



# Implication of Industrialised Building System (IBS) : The Case of Trade Contractors in Malaysia

Maychuan Theong<sup>1\*</sup>, Rosli Abd Rashid<sup>2</sup>, Changsaar Chai<sup>3</sup>

<sup>1</sup>School of the Built Environment, University Of Reading Malaysia, Iskandar Puteri Johor, Malaysia.

<sup>2</sup>Department of Quantity Surveying, Faculty Of Built Environment, Universiti Teknologi Malaysia, Johor, Malaysia.

<sup>3</sup>Department of Structure and Materials, Faculty Of Civil Engineering, Universiti Teknologi Malaysia, Johor, Malaysia.

\*Corresponding Author E-Mail: [T.M.Chuan@Reading.Edu.My](mailto:T.M.Chuan@Reading.Edu.My)

## Abstract

To further enhance the efficiency, capacity and capability of the Malaysian construction industry, the government has been aggressively championing the use of Industrialised Building System (IBS). However, several studies have pointed out that the trade contractors are very concern with the increasing use of IBS in the country because it will reduce their business opportunities. Therefore, the research is dedicated to address issues faced by the trade contractors with the adoption of IBS. The objectives of this paper are to uncover the impact of IBS to the trade contractors and to suggest solutions to address issues faced by the trade contractors with the implementation of IBS. A fundamental of the methodology is to adopt multiple case studies approach. These projects adopted both conventional and IBS construction method. A number of 8 projects were selected. Interview sessions are conducted with trade and main contractors. Collected data is then modelled by using the combination of fuzzy theory set and simple multi-attribute rating technique. Main contractors' input on several success factors that lead to the penetration of trade contractors in IBS is evaluated. Some degree of involvement of trade contractors in IBS projects is recommended. It is significant for the trade contractors to obtain skills for IBS approach besides their existing crafts. Furthermore, the trade contractors are suggested to register themselves as IBS components installer as this does not involve high investment capital or they can join the other companies to increase their technical and financial capacity. These findings will inform on numerous policy initiatives to manage the business sustainability of the domestic trade contractors, to improve construction methods, then to modernise and upgrade the construction industry within the country.

**Keywords:** Fuzzy Theory; Industrialised Building System; SMART; Trade contractors

## 1. Introduction

The use of the traditional or "wet" construction method has often been beleaguered by poor workmanship, late completion, time and cost overrun, unfavorable site condition, significant material wastage, lack of data and information, low technology usage, shortage of skilled labour and frequent work interruptions due to bad weather conditions (1-6).

As an effort to further improve the efficiency, capacity and capability of the industry as well as addressing the many problems inherent in the industry, the government, through the Construction Industry Development Board (7), has embarked on a policy and programme to increase the use of Industrialised Building System (IBS) for project development in the country. It is hoped that IBS will provide the Malaysian construction community more efficient, better quality, faster, cleaner, economic and least labour method of construction.

Currently, there is a wide range of definitions in relation to IBS. There is no a publicly agreed definition on IBS which elaborates this construction method (8). According to Mohammad Abedi, M. S. Fathi (8), most supply chain parties, project stakeholders, practitioners, researchers and government in the Malaysian construction industry recognized IBS as prefabrication and industrialization.

Inevitably, initiatives taken by the government to promote a greater use of IBS in the country by committing to develop all its

schools, hospitals and quarters projects using IBS is a novel and commendable move. However, the move has led to a change in the construction activities and the players involved. Zawawi (9) highlighted the increase use of IBS will have significant implication of the small and medium sized contractors. The researcher mentioned that the use of IBS reduces much of the craft works such as concreting, plastering, bar bending, etc. Stressed by CIDB Chief executive, Datuk Seri Dr Judin Abdul Karim, the adoption of IBS reduces trade works as all the casting works of components are executed in the factories and only assembly of finished products will be performed on site (10).

Besides, Lim (11) pointed out that the small and medium sized contractors and suppliers are concerned that their existing business will be replaced by large scaled firms and construction-related factories. This is because these indigenous construction companies are mostly small in size and lacking the technological managerial capacity and capability as well as confidence, motivation, long term aspirations, etc (12). Furthermore, Abd. Rahman and Omar (13) pointed out that many small contractors are reluctant to adopt IBS method. They prefer using the conventional method of construction which most of them are more familiar with and well suited for small scale projects. This problem is highlighted again by Zakaria, G. Brewer (14) that local contractors, particularly the trade contractors who are less innovative prefer conventional construction method rather than shifting to IBS since they are not motivated by cost factors.

This issue was discussed by a number of researchers in the recent years because almost 90% of the contractors in Malaysia are made of the small and medium sized craft or trade based contractors. They depend much of their business working as work as sub-contractors for large conventional building works. Therefore, this study intends to reveal the impact of IBS to the trade contractors and to suggest solutions to address issues faced by the trade contractors with the implementation of IBS.

