

# The Contractors' Perception of the Implementation of Industrialised Building System (IBS) in Malaysia

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**Abstract.** The implementation of Industrialized Building System (IBS) has been identified as a potential solution to perk up almost every significant aspect in the construction industry such as quality, productivity, duration of construction, labour, cost effectiveness, safety and waste production. However despite a series of promotions by the Construction Industry Development Board (CIDB), the implementation of IBS in Malaysia only accounts for approximately 15% of the market share due to several reasons. This study was conducted to identify the perceptions of local contractors towards the implementation and the risks faced in IBS construction projects in Malaysia. The data on the problems and risks of IBS implementation were collected by means of questionnaire survey and interview of G7 contractors around Kedah state. The results showed that contractor competence has been considered to be the most risky factor in IBS construction in Kedah.

## 1 Introduction

The construction industry in Malaysia has been growing rapidly. The need for shorter construction times with limited space, better quality buildings, reduction of on-site labour time and costs, simple construction methods, less wastage of materials, more durability, and more importantly, to have an environmentally intelligent construction technology has led the construction industry to develop new construction systems [1]. Industrialised Building Systems (IBS) is a construction process that utilizes techniques, products, components, or building systems which involve prefabricated components and on-site installation. IBS is capable of producing speedy and high quality products, and using IBS will enable the Malaysian construction industry to compete in the global market [2].

Regardless of the several strategies and steps taken, the market share for IBS in 2003 stood at only 15% (IBS Survey 2003), and this figure has barely changed since then. The early efforts of the government to promote the implementation of IBS in the construction industry has yet to earn a good response and the use of traditional in-situ method of construction seems to be the preferred choice for most people until today. Comparatively, the low labour costs in this country, in particular the ones that involve foreign labour from neighbouring Indonesia, Myanmar, Vietnam and the Indian sub-continent is the root cause of the industry's failure to restructure with many contractors remaining content with the current level of productivity, quality and safety [3].

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IBS Roadmap's mid-term review was conducted in 2007 to evaluate the execution of the IBS roadmap from 2003 to 2010 [4]. Based on the surveys conducted in 2003, 2005, 2008, 2010 and IBS Roadmap's mid-term review in 2007, the preliminary take up for IBS was not as high as predicted at this stage, especially in the private sector. The adoption in some way failed to get private sector buy-in. Small contractors are familiar with the conventional system and have the view that the older technology is appropriate to small scale projects and thus, are not willing to switch to a mechanized based system. This is understandable because small contractors have lower levels of financial support and are not able to set up their own manufacturing plants as it involves capital intensive investment [5]. According to the statistics from CIDB, the number of contractors involved in IBS usage is still low despite action steps in Roadmap 2011-2015 [6]. Based on CIDB statistics, only 6.14% of contractors use IBS in their building projects [7].

Technical and quality problems, that include aesthetic and functional faults like cracks, blemishes, moisture penetration, and poor thermal insulation in completed buildings, are also found in IBS projects [8]. For this reason, there is a need for methodical identification, analysis and evaluation of risk that will contribute to the achievement of projects. The achievement of IBS projects is dependent on the effective and efficient management of the risks involved. This research aims to investigate the perceptions of local contractors towards the implementation and poor reception of IBS systems within the Malaysian Construction Industry.

## 2 Data Collection

Survey research has been used as one of the methodologies for this research. The target population has been restricted to Grade 7 contractors registered under IBS system in Kedah. The respondent population of Grade 7 contractors registered under IBS system in Kedah is 118 in total according to CIDB and IBS Centre statistics. Kedah is chosen because this state would represent regions that are free from the influence of promotional activities from CIDB central office and also free from the much-concentrated existence of IBS manufacturers. The data collection process was carried out by using unstructured interviews and distributing the questionnaire survey. The unstructured interview was conducted with 5 experienced contractors to record their perceptions towards Industrialized Building System (IBS) risks in building projects around Kedah. The questionnaires were distributed to G7 contractors that are registered with Construction Industry Development Board (CIDB) in Industrialized Building System (IBS).

## 3 Results and Discussion

Survey research has been used as one of the methodology for this research. The target population only consists of Grade 7 contractors registered under IBS system in Kedah. Respondents' population of Grade 7 contractors registered under IBS system in Kedah is 118 in total. The data collection process was carried out by using unstructured interviews and distributing the questionnaire survey. The unstructured interview was conducted with 5 experienced contractors to record their perceptions towards Industrialized Building System (IBS) risks in building projects.

