

# The Issues and Challenges of Small and Medium-Sized Contractors in Adopting Industrialised Building System

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## Abstract

The construction industry plays an important role in supporting the development of small to medium-sized enterprises (SME) in Malaysia. SME contractors accounted for about 90 per cent while large contractors make up the remaining of only 10 per cent. One of the main issues highlighted by Construction Industry Development Board (CIDB) in Construction Industry Transformation Plan 2016 – 2020 (CITP 2016 – 2020) is regarding SMEs particularly in the issue of the specialisation of SME contractors, especially Bumiputera contractors in the area of Industrialised Building System (IBS) remains low. Thus, an exploratory survey using questionnaires was undertaken with 30 samples of respondents to explore the challenges of SME contractors in adopting IBS in Malaysia. The findings from the study revealed that the low adoption of IBS among SME contractors is due to three (3) main challenges. The main challenges faced by SME contractors in adopting IBS are lack of IBS knowledge, lack of financial backup and clients' preference of conventional method over IBS. The findings will be used for the development of a business model framework for SME contractors (not reported in this paper).

**Keywords:** SME Contractors, Industrialised Building System, Issues and Challenges.

## 1. Introduction

The construction industry plays a significant role in the growth of the Malaysian economy. It is a key economic engine for the overall economy. The performance of the construction industry continues to record a positive growth since the first quarter of 2014 until now. In 2017, the construction industry contributes 4.6 percent to the Malaysian Gross Domestic Product (GDP) [1] and it is expected to increase to 5.5 percent of the GDP in 2020 [2]. The industry is vital in generating wealth and employment for the nation by transforming the government's socio-economic policies into buildings and infrastructures and subsequently improving the quality of life for Malaysians [3]. The employment opportunities provided by this industry is substantial, with estimated number of registered workforce of 1.2 million or equals to almost 10 per cent of the total workforce in the country. The construction industry also contributes significantly to the development of small to medium-sized enterprises (SMEs) in Malaysia [2].

One of the main issues highlighted by CIDB in the Construction Industry Transformation Plan 2016 - 2020 (CITP 2016 – 2020) regarding SMEs is the specialisation of SME contractors especially bumiputera contractors remains low. This can be seen by the number of contractors registered as having expertise in specialist trades in areas that will be in high demand or growth areas in consequence of the projects under the 11<sup>th</sup> Malaysia Plan (RMK11). One of the area mentioned is IBS [2]. IBS is a construction technique in which the components are manufactured in a controlled

environment (on or off site), transported, positioned and assembled into a structure with minimal additional site work [4]. It consists of pre-cast concrete system, steel framing system, timber framing system, block work system, formwork system, and innovative system [5], [6]. IBS can improve quality, productivity and efficiency of the construction project with the use of the factory made product [7]. Other benefits of IBS are; cleaner environment, neater and safer construction sites, less site materials, reduction of site labour, minimal wastage, controlled quality, lower total construction cost and faster project completion [8].

Due to its benefits, IBS has been seriously implemented in government projects, where 70 IBS score for building components must be utilized in public projects worth RM10 million and above as stated in Treasury Circular SPP 07/2008. In private sector, the construction players are encouraged to use IBS where exemption to the Malaysia construction levy is given to contractors that have used 50 IBS score for building components in residential buildings projects [9]. Despite acknowledging its benefits, IBS has an adverse effect on SME contractors' construction business. According to Theong [10] the Implication of IBS on SME contractors can be seen through a reduction in number and types of construction business existing in the market as well as a loss in the amount of business. This is due to the reduction of on-site activities and the number of on-site trades such as carpentry work, bricklaying, bar bending and manual job on-site [7]. Many SME contractors have still not realized the potential effect that IBS can bring to their construction business. However, SME contractors need to move to IBS if they want to sustain their business in the construction industry. In order for them to do this, the SME contractors need to

be guided with a suitable framework. Within the above context, the aim of this paper is to explore the challenges of SME contractors in adopting IBS in the construction industry. This preliminary study is part of an ongoing research on the development of an IBS business model framework for the SME contractors.

## 2. Literature Review

### 2.1. SME Contractors in the Malaysia Construction Industry

SME contractors are at the core of the construction industry in Malaysia and account for about 90 percent of companies undertaking building construction works while large contractors make up the remaining of only 10 per cent [2], [11], [12]. According to CIDB [2] the contractors in Malaysia are divided into grades according to specific sizes measured by the amount of paid up capital and tendering capacity as shown in Table 1. The range of grades are from small contractors (G1-G3) to medium-sized contractors (G4-G5), and up to large contractors (G6-G7). SME contractors in Malaysia are generally defined as contractors within the grades of G1 to G5. SME contractors play an important role as general contractors for small and medium-sized public or private projects and as sub-contractors or trade contractors for large companies [11]. Table 1, shows the contractors' registration grade with CIDB.

