CHALLENGES FOR DEVELOPERS IMPLEMENTING IBS IN MALAYSIAN HOUSING PROJECTS.

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Abstract

Housing projects has become one of the contributors to Malaysian construction industry and there is always significant demand for housing as Malaysian economic has spurs positively. However, reports from National Housing Policy (2012) has revealed that current housing projects must transform from issues of low quality, delay, lack of skilled labour and slow adaptation of technology. Therefore the government has enforced prefabrication concept to be implemented in Malaysian housing sector to overcome these issues. Housing should be the sector that most suitable implementing IBS due to its construction nature where repetitious drawings and similar layout and specification are used for every unit. Recent study shows that IBS adoption in housing projects still behind the target. There are many challenges that discourage housing developers to adopt this prefabrication technology. This paper aims to discuss the challenges that housing developer encounter which discourage them from implementing IBS and at the end of this paper, some suggestions to overcome the challenges are proposed. This paper is based on previous research, journals and government reports as evidence. It can be concluded that Malaysian housing market still facing many barriers on IBS and needs a radical transformation that requires much more effort particularly on procurement system, supply chain and skill workers. In order to sustain the IBS usage, all parties must put great attention where this technology becomes priority, and not only as an alternative method.

Keywords: IBS, housing developers, housing project Malaysia, construction project.

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1. Introduction

Many efforts have been placed to improve Malaysian housing sectors and one of them is through culture of innovative approach of prefabrication concept (Abd Rahman and Omar 2006). Many terms are used referring to prefabrication such as pre-assembly, Modern Method of Construction (MMC), Off-site Manufacturing (OSM), Off-site Production (OSP), Off-site Construction (OSC), modularization, prefabrication, and Industrialised Building System (IBS). In Malaysia, the term IBS is officially used to represent prefabrication concept.

Many benefits can be enjoyed by adopting IBS like reduction of wastages, minimization of hazards and risks, speeding up the construction process and better quality materials (Hassim et al. 2009; IBS Roadmap 2003; Kamar 2009; Nawi et al. 2011; Thanoon et al. 2003). The components of IBS are strictly regulated and they are fabricated through efficient manufacturing processes under the supervision of trained and skilled workers, repetitive procedures, and constant quality surveillance (Nawi et al. 2011; Shaari and Ismail 2003; Thanoon et al. 2003). Besides, Shaari and Ismail (2003) and Nawi et al. (2005) reveals that adopting IBS for housing projects can reduce construction time, which is less than half of the time taken in conventional cast in-situ housing and all IBS components lead to the reduction of harmful impact on the environment (Nawi et al. 2007).

IBS has been implemented around the world especially in developed countries. In the United Kingdom, IBS has become the top priority in order to encourage efforts desirous for innovations and changes in thinking and working (Nadim et al. 2010). Besides the UK, countries following the same effort include Singapore, Hong Kong and Sweden (Lessing 2005). Australia's construction industry also regards these transformations to prefabrication as bringing many benefits to all parties in construction, not only for builders but also to clients (Blismas & Wakefield 2009).

Many researches have been done on IBS but their discussion is only on product and process implementation from the perspective of manufacturers and contractors. The areas that have been studied among others are supply chain management (Abd Shukor et al. 2011; Faizul 2006; Jaafar and Mahammad 2012; Kamarul et al. 2011), critical success factors (Kamar et al. 2009), awareness and acceptance level of contractors (Hassim et al. 2009; Mohamad et al. 2009) and barriers of IBS implementation (Oostra 2007). However, there is lack of research focusing on challenges for developers adopting IBS system. Thus, this paper will discuss the challenges that Malaysian housing developers need to face in adopting IBS for their housing project.

2. Literature Review

IBS has been introduced in Malaysia since 1960's, but it became popular only in 1998 when the Malaysian Cabinet endorsed the IBS Strategic Plan as the blueprint for the future (Din et al. 2012). Construction Industry Development Board of Malaysia has classified IBS into six categories which are Pre-cast Concrete Framing, Steel Formwork Systems, Steel Framing Systems, Prefabricated Timber Framing Systems, Block Work Systems and innovative method (IBS Roadmap 2007). The objective of this effort is to shift the construction industry to be fully industrialised, slowly reduce the dependency on foreign labours and enhance the quality of each project. To meet this target, Malaysian construction industry was encouraged to adopt IBS and the Construction Industry Development Board (CIDB) has lead this great effort (IBS Roadmap 2003).

The efforts have been continued by government to encourage IBS and one of them is by enforcing IBS adoption in housing projects (IBS Roadmap 2007). The repetitious nature of housing construction primarily when similar drawings and specifications are used makes IBS extremely suitable to be adopted. The pre-fabrication concept in housing sector can increase the quality of houses, improving the building process and ease the dependency on foreign workers.

