A Review of IBS Malaysian Current and Future Study

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Abstract: Malaysia considers the construction industry as one of the main contributors for the country's Gross Domestic Product (GDP) towards a developed country by 2020. In view of that, Malaysian Government proposed a new strategy through industrialization technology called Industrialized Building System (IBS). Although IBS was introduced since 40 years ago, with well-documented benefits and strong support from the Government, the pace of implementation and usage of IBS is still slow and below of the Government target. Current literature found out that investigation by many researchers mostly focusses on technical (hard) issues such as design structure, material testing and product development rather than on the studies related to management or soft issues, such as vendor development programs, readiness of practices, collaborative and integrated design, and supply chain processes. With regards to the challenge, this research is hoped to highlight issues pertaining on supply chain perspective towards the betterment of the IBS implementation in the Malaysian construction industry. Therefore, this paper will review the trend of Malaysian IBS in the current construction industry. Later on, followed by suggestions for the future work for more efficient and effective IBS implementation in Malaysia.

Keywords: Malaysian Construction, Industrialised Building System (IBS), Supply Chain.

1. Introduction

The Construction Industry Development Board (CIDB) Malaysia, in collaboration with various organizations representing the
construction industry, developed the Construction Industry Master Plan (CIMP) that identified and recommended measures to address these problems and challenges (CIDB, 2009). Thus, the Malaysian construction industry has been urged to use innovative construction techniques, and to move from the traditional practice (or method) of bricks and mortar system (non-IBS projects) to an Industrialized Building System (IBS) of construction, or Off-site Manufacturing/ Off-site Construction as it is more commonly termed in other countries. The importance of IBS was highlighted under Strategic Thrust 5: Innovate through R&D to adopt a new construction method in the Construction Industry Master Plan 2006-2015 (CIMP 2006-2015) which has been published as a means to chart the future direction of the Malaysian construction industry (CIMP, 2005). This initiative has been recommended for the analysis of IBS used in other countries, such as the UK government commissioned reports which have proposed IBS as an important contributor to progress in the construction industry (Blismass & Wakefield, 2008; Barker, 2004; Egan, 1998).

Numerous studies (Nawi., 2011a; Buildoffsite, 2008; Pan, 2006; Venables *et al.*, 2004; Parry *et al.*, 2003; IEM, 2001; Gibb, 1999) showed that implementation of IBS offers a significant number of benefits to adopters. These would be in terms of cost and time certainty, attaining better construction quality and productivity, reducing risks related to occupational health and safety, reducing the number of skilled workers and dependency on manual foreign labor, and achieving the ultimate goal of reducing the overall cost of construction whole life performance and profits. Based on these benefits, Malaysian government had recognized IBS as one of the strategies in the National Construction Industry Master Plan which aimed to speed up the delivery time, and to build affordable and quality houses.

2. Methodology

This ongoing research is still at the initial stage; therefore, the information presented in this paper is primarily based on the thorough review of the

relevant literature within the scope of the Industrialized Building System (IBS) and construction fragmentation. Wisconsin (2008) identified that a literature review is a "critical analysis of a segment of a published body of knowledge through summary, classification, and comparison of prior research studies, reviews of literature, and theoretical articles." Through the literature review, the definition, application, related, current and future studies of Industrialized Building System (IBS) in the construction project are being examined and highlighted. This study will concentrate on the Malaysian construction industry, particularly on the implementation of the entire IBS value chain. The timeline for this study will focus after the CIMP (2005) being launched until today.

At the same time, numerous tools and strategies developed to improve IBS supply chain process and team integration in the traditional practice and its future applicability for IBS will be discussed as well. Data and information will be gathered directly from libraries, books, articles and other printed materials searched in the international and national journals, proceedings and bulletins. This literature review is very important and helpful in the process of developing for the theoretical sections of the actual research.

3. Current Trend in IBS Research

Despite the well-documented benefits and strong support from the Malaysian government, the take-up for IBS has not been as high as anticipated (Hamid *et al.,* 2008; IBS Roadmap Review, 2007; Waleed *et al.,* 2003). The low cost of labor and high dependency on a foreign workforce in Malaysia could, perhaps, be the root cause of the problem (Kamar *et al.,* 2009; Hamid *et al.,* 2008; IBS Roadmap Review, 2007). Although members of the industry are open to the new idea, a major proportion of industry stakeholders in the private sector are indifferent, perhaps due to resistance to change, and insufficient funds and information to support the feasibility of change (Kamar *et al.,* 2009; Hamid *et al.,* 2008).