### 3.1 Problems in Implementing IBS Project

Figure 1 represents the degree of agreement of elements regarding the implementation of IBS project by the Grade 7 contractors in Kedah. Commonly, the lower adoption of IBS systems is due to having insufficient IBS knowledge, higher initial costs, resistance to change, insufficient personnel in the industry, insufficient IBS manufacturers in the industry and failure of technology transfer. From the findings, insufficient IBS knowledge is categorized as one of the most commonly faced problems by Grade 7 contractors with the mean index of 3.88. This implied that IBS knowledge is still very deficient in design, fabrication and installation work.

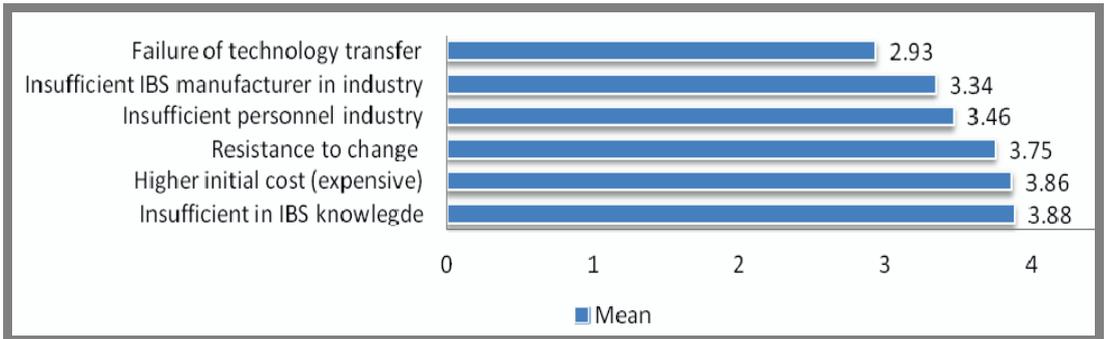


Figure 1: Problems in Implementing IBS Project

### 3.2 Risks in Implementing IBS Project

Figure 2 shows the degree of agreement by Grade 7 contractors regarding the statements related to the IBS risks in their projects. Based on the findings, it is clearly shown that the contractors agreed totally that contractor competence is the most threatening IBS risk in implementing IBS systems in Kedah. This is followed by labour and equipment productivity, defective design, change in work, labour, equipment and material availability, resolving contractual issues, quality of work, change in government regulation, financial failure, site access, safety on site and last but not least, delayed payment. This problem occurred due to a low exposure of IBS knowledge among the installers during the installation work of IBS components where the employees employ workers that do not possess sufficient knowledge of the installation process of IBS components. Failure of technology transfer is the least of the problems faced by Grade 7 contractors in Kedah, which results in a mean index of 2.93. According to these results, technology transfer of IBS systems is not a main factor leading to low implementation of IBS systems.

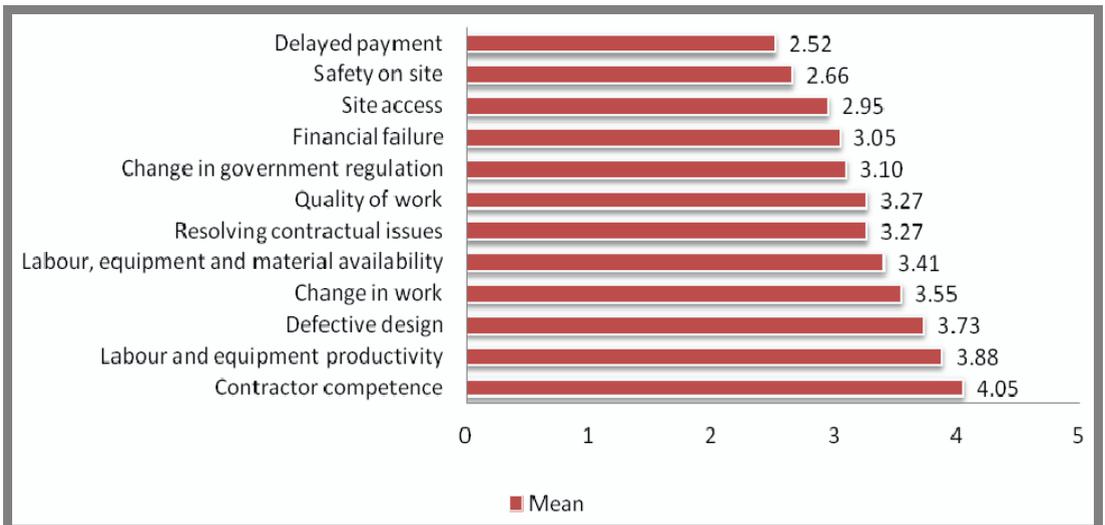


Figure 2: Risks in Implementing IBS Project

Contractor competence in managing the process during the installation of IBS components is the most critical part because most workers involved do not have sufficient knowledge in IBS installation. It will increase the cost if the duration of the installation is prolonged. This problem happens due to the connection and tie problems between the components. This is shown by a total of 4.05 mean