The successful of prefabrication adoption in housing projects can also be seen in developed countries such as Living Solution (United Kingdom), Sekisui Home (Japan), Wenswonen (Netherlands) and Open House (Sweden) (Oostra 2007). Halman et al, (2008) reveals that housing projects that use conventional method of construction requires huge amounts of manual works conducted by sub-teams compared to projects that using prefabrication method such as IBS. IBS for housing projects has creates centralise repeatable processes that allow developers to improve efficiency and quality through the repetitive works for each housing unit. Therefore it is proven that through prefabrication method, Malaysian housing sector may also gain many benefits but this needs serious attention from government, housing developers and contractors (National Housing Policy 2012).

However, there are many challenges that discourage IBS adoption in housing sector. Gann and Salter (2000) conducted research on the effectiveness of new method of construction such as IBS and they concluded that this new technology can be functioned when the entire networks can work together, and not working as individual business. This argument was supported by Rothwell (1994) and he added that to ensure the new technology can be efficiently implemented, the effort to overcome the challenges is required. Therefore, IBS in housing projects must be driven by larger networks working on common goal as partners and not as individual encompassing developers, contractors, suppliers, manufacturers and regulatory bodies (Gassmann 2006, Zainul Abidin 2010). However, adopting IBS requires the involving parties to really understand on the advantages and disadvantages of the system, to make them ready and prepare for the benefits and the upcoming challenges (Blismas et al. 2006).

Housing project needs to deal with many challenges such as logistics in procuring IBS components and this requires proper coordination on the supply chain and good communication between suppliers, contractors and clients (Goodier & Gibb 2007; Nadim & Goulding 2011). If the relationship among contractors and IBS suppliers is well integrated, the risk of miscommunication and disputes in supply chain can be reduced. Besides, the other issue is current registered IBS suppliers cannot cater the demand for IBS components for example a single supplier cannot fulfil the many demands which beyond his capacity in one time (Bildsten 2011; Blismas et al. 2005). Besides, if one supplier has dominated the supply chain, the business opportunity for other companies will be affected and thus will demotivate them and create less competition (Gibb & Isack 2003). Some architects find there are conflicts between their desires to invent novel design in housing and the technical limitations that standardised IBS may not achieve (Madigan 2012).

3. Challenges of Housing Developers in Adopting IBS

i. Design

A research conducted by Hofman et al. (2009) shows that housing developers face many problems to implement innovation in their method of construction like IBS, and one of the problems is because the customers are sceptical in design which they think will limit the architectural freedom and this new method is vulnerable to design errors. Besides, many housing developers also afraid to take the risk of using IBS because if their projects need to be stopped or suspended, they cannot easily stop the construction as they might do in conventional method, but they must still proceed with payment to IBS manufacturers and bound for other cost such as transportation and storage (Lovell & Smith 2010).

ii. Financial

For conventional projects, if contractors or developers want to stop or suspend the project the can do so without paying any cost, but for IBS they still bound to pay for components fabrication, transportation cost and cost for storage as they have contracted for these business since the components has been ordered (Lovell & Smith 2010). Besides, procuring IBS components sometimes requires contractors to pay high upfront payment which increase 5-10% from previous years (Gagnon & Adams 1999).

For housing projects, the developers who choose IBS are also depending on the economic cycle to ensure their projects can still getting profit despite of economic slowdown. Some developers are afraid whether cost for procuring IBS components might increase due to sudden bad economic cycle such as currency exchange problems as fabrication for IBS components sometimes requires imported materials from other countries (Blismas and Wakefield 2009). Some countries are facing problems due to bad economic situation, thus many housing developers do not willing to take risk by implementing IBS, as IBS need high initial cost, must pay 30%-50% upfront payment before components can be fabricated and require skill workers (Bildsten 2011).

Housing developers are sometimes need to reassure and convince the financial institution that prefabricated houses can still attract many potential buyers and receive good feedbacks from customers (Madigan 2012). This happens because there are planners, bankers, lenders and insurers who are sceptical that prefabricated houses cannot receive good attraction same as conventional houses (Lovell & Smith 2010).

iii. Unfamiliar With IBS

Most developers are comfortable using conventional method due to their familiar with cost estimates and clear of construction building methods while for IBS, they afraid for an additional cost or extra work as this system is different which they are not familiar (Nadim & Goulding, 2011). Due to this, many developers sceptical whether they can really utilise IBS method as client's expected because in their previous projects, using conventional method are still hard to them (Lovell & Smith 2010).