## 2. Literature Review

### 2.1. Industrialised Building System

Many authors linked IBS to industrialization because the system comprises of the building components that are mass produced in the factory under strict quality control or at site with minimal site activities, transported and assembled into a structure (15-18). Abdullah and Egbu (19) defined IBS as a method of construction developed based on the level on industrialization with human investment in innovation. In the meantime, CIDB (7) clarified that IBS is not limited to building but covering all types of construction structures. It defined IBS as a construction system involves manufacturing of components in a factory, on or off site, positioning and assembling into a structure with minimal site works. The board considers a project as an IBS project when the usage of IBS content reaches 70% for government building and 50% private sector building.

### 2.2. Trade Contractors: Their Capability and Capacity

It is common for the general contractors to sublet most of the works to other contractors who specialized in the respective work disciplines as they do not carry out all the works when construction projects are awarded. Generally, each construction project engages trade contractors by the main contractor in order to complete the specialized works. Approximately 75% of the project value is constructed with the help of trade contractors and suppliers (20). Even on a moderate sized project, it is common to have 20 and sometimes as many as 40 to 50 specialty contractors for large projects (21), each performing its respective trade.

As defined, trade contractors are referred to organisations or companies that subcontract their specialized trade in construction projects. They are often referred to as subcontractors due to their sub contractual relationship to the main or general contractors (22).

According to Tieder and Cox (21), Dubois and Gadde (20) and Thomas and Flynn (23), almost all trade contractors are operating small sized business while only minority of them are capable to run medium sized business. Generally, these trade contractors establish small or medium sized firms to subcontract partial of a construction project from the large sized contractor, but not the project client. This can also be seen in the structure of the Malaysian construction industry. All trade contractors are registered as small or medium sized contractors with CIDB.

Yik and Lai (24) viewed trade contractors as generally small in size and do not sufficiently equipped, technically and financially to bid for a contract work from the project clients. They take part in specific areas of a construction work within their limited capacity. The authors further commented that most tradesmen are unable to perform tasks outside their trade and it is rare with workers with multi-skills across trades in the construction industry. Small contractors are generally underfinanced (25). They have limited capital available for investment in technology which this investment normally has to compete with other demands on capital. At most of the time, although the managements are convinced of the benefits of the innovated methods, they may not be able to afford a highly priced fully functioning system. Financial issues become the main obstacle for small contractors to move forward to embrace innovated method of construction because they are lack financial backup and are not able to set up their own manufacturing plants as it involves very intensive capital investment (13).

Since the main business of these contractors have been doing work on traditional buildings costing between RM100,000.00 to RM3,000,000.00, they would not have the financial capacity and capability to venture into IBS construction. As pointed out by Mohamad Kamar, A.H. Zuhairi (26) these contractors have less financial backup to set up their own manufacturing plants.

According to Cheng, Leu (27), small construction companies have less adequate management skills, so they are incapable to secure large scale projects as these projects involve management of many areas, including resources, finance and safety. Owners tend to manage their businesses themselves as a measure of reducing operational costs. Some of them employ family members simply because of kinship relations but these have turned out to be ineffective working environment. In some cases, business funds were put to personal use and thus used in settling domestic issues (28). This has a negative impact on profitability and sustainability, then lead to difficulties in obtaining credit facilities.

Besides, trade contractors have limited personnel in terms of both availabilities and abilities (25). They normally employ very limited number of employees due to small amount of projects bid (28). Because of unaffordability to hire proficient personnel, so their employees possess limited abilities, particularly sophisticated skills. Mohamad Kamar, A.H. Zuhairi (26) also agreed that the trade contractors are also lacking of knowledge in structural analysis and design of pre-fabricated components and to undertake the producing and assembling of pre-fabricated building elements and components.

Due to inadequate in capability and capacity, the trade contractors are unable to respond quickly to the changes in the industry. They are limited to the conventional way of working. Lack of abilities financially and technically results in the reluctance to change to adopt new or innovative method of construction.

### 2.3. Success Factors of Trade Contractors in IBS Market

In order to be competitive in the volatile and dynamic construction market, local players are recommended by Siti Mazzuana, Rozana (29) to shift their paradigm from conventional construction to IBS. Trade contractors need to apply a set of success factors that are different from the main contractors (30). Through deliberate review of literatures, a set of dimensions that could assist IBS adoption by the trade contractors is discussed as follows.

#### 2.3.1. Market Condition

It is important for the trade contractors to understand the market situation and their position in the market to increase the chances of success in securing new jobs. Ng and Skitmore (31) and Tang (32) realized that businesses that possess high reputation are capable of maintaining a high quality performance and gain greater chance to sustain in the construction market. (33) further commented that market conditions provides ample business opportunities to the construction players but poor market knocks down contractors with bad performance or poor financial status.

#### 2.3.2. Resources

One of the reasons for the main contractors to sublet works to the trade contractors is due to insufficient resources such as equipment and human resources. Managing resource effectively and accurate planning to ensure smooth implementation of works improve a project delivery time by 45% and also save up on project cost by 7% (34, 35). Therefore, performance and price of the machineries or equipment and labours employed need to be handled in the most efficient and economical way. Trade contractors have to understand the project goals and specifications in order to contribute effectively to the projects.