**Table 1:** Contractors registration grades

| Grade | Paid-up capital (RM) | Tendering Capacity (RM) | Category                 |
|-------|----------------------|-------------------------|--------------------------|
| G1    | 5,000                | < 200,000               | Small Contractors        |
| G2    | 25,000               | < 500,000               |                          |
| G3    | 50,000               | < 1,000,000             |                          |
| G4    | 150,000              | < 3,000,000             | Medium-Sized Contractors |
| G5    | 250,000              | < 5,000,000             |                          |
| G6    | 500,000              | < 10,000,000            | Large Contractors        |
| G7    | 750,000              | No limit                |                          |

Source: CIDB, Malaysia

SME contractors are synonym with conventional construction method. This method is a common practice in Malaysia construction industry. The conventional construction method is a craft-based construction. It involves in-situ manufacturing of building components and installation of prefabricated elements such as roof trusses, doors and windows, bricks, tiles, etc. [13]. This method is labour intensive which requires many wet trades on-site such as brick workers, plasterers, carpenters etc. The construction process can be hampered by the shortage of skilled labour, bad weather conditions, quality issues, and unfavorable site conditions [14].

Nowadays, IBS is one of the prevalent and growing building technology in both developed and developing countries [15]. In Malaysia, the adoption of IBS has started since 1960's and this technology had become popular in 1998 when the government endorsed an IBS Strategic Plan to guide the total industrialization of the construction industry. Since then, Malaysian Construction Industry was heavily encouraged by CIDB to use IBS [16].

Even though many initiative has been done by CIDB to promote IBS, contractors are still not rapidly practicing IBS [17]. Various factors such as cost, lack of previous experience, increase in project risk and lack of trained professional are the cause of the reluctant to adopt IBS [18]. Moreover, small contractors view IBS as a deterrent and not as an opportunities [9].

### 2.2. The Challenges of SME Contractors in Adopting IBS

Below are the potential challenges that the SME contractors have to face in order to adopt IBS in it construction business.

#### 2.2.1. Lack of knowledge in IBS

According to Kamar et al. [19] the lack of knowledge in IBS construction technology is equally important. Not all contractors could accept the implementation of IBS especially those with less experience in handling IBS projects [16]. The majority of SME contractors especially bumiputera contractors are still not adopting IBS construction method [2]. From the survey conducted by Rahman and Omar [20], it was found that many small contractors are unwilling to adopt IBS in their construction business. They prefer to carry on using the traditional method of construction. The main reason for this is because of they are too familiar and comfortable with the traditional system and for them the technology suits well with small scale projects. Thus, they feel that there is no need to switch to IBS.

#### 2.2.2. Lack of Financial Backup

The adoption of IBS in the construction business requires high capital intensive [21], [22]. Due to this small contractors who has no existing financial backup are not able to set up their own manufacturing plants as it involves very high capital investment [20].

#### 2.2.3. Clients Preferred Conventional Method

Clients are influential in the decisions to use IBS in construction projects [23]. The adoption of IBS in Malaysia is more on client driven [9]. The contractor only use IBS as alternative option, either explicitly or through challenging time and quality requirements, demanded by clients [9]. Many of clients preferred to use conventional method of construction over IBS method.

#### 2.2.4. Limited Number of IBS Suppliers

The limited number of IBS suppliers also hindering the adoption of IBS in Malaysia. As of November 2017 there are a total of 263 suppliers and manufacturers registered with CIDB nationwide [24]. This number is considered low compared to the number of project that are currently being implemented in RMK 11.

#### 2.2.5. Lack of Standardisation and Repetition

CIDB has introduced Modular Coordination (MC) in IBS Roadmap 2003-2010 [4]. The concept allows standardisation in design and building components thus reducing the price of IBS components [5]. The uptake of this concept is not very popular where the designers is not using the standard for the design of building components which make the cost of the building components higher.

#### 2.2.6. Monopolised by Big Player

IBS contractors are part of subsidiaries of larger holding companies in the corporate set-up. These companies will have design and manufacturing subsidiaries located in one roof. The companies usually positioned themselves as "one stop center" and offer a wide range of IBS services to clients. The services are from design, production, and installation [17], [25]. The way these companies run business has created monopoly in the existing IBS market which limits the opportunities of other contractors [9].

