Readiness in Knowledge and Ability for Implementation of Industrialised Building System (IBS) In Malaysian Construction Industry

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Abstract
This study explores the key factors of readiness in implementation of Industrialised Building System (IBS) in Malaysian Construction Industry. Previous studies pointed out that readiness issues are one of the barriers in implementation of IBS. Readiness is a preparation for something, or willing and able to do something which is a very important criteria to make the successfull of the changes process from traditional method to IBS. Therefore, this study was conducted to come out with the factor that influenced readiness in implementation of IBS. In this study, interview was selected as research technique in data collection process and there are four interview participant, which is from multidisciplinary IBS practitioner. The result show that the readiness in knowledge and ability are the most important aspect that should be highlighted before implement IBS.

Keywords: Readiness, Industrialised Building System (IBS), Malaysian Construction Industry

1. INTRODUCTION

The term readiness, which connotes a situation that is both psychologically and behaviourally ready to take action which is willing and able. Readiness can be described at any level of analysis and at can be happened to the individual, group, unit, department or organizational level (Weiner, 2009). Walinga (2008) identifies the definition of readiness as a preparation in term of mental and physical to deal with experience or action and at the same time ready to achieve the goal and objective.

Readiness can be seen with attitude of organisation members and their intention to the need of change and ability of organisation to make the successful changes. (Susanto, 2008). The organisational change process is always problematic to the organisation particularly when the change is due to the introduction of new technology (Salleh et al, 2011). Readiness is one of the criteria of change management process, which is when the organization is ready for change process; the change implementation will be easier (Susanto, 2008). This statement supported by Weiner (2009), the author noted that the change management experts have emphasized the importance of establishing organizational readiness for make the change.

Readiness for change is the initial element and this is most important in organizational change. Readiness for change is defined as the initial state for change that is prepared in terms of environmental changes and challenges that will be faced during the period of the change (Walinga, 2008). Based on the importance of readiness to change and the issues of lack of readiness among Malaysian IBS construction players, the further study on the criteria or factor that contribute in readiness in transformation from conventional method to IBS should be undertaken.

2. IMPORTANCE OF READINESS IN IMPLEMENTATION OF IBS

IBS has been introduced since 1960, and since then, there are many advantages that can be seen from the implementation of IBS in Malaysia. Although construction player already know the advantages of IBS, but at the same time, implementation of IBS in Malaysia is still in low phase. According to Nawi et al.(2015), based on academic research's perspective, the studies in management of IBS or soft issues in IBS such as vendor development programs, readiness of practices, benchmarking, collaborative and integrated design and supply chain processes is less focused if to compare with the technical issues such as design structure, material testing, and product development.

However, there also have some researchers come out with the study on the factors that influenced the implementation of IBS in Malaysia. Several studies have revealed that, the barrier in implementation IBS in Malaysia are negative perception, readiness issues, cost and equipment, poor planning and regulations, poor knowledge and awareness issues (Kamar et al, 2009; Rahman &Omar, 2006; Ibrahim et al, 2009; Nawi et al, 2011; Kassim & Walid 2012; Razak &Awang 2014). Mohamad et al. (2009) studied the acceptance and awareness level, problem and strategies of implementing IBS in Malaysia. Their study revealed that survey on general readiness to implement IBS which covered in term of mentality is, technically, financially capable and if the client required.
Based on a literature review, most of the obstacles in the implementation of IBS are rooted than issues of readiness (Kamar et al, 2009; Mohamed et al, 2009; Nawi, 2012). According to Hamid et al (2013) in CIDB report, it has already issued the main objective of the research to measure the level of the IBS adoption and readiness in Malaysia. However, there is limited study conducted on the key factors that influence the readiness in-depth, which is important as a guideline to successful implementation of IBS project especially for new or small players on IBS in Malaysian Construction Industry. There is a lack of appropriate guidance for IBS Malaysian construction practitioners on how to understand the readiness issues in successful implementation of IBS and how they can achieve continuous improvement (Kamar, 2011; Yahya et al., 2012).

