 respondents do not really interested on green technology adoption in development project due to certain reason. Part of knowledge on green technology, 160 respondents admit that they do not really kin on new technology practices in a market especially for building construction while 150 agreed that they do not have a knowledge on building legal and procurement matters pertaining to green technology adoption.

Figure 4: Respondents' constraint factors to adopting green technology in development project



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By referring to Figure 4, it is showed the constraint factors lead the respondents to adopt green technology in their development project. 100 of them agreed on the ignorance on the new concept and they do not really updating their knowledge towards new technology currently practices in a market. 112 respondents agreed that lack of exposure and awareness provided by relevant parties in promoting green technology especially on the benefits of this technology may offer leads them to stick with the conventional types of projects. 100 agreed that limited resources available to get an idea, information and knowledge on this technology in their area. 100 respondents agreed that they are facing financial constraint when it comes to purchase new technology as they are having perception where adoption of green technology may cost them slightly higher compare than conventional types of project. Most of 140 respondents agreed that they are refuse to change align with sustainable development introduced in Malaysia. They want to stick with the conventional types of projects due to their limited knowledge.

CONCLUSION

To conclude, in response towards environmental issues, variety of initiatives have implemented by Malaysian government to create awareness on adoption of green technology into development projects (Aini et al., 2017). Green technology is a key solution to achieve sustainable development and protect our natural resources (Mekhilef, Barimani, Safari, & Salam, 2014). According to the world ranking on application of green technology in construction industry, Malaysia currently at the 26th rank. This number is still very far behind compared than other developed countries due to lack of awareness and consideration (Osman et al., 2012). The sufficiently of current green technology initiatives have remains a question. Creating awareness on adoption of green technology is very important in term of knowledge and application. Although the government has made variety of efforts toward promotion of green technology, the application is still at the low level. It is essential to find ways to attract construction stakeholder to implement green technology into their project. Hence, it is vital to investigate the level of readiness to adopt green technology in construction industry especially in Sarawak development and to find a ways to attract the construction practitioner to implementing green technology in their development project. To conclude, this research intendedly to provide background information on implementation of green technology in development of Sarawak. It is expected to provide preliminary findings for potential solution to attract construction practitioner using green technology in spite of traditional ways.

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