Critical factors of implementing Industrialised Building System in Sarawak: A research on SMEs

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Abstract. Industrialised Building System (IBS) have been adopted in Malaysia for over five decades and is expected to grow consistent with Malaysia's economic development. In promoting the adoption of IBS in construction projects, the government has taken several steps such as levy exemption for contractors and developers. Despite its numerous advantages and efforts pulled by the government, the implementation and adoption of IBS are still below the expected figure. Many researchers investigated readiness, setbacks and issues related to the implementation of IBS in Malaysia's construction projects. However, most of the research mainly for projects located in urban areas of West Malaysia. Therefore, this paper aims to close the gap on factors affecting the implementation of IBS for SMEs in Sarawak, where the level urbanisation is low. A semi-structured interview was conducted with 10 SME's contractors to get better insight view. The study found that logistics and infrastructure problems, a limited number of the manufacturer, lack of incentive, conventional payment methods, lack of financial supports are among critical factors affecting the implementation of IBS. Therefore, it was concluded that government plays major role in providing supports, incentives and facilitating the improvement of infrastructure to successfully implementing IBS in Sarawak.

1. Introduction

The terms of Industrialised Building System (IBS) may be limited to Malaysia while in other parts of the world may differently term it as Modern Method of Construction (MMC), Off – site Construction, Modular Construction, Prefabricated Construction, etc. IBS is defined as a construction technique in which components are manufactured in a controlled environment (on or off site), transported, positioned and assembled into a structure with minimal additional site works. In Malaysia IBS is divided into five categories which are precast component systems, fabricated steel structures, innovative mould systems, modular block systems and prefabricated timber structures as construction components. [1]

In Malaysia, Industrialised Building System (IBS) was first introduced almost 50 years ago with the completion of the Tunku Abdul Rahman Public Housing Estate; or commonly known as the Pekeliling Flats at Jalan Pekeliling, Kuala Lumpur. Despite many years have passed, the adoption of IBS in the construction sector is still low and represents only 15% of construction projects used IBS in Malaysia [2]. IBS Mid - Term Review in 2007 indicated that approximately only 10% of the complete projects used IBS in the year 2006 as compared to forecasting IBS usage of 50% in 2006 and 70% in the year 2008 as projected in the roadmap [3].

In contrast, other developed countries such as Finland, Sweden, Japan, Germany, and even Singapore have been successfully implemented IBS and it is very much preferred construction method due to its numerous benefits [4]. The benefits of IBS have been well-documented in the literature. Benefits such
as cleaner and safer construction sites [5]; faster construction [5, 6, 7, 8]; high quality and aesthetical value of products [5, 8]; and more organised site management [5]. Due to its many benefits, the government of Malaysia IBS has made a lot of efforts to enhance the current conventional - dirty, dangerous and difficult image of construction industry to a technologically advanced method of construction such as by developing the Industrialised Building Systems (IBS) through the Construction Industry Development Board (CIDB).

CIDB had implemented the IBS Score in construction industry to measure the level of IBS usage in building and become part of the main monitor system of the IBS construction industry. The scoring system is introduced as a structured assessment system that can be used to measure the usage of IBS in a consistent way. In line with IBS Roadmap 2003-2010, a number of strategies and aggressive steps are formulated to promote the adoption of IBS in Malaysia. First, it was announced in Budget 2005 that all new government building projects are required to have at least 50% IBS Score. It was also announced that levy exemption for housing projects that have minimum IBS Score of 50% to attract private developers. The new circular of Surat Pekeliling Perbendaharaan Bil. 7 Tahun 2008 had emphasised on the full utilisation of IBS in government's projects where the use of IBS component in government projects must not be less than 70% IBS Score. However, according to the latest data from the Implementation Coordination Unit (ICU) of the Prime Minister’s Office, only 24% of public projects valued at RM 10 million and above have achieved an IBS score of 70 while CIDB reports that only 14% of private projects have achieved an IBS score of 50 [9].

Due to low implementation of IBS in construction projects in Malaysia, many research has been conducted to investigate the issues of IBS. The most significant challenges to the adoption of IBS are higher capital cost [8, 10, 11]; lack of incentive [8, 12, 13]; low number of supplier [14]; high shipping cost [15]; and lack of knowledge and awareness [16].