3. METHODOLOGY

This study chooses the interview as a research technique in data collection method. Interviews and questionnaire together make up the survey method, which is one of the most popular techniques of social research and as methods of data collection in most research designs, regardless of the underlying methodology (Sarantakos, 2005).

For this study, semi-structured interview are selected as a questionnaire structure technique of interview for data collection. This selection chosen because of the research topic and purpose that suitable with this technique which is the main objective is to explore the key factors that influence the readiness of IBS implementation. The purpose of the exploratory interview is to develop ideas and research hypotheses rather than to gather the facts and statistics. It is concerned with trying to understand how the respondent thinks and feels, as well as taking into account their opinion about the topics of concern to the research. Therefore, interview transcripts provide a raw data that needs to be analysed systematically.

3.1 Aim And Objective

The aim of this interview is to enhance the current literature review of the key factor of readiness in IBS. Therefore, the main objective of this interview is to provide insight into the perceptions based on experience and it gained from various IBS practitioners in Malaysian construction industry. It focuses on the readiness issues during IBS construction project and the key factor of readiness to improve current practice in Malaysian IBS projects. To achieve the objective stated above, the interview adopted a semi structures discussion approach among respondents which centered on the drivers, benefit, barrier and solutions to readiness issues in Malaysian IBS construction project. Finally, the analysis of the data from this interview will be combined with information that was identified from literature to develop a framework of key factor of readiness in Malaysian IBS construction project. The development of the framework will be discussed in the next chapter.

3.2 Selection of Respondents

The interview participants are the multidisciplinary IBS practitioners. Several criteria were used for the selection of the respondents in this interview. The respondents should have at least 5 years working experience involving Malaysian IBS construction project. Besides that, the respondents were selected in such a way that they are dispersed geographically and represent different divisions of the project organisation (company) such a planning, design, construction and manufacturing in order to generate different opinion.

As highlighted earlier, the respondent represented various disciplines in Malaysian IBS construction project, such as contractors, designers (or consultants), manufacture and academic researchers. Due to issues of confidentiality, it was decided that the name of respondents in this study would not be disclosed. Instead codes (e.g., R1, R2) will be used to identify the respondents. The list of the respondents is shown in table 1.

Table 1 Respondent’s Profile

<table>
<thead>
<tr>
<th>Name</th>
<th>Position held</th>
<th>Experience</th>
<th>Company/Discipline</th>
<th>Location</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>Consultant Architects</td>
<td>15 years</td>
<td>Contractor</td>
<td>Eastern</td>
<td>Male</td>
</tr>
<tr>
<td>R2</td>
<td>Professional Engineer</td>
<td>15 years</td>
<td>Supplier</td>
<td>Southern</td>
<td>Male</td>
</tr>
<tr>
<td>R3</td>
<td>Consultant/ Researcher</td>
<td>12 years</td>
<td>Developer</td>
<td>Northern</td>
<td>Male</td>
</tr>
<tr>
<td>R4</td>
<td>Chief Executive Officer</td>
<td>25 years</td>
<td>Manufacture</td>
<td>Southern</td>
<td>Male</td>
</tr>
</tbody>
</table>
This research has been focused on identifying the factors that contribute to the lack of readiness in the implementation of Malaysian IBS and has attempted to gain detailed explanations and understanding of these issues. Besides that, the researcher aims to gather and update the information from the multidisciplinary background of Malaysian IBS stakeholders as a guideline to the industry in order to increase the level of IBS implementation in the Malaysian construction projects.

4 FINDING

As highlighted above, the aim and objective of this interview are to assist and improve the current literature review relating to the increase the level of implementation of IBS in Malaysia. All the finding will be used in the development of a framework of key factor of readiness in Malaysian IBS construction projects. The finding of the interview analysis is discussed below:

4.1 The readiness issues in IBS project

To assess the extent to which the issue of readiness in IBS, the first question asked of each respondent was: "In your experience, is that the readiness issues is one of the barrier in the effort to increase the implementation of IBS in Malaysia?"