indexes. According to several representatives of the contractor company, they had a problem in searching for skilled workers in IBS systems. Many of the labourers possess only medium knowledge in IBS implementation and finding the system installers is harder to achieve. Hence, the result stated that they have lower productivity in labour and equipment as well as defective in design. The Grade 7 contractors have shown lower agreement towards the risk of delayed payment. Most of the contractors agree that delayed payment is not a main risk in implementing IBS system because most of them have been involved in government IBS projects. If they managed to fulfil the entire requirements while using the IBS system, the government will reward them by making immediate payment.

### 3.3 Suggestions and Comments on the Usage of IBS

Table 1 represents the degree of agreement for elements regarding IBS suggestions suggested by the Grade 7 contractors. From the findings collected, they prefer to promote formation of other suppliers in big numbers to avoid monopolization by certain groups and represents the highest mean index of 4.16 followed by monitoring the standardizations of sizes and shapes of the components (4.11), multiplying R&D centre for IBS (4.05), get more efficient workers trained in IBS (3.96), more efficient education awareness on IBS through courses and seminars (3.93), promote more designers to design in IBS (3.86), more incentives from government to lower the cost using IBS (3.73), make IBS campaigns and seminars as compulsory for contractor, engineer, developer and architect to attend (3.46), the architect design should be made compulsory in accordance to modular coordination (3.41) and lastly make IBS compulsory in the construction business (2.41).

The monopoly of IBS projects is one of the factors responsible for the higher cost of IBS products in Malaysia that consequently make most of the contractors feel reluctant to use IBS system in their projects. The results also show that respondents are strongly opposed to the suggestion that IBS should be made compulsory in construction which indicates a total of 2.41 mean indexes. This result shows that most of the contractors are not ready to use IBS systems in construction work and wish to have the choice to decide on which building system will be more economical for the respective project.

**Table 1.** Suggestions and Comments on the Implementation of IBS

IBS Suggestions	Mean
Promote a lot of formation of other suppliers to avoid monopoly	4.16
Monitor the standardization sizes and shapes of components	4.11
Form many R&D centre for IBS	4.05
More efficient workers training in IBS knowledge	3.96
More efficient education awareness on IBS through courses and seminars	3.93
Promote more designers to design in IBS	3.86
More incentives from government to lower the cost of using IBS	3.73
Make compulsory for contractor, engineer, developer and architect to attend IBS campaigns and seminars	3.46
Make compulsory for architect to design in accordance to modular coordination	3.41
Make IBS compulsory	2.41

Based on the interviews with several professionals in Kedah, they suggested that IBS should be made a compulsory subject for students in the construction industry. By implementing this suggestion, they will know the basics of IBS and will be able to develop it when they become involved in the real construction industry. Some asked to improve the individual joints of IBS components and some wanted a lot of seminars and campaigns to be held to convey detailed information about IBS systems.

## 4 Conclusions

A research survey has been conducted to investigate the perceptions of local contractors towards IBS implementation and risks in Malaysia especially in Kedah. We sought the current view of contractors in Malaysia regarding the impact and the frequency of 12 risks which are; site access, safety on site, quality of work, financial failure, change in work, defective design, change in government regulation, contractor competence, delayed payment, resolving contractual issues, labour and equipment productivity and lastly labour, equipment and material availability are presented in a questionnaire survey. Contractor competence has been considered to be the most significant risk category a contractor could suffer from in IBS construction in Kedah.

Labour and equipment productivity was seated as the second highest risk faced by contractors in Kedah that indicated the workers possessed insufficient IBS knowledge, especially in installation processes. Knowledge in fabrication is also important to avoid creating defective design where this risk is voted as the third highest risk by contractors in Kedah. Hence, monitoring the standardization sizes and shapes of the components is really important to avoid connection problems during the installation process.

The problem regarding higher initial cost in implementing IBS systems needs to be given a lot of attention by promoting the formation of many other suppliers to avoid a monopoly. The monopolization of IBS business is one of the factors responsible for the high cost of IBS products in Malaysia that has resulted in reluctance by most of the contractors to use IBS in their projects. Through this survey, the risks identified in IBS construction projects can be used as a guide for contractors in making better and wiser decisions when dealing with risk management in projects that employ the Industrialized Building System (IBS).

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