In an attempt to understand the poor diffusion of IBS, some researchers (Nawi et al., 2011b; Kamar *et al.,* 2009; Hamid *et al.,* 2008; IBS Roadmap Review, 2007; Nawi *et al.,* 2007a) had investigated the barriers to effective IBS implementation in construction. One of the main barriers of IBS implementation in the Malaysian construction industry is related to poor integration among stakeholders during the design stage (Kamar *et al.,* 2009; Haron *et al.,* 2009; Hashim *et al.,* 2009; Chung, 2006; Haron *et al.,* 2005; Thanoon *et al.,* 2003a) and it is reported that this is more critical to address this issue rather than the aforementioned barriers to IBS implementation (CREAM, 2010; CIDB, 2009; Blismass & Wakefield, 2008; IBS Roadmap Review, 2007). This central issue can specifically affect the various stakeholders in the IBS value chain: either, manufacturers, designers, local authorities, contractors, suppliers or clients. These problems requests for an improvement in communication and integration among the relevant IBS players such as designers, contractors and manufacturers, more so at the design stage (CIDB, 2009).

According to CIDB (2009) and IBS Roadmap Review (2007), a radical improvement in the procurement system and supply chain process towards a more integrated approach is needed in order to achieve successful IBS implementation. As construction becomes more innovative, competitive and complex, more participants are involved in IBS projects and thus, more integrated and collaborative approach is needed especially during the design phase of the construction project life cycle process. In addition, the current research trend of IBS in Malaysian came from both practical and academic perspectives. From a practice perspective, previous studies identified that the construction industry still facing following problems:

- The IBS Roadmap (2003) sets the target for at least 50% of completed projects in Malaysia will have used IBS by the year 2006, and this figure should increase up to 70% by the year 2008. According to the IBS Roadmap Review (2007), it was reported that approximately 10% of completed projects in Malaysia used IBS, while less than 35% of total construction projects used at least one IBS product in the year 2006. Hence, IBS usage falls significantly low from the government target. Nevertheless, the government is still pushing forward the implementation of IBS in order to address the challenges of the industry (CIDB, 2009). Therefore, there is a lot more to be done for a Malaysian government's strategy to improve the IBS implementation,
- Nawi et. al (2012) highlighted the importance of supply chain collaboration and set a target of 20% of construction projects (by value) that should be undertaken by integrated teams and collaborative supply chains by the end of 2004, rising up to 50% by the end of 2007. However, in reality, the IBS Malaysian industry as a whole is still highly fragmented. The confrontational culture still prevails in the industry.
- There are lacking on the appropriate guidance for IBS Malaysian construction practitioners on how to understand the key issues of integrated teams and how they can achieve continuous improvement (Nawi et al., 2012;

CIDB, 2009; Faizul, 2006). Although integration frameworks, concepts and principles such as partnering, concurrent engineering (CE), lean principle, and supply chain management (SCM) exists, most of them did not provide any specific guidelines to be followed by practitioners on how to achieve effective integrated design team delivery especially for Malaysian IBS implementation.

From the perspective of academic research, the following drivers for this research are relevant:

- Many studies on IBS usage in the Malaysian construction industry focus on two areas; firstly, a cluster of studies focus on technical (hard) issues such as design structure, material testing and product development (Rashid, 2009; Haron *et al.,* 2005); secondly, there are limited studies relating to management or soft issues, such as vendor development programs, readiness of practices, collaborative and integrated design and supply chain processes (Hanafi, 2008). Hence, management/ soft issues need to be further investigated because of its broad research focus to facilitate widespread IBS implementation in Malaysia.
- The construction industry has been encouraged to learn from the manufacturing industry (Egan, 1998; Blismass & Wakefield, 2008). These reports clearly encouraged designers, manufacturers and developers work together (collaborate) to create a design-led solutions, to meet the needs of the modern household at an affordable price. Since there has been a lack of integration in the construction industry, emergent schemes such as concurrent engineering (CE), supply chain management (SCM), lean principle and partnering have been established. In contrast, many of these initiatives do not fully address the problem and therefore have not achieved the expected success. Further study is needed to improve integration.
- Most research in Malaysia promotes the benefits of IBS (Hamid *et al.,* 2008; IBS Roadmap Review, 2007; Thanoon *et al.,* 2003a; IBS Survey, 2003) but fail to briefly develop guidelines on how it can be implemented, particularly on how to improve team integration.

Based on the above discussion, the need for greater team integration and collaboration of the supply chain particularly in design project team delivery of Malaysian IBS projects are paramount. According to Titus & Brochner (2005), to achieve integration, improvement in communication and relationship are needed. This includes maintaining a long-term relationship with supply chain members (Buzell & Ortmeyer, 1995), working cooperatively and without boundaries with various project members (Baiden *et al.,* 2006), free information sharing with the supply chain (Lee & Whang, 2000), strong commitment at all levels of the multidisciplinary project team (Evbuomwan & Anumba, 1998); and operating in an atmosphere where relationships are equitable, members show respect for each other and operate a 'no blame' culture (Dainty *et al.,* 2001).