“Yes, readiness is one of the issues in implementation of IBS in Malaysia. Everything in this world was started from the mentality of readiness. When you are ready, then the game will play smoothly. It is same goes with IBS in Malaysia. When the industry was ready to implement IBS, then IBS will be success implementation.” — R1

From the first question of interview session, the entire respondent was agreed that the readiness issues are one of the barriers in implementation of IBS in Malaysia. R4 believe that, the issues of readiness in IBS was not a big issues in industry but this issues was very important and give impact in order to increase the implementation of IBS in Malaysian construction industry. The statement was supported by R2

“For the readiness issues in the Malaysian IBS, I agree this issue is one of the barriers in IBS implementation. This is because, we can see if stakeholder of IBS was ready to implement IBS, so I think that will reduces other problem. For example ready in term of knowledge, mentality and risk. Then, whatever probabilities happen in the future, they will ready to faced and find the solution so, we can said that readiness will increase the implementation of IBS” — R2

In term of the readiness in IBS project, the question: "What are the issues of readiness that exist within IBS construction project?” was asked in order to gain understanding of the issues that exist from multidisciplinary perspective of IBS practitioners. This question aims to elaborate on how the issue of readiness can be triggered and what the factors of contributed towards it.

All of the respondent are agree that lack of knowledge is the main problem in issues of readiness. Some aspects of the knowledge should be emphasized by stakeholders in the IBS project. An experienced as consultant architect from contractor, R1 highlighted that the biggest problem in readiness is the lack of knowledge among architects in IBS project. According to R1, this problem affected all the design works. R1 stated that:

“Most architects have no skills and willingness to design for IBS drawing; this is because the IBS drawings are more complex than traditional drawings. Then, when contractors get the traditional drawing and they have to hired IBS consultant architect to redesign and then convert all their traditional drawing to IBS drawing.” — R1

This stance was strongly supported by R2 and R2 explained that IBS is all about new management and coordination. R2 also highlighted that the consequence of lack of knowledge about IBS especially in design stage are affected the process flow of project. Mostly when architect give traditional drawing, the drawing must be redesigned and converted to IBS drawing. It will take the additional time and cost to do it. Therefore knowledge in process flow IBS project is very important to make sure no repetition process during the project. In connection with that, R4 adds:

“Based on my experience, i noticed that industry have a lack of expertise consultant in IBS. For example knowledge and experiences among consultants, either engineers consultants, quantity surveyor or architect is one of the challenges faced in order to increases the implementation of IBS project.” — R4
From the supplier and developer perspective (R2 and R3), lack of readiness in providing skilled workers are also can be the factors that contribute to the readiness issue. However, there have some contradicting opinions with the contractor perspective on this point. R1 responded that there have no problems to find the skilled workers on the project site as long as they are provided the good IBS drawing. On the other hand, R3 highlighted that there are challenges in the lack of skilled worker in IBS projects. This situation happens when there is deficient in training for the installation component in site project and this is because the design is not guarantee by vendor.

According to an experienced as a consultant and researcher (R3), R3 believes that there are some financial problems that are rooted from lack readiness before starting the IBS construction project. R3 further explained that:

“The financial problems mostly occurred to new contractor or a small company. This is because, progress payment procedures for IBS project and conventional project is a different. For IBS project, majority of client make payment after seeing the results of its work while the contractor should make a payment to the manufacturer before it. Therefore, for smaller companies, they are difficult to ‘roll’ the capital.” - R3

Respondents also describe that poor communication as a factor that contributes in readiness issues. R3 explained that:

‘IBS become more complicated when there have no standardization for design and mould. In UK, they already set their standards for design and mould in IBS project. Therefore, the architect was easy to make drawing and the drawing can be used for all manufacturers and contractor and technology transfer can also be executed smoothly.’ - R3

The declaration was fully supported by other respondents. When stakeholders have good communication with each other, it will help in term of discussion for standardizing the system in IBS project. The selection of IBS project team members is very important to ensure that they are all competent to share knowledge and capable to successfully complete the project. R1 also explained that mentality of industry player which is they are not willing to change their current practice and want to stay within their comfort zone and continue to use conventional construction methods for their construction project unless there is a request from client to use IBS. So, it was become more challenges when they are not ready to use it.