2. SMEs in IBS projects in Sarawak

Although many previous studies were done in Malaysia related to IBS, only two are found to be conducted in Sarawak. One of the studies conducted a quantitative study where the focus group is large size company. The researcher found that IBS was still considered new to most of the contractors in Sarawak and thus, further indicated that they still lacked exposure [5]. Meanwhile, another researcher revealed that there is no significant difference between setbacks of IBS in rural areas of Sarawak, East Malaysia and urban areas of West Malaysia. These setbacks are resistance to change, negative perceptions of the stakeholders towards IBS designs, expensive overall construction costs, lack of knowledge and exposure to IBS technology and lack of IBS manufacturers in the industry. From the case study done, the researcher found that the lack of local IBS manufacturers and expensive overall construction costs are two significant setbacks [17].

Examining both research done in Sarawak [5, 17], none of them focusing on SMEs. Small - and medium - sized enterprises (SMEs) are at the core of the Malaysian construction industry. Because the SMEs are the majority, their characteristics significantly affect the current practices in the industry. Nonetheless, there is no standard definition of SME in Malaysia. Based on the CIDB's definition of construction SMEs, G1 to G3 contractors fall under the small-size category. G4 and G5 contractors are categorised as medium-sized contractors, and G6 and G7 contractors are categorised as large [18].

In Sarawak, a majority of IBS contractors fall under SMEs. Referring to Table 1, a total of 139 contractors grade G1 to G5 compared to 52 contractors grade G6 to G7 registered under CIDB for various IBS system in Sarawak. Due to majority of SMEs registered in CIDB and lack of research of IBS involving SMEs, this study is intended to close the gap between parties involved in IBS projects.
Table 1. Number of contractors involved in IBS according to contractor grade of registration in Sarawak.

| Contractor grade of registration | G1 to G5 | G6 to G7 |
|---------------------------------|----------|----------|
| Precast component systems       | 41       | 15       |
| Fabricated steel structures     | 65       | 30       |
| Innovative mould system         | 4        | 1        |
| Modular block systems           | 25       | 1        |
| Prefabricated timber structures | 4        | 5        |
| **Total**                       | **139**  | **52**   |

Source: Construction Industry Development Board (CIDB)

3. Methodology

The focus of this paper is on getting the insight towards IBS implementation for SMEs. This paper examines critical factors in implementing IBS in Sarawak qualitatively. In order to acquire potential interviewees, a pilot questionnaire survey was conducted in the earlier stage of the study to 250 contractors in Malaysia. From 250, 73 replied to the questionnaire survey. In order to gather more information to increase understanding and expanding knowledge on the issue, semi-structured interview was conducted. From 73 replies, 15 of the contractors were selected to be interviewed. The potential interviewees were selected based on:

1. More than five years experience in managing IBS projects.
2. G1 to G5 contractor
3. Experienced managing projects in Sarawak

From 15 selected respondents, 10 contractors agreed to be interviewed. Data gathered from the semi-structured interviews were analysed qualitatively as the information was in the form of opinions, comments and statements.

4. Findings and Discussions

4.1. Lack of incentive

According to the interview done with contractors, four of the respondents agree on the lack of incentive implementing IBS for small contractor. The incentive has no direct effect meaning to other than the main contractor and developer due to the fact levy exemption only affecting the main party of the IBS project. For small contractor who mostly undertakes installation of IBS components, the respondents further emphasised that the contractor did not receive the said levy exemption due to the amount of contract below RM 500,000. Two of the respondents received the levy exemption but further argued that the value of exemption is too little (based on the 0.125% rates of levy to be paid). In Budget 2006 announcement, tax incentive was offered through Accelerated Capital Allowance (ACA). IBS manufacturers would be given ACA for expenses incurred in the purchase of moulds used for production of precast concrete components [2]. The tax benefits are expected to motivate industry players to invest more in IBS. However, the respondents argued that they did not aware of the announcement and they further added only one party is benefitting from it, i.e. precast concrete manufacturer. From the result of the interview session, incentives given by the government is unfair in the context to facilitate the stakeholders. The current policy is developed in favour of larger stakeholders i.e. manufacturer and developer who are viewed to be the main driving force of IBS implementation. Hence, the policy maker has to impartially formulate a new strategy which will
benefit each stakeholder in IBS implementation. The respondents further suggested the government should impose a reduction of company's tax for a company that involved in IBS project where all parties will the received the same benefits.