#### 2.2.7. Government Policy

The current policy by the government states that IBS must be utilized in public projects worth RM10 million and above [9] and for private project they are encouraged to use IBS [26]. Due to this

reason many SME contractors is still using the traditional method of construction for projects worth 5 million and below.

### 2.2.8. Payment Problem

IBS manufacturer normally require large amount of advance payment before components are delivered to the construction site. Contractors still need to pay the suppliers even though clients delay payment until completion of the construction project [2], [27]. If the payment is delayed means a delay in the components' delivery, which eventually affects the productivity of the construction projects [17].

### 2.2.9. Cheap Labour Cost

IBS can reduce the usage of labour at site [8], [28], this construction method only required few skilled labours to do the assembly work for all the building components at site. The availability and abundance of cheap foreign labour is a priority option for the contractors and it surpasses the use of mechanized system [29]. It is the root of the problem of the slow adoption of IBS in Malaysia [7], [9].

### 2.2.10. High Construction Cost

The most significant barrier restricting the use of IBS for contractors is higher construction cost [7]. The contractors need to employ heavy machineries at site such as lorry for the transportation of building components from factory and crane for the installation of all the building components at site.

## 3. Methodology

The objective of this exploratory survey is to seek the opinion of the construction industry players regarding the issue and challenges of SME contractors in adopting IBS. The survey was conducted in the months of December 2017 to February 2018. A total of 30 companies has taken part in this survey which comprised of SME contractors, large contractors and IBS manufacturers that are registered under the CIDB. The targeted respondents were the company's managing directors and senior managers that can make decisions on the direction of the company. The reason for the selection is to make sure that the data is reliable. A total of thirty (30) usable completed questionnaires were received and analyzed.

The questionnaires consist of three sections, part one is the respondent's background while part two is the challenges of SME contractors in adopting IBS and lastly, part three is for open ended comment. In part two of the questionnaire, 10 items were used to measure the SME contractors' challenges in adopting IBS. All the items were measured with a 5-point Likert-type scale ranging from 1 = strongly disagree, 2 = disagree, 3 = slightly agree, 4 = agree, and 5 = strongly agree. Neutral answer, neither agreed nor disagreed, was avoided to ensure respondents make their stance and show their preference. The analysis of the questionnaires received were done using SPSS version 23. The results are then ranked and tabulated accordingly.

## 4. Results and Findings

Figure 1 shows the types of organization that took part in the exploratory survey. A majority of 50 percent of the respondents were from SME contractors followed by IBS manufacturers (26.7 percent) and large contractors contribute 23.3 percent respectively. Figure 2 illustrates that the majority of the respondents are experienced in IBS construction method with only 23.3 percent of the respondents not having such experience. This data indicates that the answer given by the respondents are reliable.

The Cronbach's alpha obtained in this survey is 0.81, which showed that the result is reliable [30]. Table 2 shows the respondents' view regarding the importance of each challenges based on a five-point Likert scale. Based on the statistical analysis, the mean value for all of the factors were  $\geq 3.0$ , indicating that all of the factors listed are important challenges to the adoption of IBS in the construction business except cheap labour cost and high construction cost. Lack of knowledge in IBS is the most important challenge in IBS adoption, followed by lack of financial backup and clients' preference on conventional method over IBS construction method. The respondents also regarded factors such as high construction cost, availability of cheap foreign labour and government policy as less important.

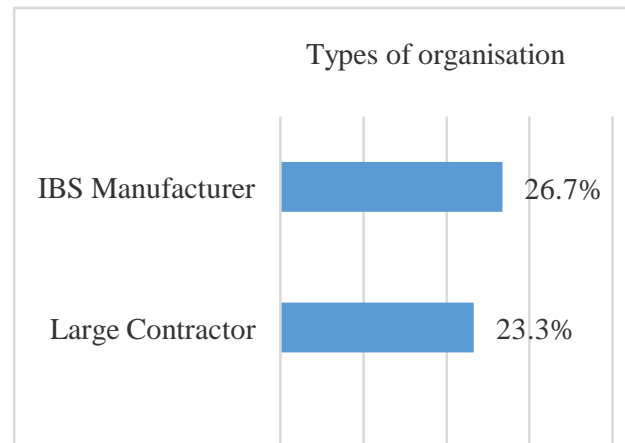


Figure 1: Types of organization participated in the survey.