In addition, R3 pointed that lack of readiness in training for installation of IBS project influence the level of implementation of IBS in Malaysian construction industry. When there are no design guarantees by vendor, most of the contractors are not willing to take a risk because it will be challenging to the contractor to make their own installation. R2 and R3 also highlighted that stakeholder must have readiness to provide the equipment for IBS project before starting the project because one of the problem in industry nowadays is inadequate the equipment for IBS project.

4.2 The Improvement to overcome the problems identified

In term of the initiatives or method to be taken to overcome the issues identified in question 1, the question: “What is the solution to resolving the problem of lack of readiness among IBS industry player?” was asked to identify the type of solutions from different perspectives of multidisciplinary IBS player for overcoming the problem that were identified in question 1.

“One of the solution is should have a proper training to contractor on how to manage IBS project or how to develop the company that use IBS. There is because the better ways to involve IBS project is the owner direct to IBS consultant.” - R1

For the IBS training issues, all respondent are agreed that the proper training should be undertaken for the first step to involve in IBS project. R1 also added the others solution and there is highlighted by R2.

“Awareness of IBS implementation should be before start the project. Usually, the problem readiness happened when the project start with conventional project then after drawing complete, the owner or the contractor want to change the drawing from conventional to IBS. So, that’s why the awareness comes first that follow with the planning.” - R1

On the other side, R2 are pointed that the important of effective government incentive program as a one of the solution and the statement was fully supported by all respondent.
"One of the solutions that maybe should be taken by government is apply the concept of standardization in term of design and product that be used in IBS project. It will make easy to player to ready to implement. Like now, CIDB provide the IBS catalogue in order to make standardization in IBS project. So, the designer will make use of the component of IBS catalogue in their design, the manufactures can produce these components ready stock item in their factory and the contractor will easily obtain the required component during the construction stage. But so far IBS catalogue not widely use in our industry yet so maybe government should focus on this incentive." -R2

On previous declaration, the issue of lack of readiness was contributed to poor communication among stakeholder and R3 comes out with the solution for the problem and the statement also suggested by all respondents.

"To avoid the changes of design of the project, concept of design freeze should be undertaken. The changing conventional design to IBS after get tender is a bad practice because the benefit of IBS only benefit if decision to use it are decided early not during the project, that’s why the concept of design freeze is important in IBS project." -R3

All respondent do believe that government especially CIDB already execute the program to support the industry players to involve in IBS project and get benefit from it but there have some program should be restructure to make it more effective.

"Government introduced may program incentive to industry in order increase the implementation of IBS and the industry player get the benefit of IBS but personally I think there have some program that did not achieved the objective yet. For example the IBS catalogue, the numbers of industry players very low. Maybe government or CIDB should take another step to expand the program because the IBS catalogue is a good incentive to promote the benefit of IBS." -R4

From the interview session, the results showed that the respondents believe that the issue of readiness in the implementation of IBS is one of the important issues and based on their experience in project IBS, they shared a number of factors that affect the lack of readiness among industry players. Table 3 shows a summary of the findings about the factors that cause a lack of readiness in the implementation of IBS.