It is proven that without proper planning and preparation from builders, the implementation of IBS would not be successful (Nadim & Goulding 2011). Surveys show many builders still believing that once houses are installed with IBS concept, they cannot receive any changes and this problem would not happen for conventional method (Sadafi et al. 2011). Most housing developers and building companies are not ready to adopt IBS in their projects as they believe their companies are lacking in IBS knowledge and having less capital to invest for it (Zainul Abidin 2010). Besides, implementing IBS means that builders must be ready to face complex process where more detail design are required, and if error happens the need for corrections would take longer time than usual especially to builders who are new to this system (Gibb & Isack 2003). In addition, IBS process also requires builders to have good relationship with new and untrained subcontractors which they might not have contracted before (Hofman et al. 2009). Due to unfamiliar with IBS system, some companies have to deal with conflicts as they face many challenges when changing from conventional method to IBS as workers were only trained for conventional method of construction (Sadafi et al. 2011).

iv. Clients Perception

Furthermore, most housing developers give priorities to their house buyers where some house buyers believe IBS will limit the shape and design of the building and cannot provide freedom for future renovation (Blismas & Wakefield 2009). Home owners are not willing to sacrifice their desire for decorating the house and freedom of changing the design just because to fulfil government target in pursuing IBS implementation (Madigan 2012). Furthermore, some people carries the stigma of IBS is aim for cheap housing and only sustain for temporary buildings (Goulding & Arif 2013). Thus, both IBS manufacturers and housing developers should resolve the sceptical and negative thinking of house buyers towards IBS, and double the effort of giving awareness to public that this system are giving many advantages and will not limit their desirous design (Bildsten 2011).

v. Lack of Specific Regulations

Despite of government incentives in promoting IBS, the effort are limited due to lack of enforcement, slow implementation and problems with coordinating many suppliers and builders. For instance, housing projects that implementing IBS should have the potential of better thermal performance for occupiers, but there is no regulation or guarantee that can ensure this advantage can be achieved (Miller, Buys & Bell 2012). Therefore, it is suggested that projects that adopting IBS should have their own standard of building regulation which is different from ordinary regulation for conventional method (Nadim & Goulding 2011; Zainul Abidin 2010). Currently, projects that adopting IBS must follow the same standard regulations as conventional method in terms of health and safety, environment impact, waste management, thermal performance etc (Miller & Buys 2012).

Since IBS Roadmap 2003, there are still no specific IBS building regulations or standard guidelines for contract documents or procurement systems in terms of tendering, design, construction and payment. The only references or guidelines are IBS catalogues (such as Precast Concrete Building Components for Residential Buildings, Modular Coordination Implications – Building By Laws and Regulations, Joints and Tolerances for Building Construction) published by CIDB Malaysia (Kamar et al. 2009; Hussein 2007).

According to IBS Roadmap Review (2007) report, IBS adoption must include an appropriate procurement method which is unswerving, reliable and fair to clients, developers and housing contractors. The current payment mechanism under present procurement is not suitable to be applied in IBS project and this makes IBS as not the primary option for developers (Abd Rahman & Omar 2006). Under current procurement, housing developers need to pay up-front payment by using their own money as this money cannot be claimed from client until the components are delivered onto site (Kamar et al. 2009).

vi. Logistics

Housing developers and builders need to face challenges from companies that supplying and producing conventional building materials where these companies will keep lobbying clients to stay with conventional method as this will keep their businesses survive (Lovell & Smith 2010). Besides, many traditional building contractors make public to understand that traditional design can only be achieved through conventional method, and IBS only suitable for modern design projects (Hofman et al. 2009).

In addition, housing projects that implementing IBS cannot be guaranteed the cost saving and good return of investment (Aburas 2011. The reason is IBS needs high investment on initial cost such as to provide skilful workers, mechanised equipment and automated machines to fabricate the components (Lovell & Smith 2010). Due to small numbers of IBS manufacturers and suppliers, the housing developers afraid that their demand for IBS components cannot be met as they require a large number of quantities of components in one single time (Elnaas 2009). In addition, at present there are insufficient incentives that encourage competition in producing IBS components and the available companies that produce them are located in selected area like Selangor, Kuala Lumpur, Johor and Kedah (Kamarul et al. 2011).

Besides of cost for routinely transport the components from IBS factory to site, there is another issue of carrying heavy and large size of IBS panel which might cause danger to other road users and local people near the site (Hassim 2009). During the transportation and unloading process, there should be detail inspection and supervision to avoid components defects and to ensure all components are placed at the right place to prevent double handling.

