

Sustainability in the Construction Industry in Malaysia: The Challenges and Breakthroughs

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Abstract—As Malaysia aims to be a developed country by year 2020; the construction industry has since been identified as a major catalyst for the country to attain the status. It is one of the sectors that contribute to most environmental pollutions. It is, therefore, important for the industry to implement sustainable construction practices to reduce the negative impacts that it has on the environment. However, most Malaysian developers have placed much focus on market demand and economic factors; neglecting the need for attention on environmental issues. The practice of sustainable construction is deemed to be an obstacle to achieve short-term economic goals due to the higher cost incurred in the operations. Hence, choices need to be made and a balance needs to be struck in weighing the long-term environmental benefits against immediate economic factors. This paper discusses the challenges faced by Malaysian developers in adopting sustainable practices in the construction industry and the cause of these challenges. It also looks into the achievements and breakthroughs that developers in Malaysia have achieved so far. The paper aims to explore the long-term benefits of sustainable practices that would potentially raise awareness on the feasibility and economic potential of sustainable construction.

Keywords—Construction industry, construction method, sustainability.

I. INTRODUCTION

SUSTAINABILITY has been an issue of interest for all stakeholders in the engineering industry. Sustainable practices may directly or indirectly affect the future economy of a country and its ecosystem. As an example, the use of certain construction materials – from the extraction of raw materials to processing and manufacturing, from fabricating to transporting to site, and from maintenance to disposal - may contribute to global warming. In general, sustainability is known as the ability to meet the current demand without compromising future needs. This means that sustainability is a means of action of which its end results can be sustained and continued [1].

Construction industry is one of the sectors that contribute the most problems to the ecological system especially to the environment. Therefore, sustainable construction practices play a big role in moving towards sustainability. Sustainable construction practices refer to construction methods that cause less harm to the environment. The implementation of sustainable methods in this industry is required to achieve win-win outcomes as to attain mutual benefit for the

environment, the advanced society, and the economy of the industry.

In over the last twenty years, the construction industry in Malaysia has been consistently contributing between 3%-5% of the national Gross Domestic Product (GDP) [2]. The construction industry is also an industry that contributes to most of the negative impacts to the environment such as soil erosion and sedimentation, flash floods, depletion of natural resources and the use of building materials which will affect human health [3]. The continuous growth of the industry is due to the achieving of vision 2020, where it calls for adequate housing and rapid urbanisation [4]. In response to this, most developers have prioritised economic issues rather than environmental and ecological issues.

However, the 5th prime minister of Malaysia, Tun Abdullah bin Haji Ahmad Badawi, has urged Malaysians to not forget the importance of managing and utilising natural resources in a sustainable manner. Developers were also warned to ensure that the environment must not be sacrificed in favour of economic development [5]. It is the national ambition to consider long-term strategies to assist the achievement of national goals. Another basic vision that emerged is for the country to be ecologically sustainable [6]. This basic vision has become a strong step towards the sustainability agenda in the country.

The issue of sustainable development has emerged as one of the top issues in the Eighth Malaysia Plan (2001–2005). One of the highlights is that government is giving high priority to research and development as one of their strategies to achieve sustainable development [7]. The plan also states that concerted efforts are needed in the construction planning processes to improve energy efficiency as well as waste and environmental management [8]. The government continues to address the issue in the most recent Tenth Malaysia Plan (2011–2015) to ensure that the future is not compromised as the country continues to develop [9].

The Construction Industry Development Board Malaysia (CIDB), which is a body established to develop, improve and expand the Malaysian construction industry, also plays a role in urging all the stakeholders of the industry to develop good construction planning and management in order to protect the environment. CIDB has also identified the environment and other sustainability-related issues as one of the top issues of the construction industry [2].

Apart from these government and non-governmental organisations, local universities such as Universiti Sains Malaysia, University Technology of Mara and National University of Malaysia have also shown interests in this field

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by offering funding for more research. These universities have also been involved in organising many symposiums and conferences to raise the awareness on sustainable development and to exchange knowledge in this field [8].

Although Malaysia is still in the infancy stage in moving towards sustainability [10], positive signs are shown by most of the stakeholders in the construction industry by taking more initiatives in moving towards to sustainable construction.