**Table 2** Factors that cause a lack of readiness in the implementation of IBS

<table>
<thead>
<tr>
<th>Problems/Issues Respondent</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lack of knowledge in design stage</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Lack of expertise consultant in IBS</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>3. Lack of skilled worker</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>4. Financial problem</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>5. Poor communication</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>6. Lack of desire to change current practice</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Lack of training for installation of IBS</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>8. Inadequate the equipment for IBS project</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 3** The improvement to overcome the IBS problem on readiness issues

<table>
<thead>
<tr>
<th>Solution Respondent</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Design freeze</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2. Awareness among Architect</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. IBS training</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>4. Effective Government Incentive</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>5. Standardization</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The findings from the semi-structured interview sessions identified many problems and challenges faced by the IBS players in the IBS design process. The problems that have been highlighted are summarized into two key factors, which are knowledge and ability.

Knowledge

Finding from interview sessions concurred that the all of the respondents agreed that lack of knowledge and expertise of IBS during the design stage are the main factor contribute to lack of readiness in IBS implementation. According to engineer from supplier (R2), all of IBS players must have knowledge of the coordination in IBS project to ensure a good communication among IBS stakeholders and no defects after the installation. This finding also supported by other literature review.

The beginning of a transformation begins with the knowledge because it very important for the success of the transformation. Majority of the construction players in Malaysia have knowledge about IBS (Kamar et al, 2009; Yahya et al, 2012). However, there is still a problem arise which is the lack of knowledge on IBS and it makes the obstacle to IBS implementation (Razak and Awang, 2014). The definition of knowledge from Oxford Dictionary is facts, information and skills acquired through experience or education and the theoretical or practical understanding of a subject. According to Hiatt, J. M. (2006), knowledge was highlighted as first step on understanding how to change, training and education on new skills and the process of learning new tools, behaviours and processes.

Lack of technical knowledge in this area are also challenges that faced by contractor in Malaysia (Hamid et al, 2008; Kamar et al, 2009). Knowledge in technical part and management system is the combination that must fulfil by stakeholders of IBS to make the successful of the implementation. When the stakeholders have knowledge, they have a basic to transform to IBS. Then, they must have capability to make the real transformation.

Ability

The result of the interviews show that of the respondents agree that ability to provide skilled worker, machine and other equipment and training for installation stage is the factor that contribute the readiness among IBS stakeholders. The statement of respondent has supported by previous study.

Most stakeholders adopted appropriate, simple and flexible technologies with low capital investment due to a project-by-project cost strategy. There are no real benefits to implementing the latest construction technologies, without considering their capability and readiness to embrace in it. The limited of technology availability also generally discourage the IBS implementation (Hamid et al, 2008; Kamar et al, 2009). The stakeholders prefer matured technologies which have been proven and technologies which are not heavily dependent on the volume of works. One such option is to adopt flexible and adjustable moulds, a mobile factory and onsite casting (Kamar, 2009).

For this element, the ability of skilled worker is important aspect that should organisation complete in order to ready for the IBS implementation. If to compare the level of skilled worker between conventional construction methods, IBS is more demanding and still lacks of skilled workers in Malaysia (Nawi, 2009). A skilled and well-trained workforce is very critical as IBS method requires new skill sets and talents which are different from the conventional method of construction. The new skills include design, coordination, installation and extensive use of Information Technology (IT). In addition, the IBS specialized skill need the intensive training which requires more time and investment (Thanoon et al. 2003). Based on survey that conducted by Bari et al. (2009), the findings show that contractor's specialized skills, contractor's technical expertise and financial management ability is most of the factors that have significant effects on costs. According to Razak & Awang (2014), financial failure is one of the risk in the IBS implementation process. This shows the readiness of contractor is essential in ensuring the cost of project fulfill the customer needs.

5. CONCLUSIONS

Based on the previous study, it shown that although IBS was introduced in the past almost 40 years ago, there a still have an issues of readiness among stakeholder. To implement IBS successful, industry player should be fully ready and prepare before involve in IBS project. It is to make sure that industry players get benefit from IBS. From the finding in this study, the element knowledge and ability was highlighted as key factors that influence readiness of IBS implementation.

REFERENCE