4. Suggestions to Overcome The Challenges

i. Better Collaboration Among Participants

The implementation of prefabrication concept like IBS for housing can be enhanced through better relation and negotiation among suppliers, contractors and clients. This has been agreed by Barlow et al., (2003) where he added that the advantages of prefabrication concept such as interchangeability of parts, simplicity of connecting parts, consistent measurements sizes and consistent predictable build construction processes will of course require good relationship between manufacturers, builders and client. Besides, through close relationship of manufacturers and builders, the fabrication of components can be made more simpler and efficient with elimination of unnecessary contractual procedures (Gann 2000). For housing projects, delay is a result of ineffective project team due to unresponsive and inefficient supply chain (Lessing et al. 2005). Roy et al. (2003) reveals that by sharing clearly information and getting the resources through efficient supply chain from beginning of the project can ease the problems that cause delays. Therefore, it can be said that housing projects that practicing proper negotiation and having long term relationship among suppliers, contractors and clients can definitely improve the performance and having more potential in achieving the project's target (Kamarul, 2011).

ii. Proper Planning

IBS is seen as cost effective, however there are still incidents which may increase the cost such as material mishandling where the big IBS components need to be replaced at the right location and this will require time, cranes and machines (Dainty & Brooke 2004). Thus, before placing the components, the project site must give specific attention in avoiding double handling from the beginning. This double handling of components leads to overestimation of cost and underestimation of savings as moving the components require large cranes, skilful operator and time consuming (Blismas et al. 2005).

iii. Developing Specific Rules and Regulations

Housing developers who adopt IBS should practice different rules and regulations from conventional as IBS nature is not similar to conventional (Elnaas et al. 2009). For example, implementing IBS must also include suitable procurement especially on payment that gives fair rights to all parties in the project (Kamar et al. 2009). Because of developers need to pay upfront payment when procuring IBS, a new payment system should be implemented which allows developers to claim this payment as soon as they have ordered the components (Shukor et al. 2011). At present, the payment system only allows developers or contractors to claim when IBS

components are sent to the site. This creates and extra burden to developers where they need to do extra work in finding the capital to pay the up-front payment.

iv. Creating the Competition for IBS

Besides, of IBS gives better quality due to its high levels of precision during fabrication process at factory (Bildsten 2011; Elnaas et al. 2009; Gibb & Isack 2003; Jaillon & Poon 2010), it is not enough to just only consider the advantages of IBS components without looking into the potential of growing the competition among IBS suppliers (Pan and Goodier 2011). This is to avoid a static status that only cater for demand and not trying to expand the technology. If IBS is seen as only to replace the conventional, then builders will only change to IBS for fulfilling the demand, and they are not moving for creating new prefabrication industry that can spur the technology through inventing new method (Lessing et al. 2005; Pan and Goodier 2011).

As the workers are already familiar with conventional method, they can be trained to become qualify in assembling IBS as it is easier to learn for those who already master in the building construction (Hussein, 2007). Besides, by centralising the fabrication of components at factory, some workers can be trained to be employed for fabrication of components, as this process require their knowledge such as concreting, bar bending, curing and many more (Goulding & Arif 2013). These workers who shift from working in conventional into working under IBS, can enjoy better working environment which is more safety and healthy, and their repetition of tasks will give them more concentration (Bildsten 2011).

v. Government Incentives and Policy

The government incentives that encourage the adoption of IBS can support greater use of this prefabrication concept (Aburas 2011; Jaillon & Poon 2010). Incentives that successfully attract the builders are exemption on building fees that using prefabricated materials and tax concession on capital invested in IBS factory (Jaillon & Poon 2010; Din et al. 2012). These incentives have encourages the IBS fabricators and contractors as it helps them to explore IBS without sacrificing their profit margin (Din et al. 2012).

Some scholar suggested that to increase the usage of IBS, government should provide better policy using contract terms that promotes prefabrication concept (Gaze et al. 2007). For example, through government regulation, Singapore builders are required to meet a minimum score for IBS which measured under 3S Principles of Standardisation, Simplicity and Single integrated elements. This approach encourages IBS adoption as it explains to builders that the concept of prefabrication is about repetitive sizes and materials, uncomplicated construction and the use of integrated offsite made materials (Chiang et al. 2006).

5. Conclusion

This paper has reviewed the published evidence on challenges that housing developers have to face in adopting IBS. It can be concluded that challenges on the contractors and IBS suppliers are on the integration and flexible negotiation relationship which hard to achieve. Contractors and manufacturers are afraid of taking the risk, sometimes they care too much on payment issues without realising IBS will of course needs high capital and this has become the nature of IBS, not same like conventional. Adopting IBS does not mean every party will be similar in getting their rights as in conventional, but instead each party has to give some tolerances as this method depends more on thrust and technology development. On consumer perception, there are still some sceptical on IBS especially on freedom of design and the suitableness on future renovation. To encourage IBS, government incentives have been proven to be effective. However, more effort should be placed on consumer perspective to promote the usefulness of IBS (Lessing et al., 2005). Earlier focus was placed on the process of building, advantage of IBS, cost effective and supply chain, but not on the perspective on consumer (Madigan, 2012).

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