In this context, information and knowledge sharing is a fundamental approach that underpins both communication and collaboration. According to Baiden *et al* (2006), this information sharing approach can be achieved through an integrated working environment that involves different participants. However, tangible examples of full integration achievement in the industry are limited (Nawi & Lee, 2010; Vyse, 2001; Vincent & Kirkpatrick, 1995). Previous researchers (Lee, 2002; Akintoye, 2000; Egan, 1997; & Latham, 1994) suggested that level of integration is still lacking in the construction process, particularly during the design stage.

Even though many studies (e.g. Song *et al,* 2006; Baiden *et al.,* 2006; Buzell & Ortmeyer, 1995) have concentrated on this area that attempt to improve construction design team integration, they do not provide any specific guidelines on how to achieve successful integrated design team delivery. Many frameworks/ approaches that have been developed to aid project team integration through 'relationship contracting and integrated procurement such as Design and Build, Early Contractor Involvement, Partnering (Bowron, 2002; Edwards, 2007; Matthews, 1996; Chan *et al.,* 2003; Black *et al.,* 2000); Concurrent Engineering (Kamara *et al.,* 2000; Evbuomwan & Anumba, 1998; Broughton, 1990); Lean Thinking (Huovila, *et al.,* 1997; Matthews & Howell, 2005); and Supply Chain Management (Khalfan & McDermott, 2009; Love *et al.,* 2003; Vrijhoef & Lauri Koskela, 1999). However, the impact of these initiatives on the implementation of IBS is still limited.

4. **Recommendations for Future Work**

This section discusses related areas of research where additional investigations may be valuable or would further improve the level of adoption in implementation of Malaysian IBS. In the entire process of this research, there are various issues that were uncovered and highlighted. In response to that challenge, and consistent with the needs of the construction industry, therefore, some recommendations for the further improvement in Malaysian IBS construction projects are as follows:

- Further research on IBS implementation in other developing Asian countries that have similar practices and the same cultural construction background would be helpful to focus on this issue. Additionally, it might be useful to consider a comparative study with other Asian countries that are at a different stage of development (developed countries) to Malaysia. This is to see how effective and efficient IBS being implemented in another country as compared to current practice in Malaysia.
- Since the study of effective integrated team delivery for IBS Malaysia were already there, a further study was suggested in order to investigate and produce detailed guidelines or procedures for successful implementation of the factors in Malaysian IBS projects.
- Further study is required in terms of investigation and validation processes among non-Malaysian IBS practitioners to generalize and enhance the applicability and validity of the current approach of effective integrated team in Malaysian construction projects.
- Since the implementation of integrated design teams in IBS projects involves so many parties such as clients, designers, manufacturers**,** contractors, transporters, and various government bodies, there needs to be research into whether there should be a governing body to act as mediator to gather together all the parties involved, as well as to be in charge of the design process in IBS projects.
- A future study should also focus on the state of readiness aspect. It is really important to know whether the current local IBS practitioners are well prepared or have enough capability in terms of knowledge, skills, and resources to consistently deliver IBS projects with a fully integrated team practice.
- Although there are a lot of frameworks or approaches for effective integrated team in IBS however as highlighted before the impact of these initiatives on the implementation of IBS is still limited. This is because of the confusion and partial understanding that exists between current construction industry stakeholders either in terms of unclear working processes or lack of framework, model or guidelines that can be practically applied. For example, confusion or misunderstanding arises because most of the integrated framework/ approaches adopted different ways. Consequently, it creates difficulties among practitioners when deciding which one of the framework/ approaches is the most suitable for use in their project. Furthermore, some of the framework/ approaches have not focused specifically on how IBS project teams can integrate and work together to become a single entity. Therefore, it is important to conduct this type of research in order to identify what the important factors for integrated project team design delivery, especially in IBS projects.

Conclusion

Despite the above limitations, the contribution of knowledge of this paper came from both practical and academic perspectives. From the practical perspective, previous discussion on Malaysian IBS project implementation guides already exist, but most of them did not provide any specific guidelines to be followed by practitioners on how to achieve effective integrated design team delivery. According to previous researchers, there has been a lack of attention paid to IBS supply chain integration, which is why the emergent schemes such as Concurrent Engineering (CE), Supply Chain Management (SCM), Lean Thinking or Partnering have been developed. However, many of these attempts have not fully addressed the problem and achieved the expected success. Therefore, further research is required particularly focusing on the tangible example of the Malaysian construction industry to improve supply chain integration, especially in the design team, among Malaysian IBS projects.

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