II. METHODOLOGY

This review study was conducted to explore the perspectives of the Malaysian construction industry on sustainable practices and development. The literature research aimed to investigate the progress of adoption of sustainable practices in Malaysia by reviewing the challenges and breakthroughs faced by the industry in the process.

This study also attempted to gather insights from two local construction companies through responses to interview questions. The names of the companies are not stated in this paper to preserve the privacy of the companies. This part of the study was conducted to seek for more updated opinions from the industry, other than those reported in published literature, regarding sustainable construction practices. These construction companies were chosen because they are among the most successful contractors in Malaysia with wide experiences in construction industry.

The interview questions were designed to focus on the implementation of sustainable practices in construction industry by describing and quantifying the implementation level of them. The interview format was composed of five open-ended questions, which are as follows:

- i. [Company name] is an undoubtedly a renowned contractor company in Malaysia. Its pride is also coined by its contribution in successfully completing sustainable projects. Which of these projects would be the most notable of all?
- ii. Sustainable practices, in its initial stages, typically incur higher costs than conventional practices [8] deterring many companies to take heed. What are the benefits of implementing sustainable practices in the industry that motivate and encourage [company name] to take its step towards sustainability?
- iii. Studies have also shown that the return on investment in the steps to undertake sustainable practices in the construction industry take a relatively longer period of time. In the effort of working towards sustainability, has [company name] observed the same scenario? If so, what is the average breakeven point?
- iv. It is reported that challenges and obstacles are inevitable when sustainable practices are implemented [11]. What are the challenges and obstacles that [company name] has faced?
- v. With the knowledge and technology we have now, what is your opinion on the level of practice of sustainability in the construction industry?

The findings of the literature review and interviews with the companies are presented in the following section.

III. RESULTS

A. Challenges Faced and Their Causes

1. Financial Constraints

In the construction industry, sustainability is generally interpreted as environment oriented or focused. The main reason for the neglect of sustainability in some developing countries is that most of the sustainable methods may cause a conflict between long-term environmental benefit and short-term economic operational goals [12], [13]. A greater concern is given to economic and social issues, like the return on investment of a project, than to the affected environmental issues such as the pollution caused by the construction of the project. Therefore it is important to maintain a balance between environmental protection, economic development and social development in prioritising sustainability in the industry [14].

Implementing sustainable practices need significant amount of time and cost investment. This, in turn, decreases contractors' interests in doing so [15]. Cost increase is one of the main challenges as the increase in cost is mainly due to the application of the measures for implementing environmental management, which will unavoidably require the investment of both time and resources.

The higher cost incurred for importing of the green materials and technology is a hindrance to the shift towards sustainability [16]. The financial capability of a developer depends on its size; large-sized developers have greater financial capacity in order to pursue for sustainable practices. Therefore, large-sized companies are more aware of the issue of sustainability as they drive towards it by executing proper planning, design and allocation of budget. Most of them have the capability to perform well to meet the required standards as well as aiming for green certification by developing and applying more green methods.

However, Malaysian developers are mainly made up of medium and small-sized companies. Small and medium-sized developers are aware of issues pertaining sustainability, but are mostly financially constrained. It is to their preference to build to just meet the regulatory criteria and to gain optimum profit rather than putting effort in giving more consideration to environmental and social aspects. For this reason, unless there is an increase of market demand for green buildings; most of the construction stakeholders will be reluctant to transform the industry towards sustainability [16].

2. Awareness and Knowledge

The relatively slow shift [8] towards sustainability in the construction industry in Malaysia is also due to the lack of awareness and knowledge of pertaining issues [16]. It is important that all general stakeholders in the construction industry such as contractors, developers, consultants as well as clients are fully aware of the importance of achieving sustainable construction. This will cultivate interest among them and further serves as a motivation to pursue knowledge. Having due diligence helps in their decision making which

benefits every party, while contributing the least damage to the environment [17].

However, a more recent study found that bigger and more established companies are actually well aware of the importance of sustainability practices. In fact, actions are being taken to meet all the requirements needed to pursue sustainability in the construction industry. For example, by implementing strategic planning, as well as, looking into the allocation of resources. These companies tend to have stronger financial positions and different perspective from smaller companies, mainly due to their wide range of experiences and expertise as they deal with clients whom are mostly high income earners and foreigners. They incorporate sustainability in their building concepts by using green materials, having green designs as well as generating green system for their projects. They also believe that sustainable practices can be profitable [16].