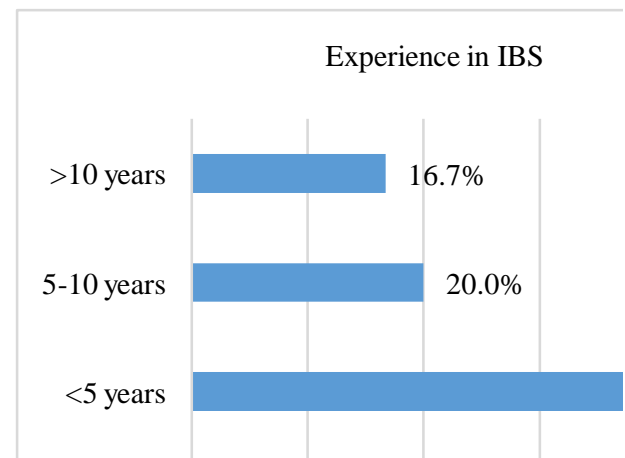


Figure 2: Respondents' experience in IBS method

Table 2: The challenges of SME contractors in adopting IBS – Ranking

| Descriptive statistics                 | N  | Mean | Std. Deviation |
|--|----|------|----------------|
| Lack of knowledge in IBS               | 30 | 3.63 | 0.718          |
| Lack of financial backup               | 30 | 3.57 | 0.858          |
| Clients preferred conventional method  | 30 | 3.43 | 1.104          |
| Limited number of IBS suppliers        | 30 | 3.33 | 0.844          |
| Lack of standardisation and repetition | 30 | 3.27 | 0.980          |
| Monopolised by big player              | 30 | 3.13 | 1.074          |
| Government policy                      | 30 | 3.10 | 1.062          |
| Payment problem                        | 30 | 3.10 | 1.029          |
| Cheap labour cost                      | 30 | 2.97 | 1.033          |
| High construction cost                 | 30 | 2.83 | 0.913          |
| Valid N (List wise)                    | 30 |      |                |

From the data analysis in Table 2, it was found that only Eight (8) challenges are considered important to the SME contractors and for the discussion only three (3) will be discussed. Below are the three (3) main challenges of SME contractors in adopting IBS:-

## 2.1. Lack of knowledge in IBS

SME contractors are only familiar with conventional method of construction as compared to the IBS method. This is caused by lack of knowledge and experience in IBS. This is supported by the study done by Kamal and Flanagan [11] which found that one of the main challenges faced by the Malaysian SME contractors in the construction industry is the ability to absorb new knowledge and technology and to implement it in the construction phase. IBS is considered as a specialist trade. In order to enter into this construction business, SME contractors need to be specialized with additional engineering knowledge required for the SME contractors to design, manufacture and construct the IBS systems. Unfortunately, a majority of the SME contractors do not have such knowledge. For this particular reason SME contractors are still lacking in this area. According to the respondents, SME contractors' especially small contractors have a problem to understand the IBS concept due to minimum point of reference from government technical agencies such as Public Work Department, local authorities etc.

## 2.2. Lack of Financial Back Up

The initial cost for IBS factory setting is considered high. The contractors are required to buy new equipment and invest in machinery, technology and training. The expected investment required for SMEs to adopt IBS is around RM 1.25 million. This amount is considered feasible for SMEs [7]. However, according to the respondents, SME contractors found it difficult to get loans and financial support from the financial institution. In addition, the suppliers do not give credit facilities to the SME contractors especially for new SME contractors.

## 2.3. Clients Preferred Conventional Method of Construction.

The current policy states that IBS is not required for small and medium size projects worth below 10 million but its use is highly encouraged. Due to this reason clients only preferred to use traditional method of construction in their projects. Furthermore, some clients' have a negative perception about IBS. They perceived that the buildings built using IBS are normally associated with low quality buildings, leakages, abandoned projects, unpleasant architectural appearances etc. [20].

## 5. Conclusion

SME contractors are at the core of the Malaysian construction industry. The number of SME contractors are more compared to large contractors. One of the main issues highlighted in CITP 2016 - 2020 is regarding SME contractors. The specialization of SME contractors especially bumiputera contractors in the area of IBS remains low. IBS is one of the prevalent and growing building technology in both developed and developing countries. The study revealed that the issue of low specialization among SME contractors in the area of IBS is due to three (3) main challenges. The challenges of SME contractors in adopting IBS are due to lack of knowledge in IBS, lack of financial back up and client preferred conventional method of construction compare with IBS. From the findings, it is suggested that a business model framework for SME contractors should be developed to overcome the challenges and guide the transformation of conventional SME contractors to IBS. This could help to increase the specialization of SME contractors in the area of IBS as required by the government. With the increase of specialization of IBS among SME contractors, this will increase the capability and capacity of SME contractors in the construction industry.

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