4.2. Limited number of manufacturer of prefabricated elements
Based on the result from interview session, six of the respondents suggested that limited supplier of IBS components in Sarawak, among others affecting the construction cost of IBS. The lack of IBS manufacturer caused no competition on the price, resulting in higher price of IBS components. This is supported by the database developed by CIDB, the number of IBS manufacturers in Malaysia is 169 in 2013 where almost 90% located in West Malaysia [19]. However, there is no current list of manufacturers available. The respondents further added that most of the factory located far from the site. Thus, it results to ineffective distance to a site, causing more on transportation cost.

Three of the respondents suggested database of IBS manufacturer should be compiled and made online for easy reference of industry players. Information such as the location of the IBS factory is important to consider initially before requesting further information i.e. price quotation. Three of the respondents stated that they are interested in investing in IBS factory. However, the chances of securing a continuous and sufficient demand for the product worries the contractor especially to reach breakeven point of the investment.

4.3. Logistics problems
According to the interview done with contractors, five of the respondents stated that logistics problems, especially in the rural area of Sarawak, hindered the usage of IBS. The respondents further added that logistics and shipping costs would result in expensive overall construction costs. Three of the respondents who involved in precast concrete components stated that the components are big, bulky, heavy, and require the use of expensive cranes for hoisting. In the situation where the site was situated in a rural area and can only be accessed through a river, the additional cost incurred to transport the components.

In addition, one of the respondents argued the infrastructure of Sarawak is still 30 years behind the other states. Infrastructure such as road outside the cities which is long, narrow and unpaved needs to be upgraded and not suitable to move large components of IBS and heavy machineries. Inaccessible interior over remote areas is inaccessible with ground transportation and dependent on river access where only shallow-draft vessels and small boats like sampans can manoeuvre. Shallow river of Sarawak depended heavily on tidal movement and the silting of the river. This situation will give impacts on the construction schedule and the construction cost.

All respondents further suggested that the government should consider providing additional incentives for parties in IBS projects located in the rural area. Improvement of the infrastructure i.e. roads will also significantly contribute to the growth of IBS in Sarawak.

4.4. Conventional payment method
According to the interview done with contractors, three of the respondents emphasised that conventional payment method where progress payment is made when materials arrived at the site is not suitable for IBS. In the event where the offsite casting is employed, contractors will not be getting any payments from the employer until IBS components delivered to the site, though payments have to be made to the manufacturer once the components are cast. This issue will cause financial difficulties and complicate the cash flow of the contractors.

The respondents further suggested that a new set of standard payment where off-site casting is employed should be developed and promoted to ensure all parties are made aware of it.

5. Conclusions and recommendations
This paper manages to draw significant factors affecting the implementation of IBS in Sarawak as the barriers and issues of the implementation differs from West Malaysia. Prior to IBS implementation, factors such as site location, location of the manufacturing factory, infrastructure conditions and services available should be assessed beforehand. Sarawak is less developed state compared to other
states in Malaysia and most of the rural areas are underdeveloped. In a rural area, the facilities and infrastructure i.e. road network and river network need to be improved to accommodate the transportation of IBS components and machinery.

Incentive programme developed by the government through CIDB plays important to enhance the adoption of IBS if it is implemented properly. The current incentives programme falls short as it is found to be inadequate and impartial towards all IBS parties. This paper proposes that the incentives should be provided to all IBS parties, without many conditions that have to be met.

Although this paper managed to provide qualitative study, further research is recommended to be conducted in terms of increasing number of respondents. It is also recommended spatial study for future research to be done to locate IBS factory in Sarawak. It will help in manufacturing new location and knowing the flow of transporting IBS component from IBS manufacturer to the site construction.

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