The lack of new knowledge among contractors has also caused another obstacle in achieving sustainable construction. It causes failure in reaching a consensus among experienced developers and the younger generation. This is because environmental issues were not pertinent and were not given a priority in education until a decade ago. The experiences of seasoned contractors in the industry are valuable and essential, although not equipped with new knowledge on sustainable practices. On the other hand, the younger generations those are educated with knowledge on sustainable construction face difficulties in disseminating theoretical understanding of sustainability knowledge into practice. Therefore, developers tend to reject the suggested ideas of the younger generation [8].

Albeit the lacking being a major hindrance to implementing sustainable concept, eliminating this cause may not effectively curb the problem. It is also reported that having the knowledge does not necessarily guarantee that it is being implemented as the level of implementation of sustainable practices in Malaysia is reported to be still mostly low [8]. The level of knowledge on the concept of sustainability among the developers was found to be moderate as there is a big gap for the level of knowledge between the big and well-established companies and the small companies [16]. One of the main reasons is that most developers in Malaysia are profit-driven and they respond to client demands. The shift to focus on sustainability would be driven if there is client demand.

B. Achievements and Breakthroughs

The slow shift to sustainability in Malaysia is not without its notable achievement. To date, there are several projects in the country that were sustainably constructed. Following are an example of a construction method and an example of a successful project.

1. Industrialised Building System (IBS)

IBS is a construction method in which structural components of a structure are mass produced either in factory or at site under strict quality control and minimal on site activities [18]. The manufactured components are delivered to

construction sites for assembly and erection. The construction operation of an IBS structure is, therefore not affected by adverse weather condition and is shortened, thus reduces interest payment or capital outlays [19]. IBS allows flexibility in design as different systems may produce their own unique prefabrication construction methods [20]. Reportedly, IBS produces higher quality structural components through careful selection of materials, use of advanced technology and strict quality assurance control [21]. It is also found to be cost saving when the system formwork that are made of steel, aluminium and scaffolding are reusable [22].

The use of IBS in construction reduces the need for labour on site. The Malaysian construction industry relies heavily on foreign workers. If the demand for labour remains the same and the supply decreases, construction cost will increase. A study in Israel found that the use of IBS in construction reduces the cost of labour up to 70% when compared to that of the projects using conventional construction method [23]. In Singapore, the savings in labour cost was found to be 46.5% [24].

Among successful IBS buildings in Malaysia are Brickfields Secondary School and Kuala Lumpur Convention Centre in Kuala Lumpur, Subang Square in Subang Jaya, Selangor, and Millennium Hall in Seberang Prai, Pulau Pinang. Even with numerous successful projects, the implementation of IBS was not without its challenges. The Malaysian government encouraged the adoption of IBS in the construction industry through the effort of CIDB in outlining the strategies in IBS Roadmap 2003 -2010 [25].

2. Tanarimba

Tanarimba is a sustainable housing project. It occupies an area of 7299 acres in a tropical rainforest in Janda Baik, Pahang. Tanarimba is a blend of man-made and natural elements in an exciting concept of ecologically-sensitive community development. It also introduces the world to ecotourism opportunities in Malaysian highlands. The project has been dubbed as the forefront of the ecological movement in construction [26].

The highlight of project Tanarimba is that most of the structures in it were built using natural resources and all building materials used were sourced in-situ. Pine trees were used for the construction of road and infrastructure work, which were sourced from a plantation. The plantation covers 60 hectares of land which was initiated as an alternative for paper industry. It was however left unutilised due to project reevaluation. Rocks were used for the construction of wall and pillars. Pine was used for the flooring system while doors are made of resak woods. The design of window frames and roof trusses are made up of woods and mixed hardwoods respectively. The completion of Tanarimba shows that the workability and stability of structures can be achieved by using natural resources instead of common construction materials such as concrete [27].

The alignment of roads in Tanarimba was designed according to the natural terrain of the land, eliminating the

needs of cutting down the trees. This has allowed 80% of the area of Tanarimba to remain as forest [27].

Tanarimba has proven itself to be profitable after it has broke-even in 1999, four years after construction. The success of Tanarimba is awarded with 'Honorary Mention' in the Planning and Master Plan category in the Malaysia Institute of Architects (PAM) Award in 2004 [27].

C. Insights from Local Construction Companies

Some of the feedback provided through the interview was not informative as one of the companies is not the developer of their projects and the decision to implement sustainable practices is vested in the original intent of the developers. However, it was emphasised that an efficient waste and environmental management are implemented during the construction of projects.

The other company suggested that Malaysia is currently moving towards sustainability in a slower pace, mainly due to lack of human resources and skills. The implementation of sustainable practices is recognised to require the support of trained professionals, tradesmen and labourers. This is certainly consistent with the findings of the literature study. In their opinion, the uncertain economic environment especially in developing countries where the private sector has a very narrow market base to leverage is another main challenge. It was also noted that there is a conflict between experienced contractors and younger engineers. The experienced contractors do not have much exposure to sustainable construction and therefore prefer to use conventional method of construction that are tried and tested. On the other hand, the effort of new and younger engineers whom are exposed to this subject during their higher education is usually hampered due to the lack of experience and skills in the particular field.

The company also emphasised that government effort would play a main role in pushing the trend forward. The government would need to play a main role in promoting the adoption as the joint effort between the government, non-government organizations and educational institutions to create awareness among the public on the benefits of sustainable construction practice. Cooperation among them is essential as there are projects that embrace the ideas of sustainable construction, but the number is still low. This creates the need for support from the private sector as well to work along with the government.

The more notable projects that the two companies contacted were/are involved in are the SMART Tunnel and KLIA 2.

IV. DISCUSSION

The paradigm shift to adopt sustainable construction method in Malaysia is at a slower pace compared to other advanced countries. The findings of this study show that the challenges faced by the industry are basically associated with the burden of having additional costs. It is not only the intricate work and green materials that incur costs, but also the skills and expertise required for the execution of sustainable construction methods.

Since expertise is needed for sustainable construction, measures should also be taken to preserve the skills sets of practitioners. Initiatives in research and development activities may enable development of knowledge and technology in sustainable practice. This may accelerate the progress in implementing sustainable construction method, as more interest among experts are sparked and that technologies may be made available locally.

The awareness of the benefit of sustainable practice on the environment among the developers and contractors needs to be raised. It is also important that stakeholders of construction companies to be well informed about the economic benefit of implementing sustainable construction method. Since the construction industry responds to client demands, awareness of the issue should also be raised among the public. The cause and effect scenario is clear, especially of late, as the private sector responded to the demand for green residential buildings that are built according to Green Building Index (GBI) certification. For example, the Central Residence project by Yuk Tung Group, VERDE at AraDamansara by VillamasSdnBhd, and KEN RimbaLegian Residences by KEN Holdings Berhad, the first landed home development in the country to be awarded the BCA Green Mark Gold Award. In such fashion, also, the developers and contractors may be encouraged as consumers become more informed about the effect of sustainable construction practice.

V. CONCLUSION

As the concern for the environment increases, the need for greater focus on sustainable practice becomes more urgent. The major consideration that impedes the change of practice to sustainable method in the construction industry is found to be financial. This shows that awareness should be raised and knowledge needs to be delivered to contractors, developers and the public on the long term benefit of sustainable construction practice.

This can be made possible with the government playing the main role. Through joint effort with educational institutions, research and development activities can be increased to enable local production of green building materials and technology at a lower cost and hence encourage contractors to adopt sustainable practice. Training programs can be organised to increase and deliver knowledge on sustainability to stakeholders of the construction industry through bodies like CIDB.

Measures can also be taken by the government in ensuring the practice of sustainable construction method by enforcing strict rules and regulations for disposal of construction waste. Proper waste management in the construction industry has been found to be cost saving [28], [29].

Of late, more GBI certified buildings are emerging in Malaysia, indicating that the nation is already aware of sustainability issues. To date, although the shift to sustainable construction in Malaysia is still at its infancy stage, it is important to note that there are projects that have been successful. In view of this, the construction industry in Malaysia is able to progress and be more sustainable when the

government and private sector share a common concern and vision.

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