### 2.3.3. Adaptability to change

Ng, Tang (33) acknowledged that ability to adapt to changes is one of the critical success factors for the trade contractors. Mason (36) commented that the construction industry is slow in adapting to change, especially at the subcontractor level. Currently, the construction industry is moving towards industrialization and hence, it relies immensely on the technology or methodology used. As a result, many tall and sophisticated mega projects are carried out and these require improved skills and resources to ensure better quality, cost and completion time. Pullig and Chawla (37) postulated that companies that are eager to adopt new technologies have higher opportunities to sustain and develop their business in the increasingly competitive environment.

### 2.3.4. Financial performance

Cash flow represents the financial indicator for the construction companies. Any delay in payment from the main contractor or client creates cash flow bottleneck to the trade contractors as the costs of owning and operating equipment and labour wages are significant parts of their business. According to Ng and Tang (30), it is important for the contractors to maintain a positive cash flow of settling liabilities, especially when they are ready to venture into new methodologies in construction. Healthy financial track record enables the construction companies to purchase up-to-date equipment and improve skills in a specific trade to expand their business matching the current development of the industry.

### 2.3.5. Relationships

Shaikh (38) pointed out that relationship plays a predominant role in construction projects. Kumaraswamy and Matthews (39) emphasized on the relationship between trade contractors and main contractors or consultants for cost reduction purpose while Ng and Tang (30) focused on that with other project participants in order to improve work performance. With extensive trade contractors on site, the number of specialized labours and equipment is large. Therefore, the authors viewed that the quality of construction works is affected directly by the skills of the trade contractors.

## 3. Methodology

Literature review and case study are the fundamental data collection techniques for the purpose of the study. The research focuses on the literatures in three folds. They are construction technology options, i.e. IBS construction method; characteristics of trade contractors and success factors for trade contractors in IBS market. On the other hand, in depth inquiry is made to the trade contractors and main contractors through interview sessions.

(Simons (40)) and Swanborn (41) referred case study research as a process of conducting systematic and critical inquiry into a phenomenon and generating understanding to contribute to the public knowledge. It is a common research method that allows researchers to investigate real-life events of a system (the case) or a few systems (the cases), such as individual or group behaviours, organizational process, industry change, etc (41-43). Similarly, (Yin (44)) viewed a case study research as an empirical inquiry that investigates a contemporary phenomenon in-depth. It is also useful in exploratory research to understand existing phenomena for comparison and to study the effects of change or innovations (45). Main focus of the study is effect of the shift in the method of construction from traditional to innovated approach. The shift is complex for the construction industry as it involves changes in activities, processes, entities and their interrelationships. Therefore, case study data collection method is appropriate to unveil these changes. For the purpose of this research, a total of 8 cases are identified and the required data is collected. As confirmed by several authors (40, 41, 44, 45), interview methods are most commonly used in case study research to facilitate in-depth analysis and understanding.

Hence, structured interviews are taken place with 23 trade contractors that are involved in the 8 cases and they were interviewed face-to-face. A set of open-ended questions were asked to the participants in relation to the impact of IBS on the trade contractors. Besides asking questions revolving the number, type and amount of business affected, it also involves an independent examination of the nature of the organizations by the researcher, so that they could be grouped and analysed further. Data acquired from this group of respondents facilitates the suggestion for the trade contractors in selecting the construction method.

The research adopts Fuzzy Set Theory and Simple Multi-Attribute Rating Technique (SMART) for data analysis purpose as a number of researchers adopted these as tools in problem solving research that relates to the selection of construction method alternatives. Membership function, linguistic responses from the interview sessions, fuzzy integrals, and fuzzy weighted sum are main concepts of fuzzy set theory ((46, 47). Its strength in describing linguistic statements with numerical values allows model handling some concepts that are meaningful but cannot be clearly defined (46). For this study, let  $a_j$  be the fuzzy number (weight) assigned to an alternative  $A_i$  by the trade contractors (TC) for the criterion  $C_j$ , then the average of fuzzy numbers across all the TC can be expressed as

$$A_i = (1/t) \times (a_1 + a_2 + \dots + a_j) \text{ for } j = 1, 2, \dots, t \quad (\text{Equation 1})$$

where  $t$  represents the numbers of trade contractors in the interview session.

Alternative  $A_i$  with the rating of the criteria  $C_j$  to be measured can be represented in matrix form as

$$A_i = \begin{pmatrix} X_{11} & X_{12} & \dots & X_{1n} \\ X_{21} & X_{22} & \dots & X_{2n} \\ X_{31} & X_{32} & \dots & X_{3n} \end{pmatrix}$$

where  $x_{ij}$  represents the rating or score with respect to criterion  $C_j$ .

To obtain the weight,  $W_j$  of criterion  $C_j$ , defuzzification that produces a crisp value to represent the degree of satisfaction of the aggregated fuzzy number is expressed by

$$W_j = (x_1 + x_2 + \dots + x_n) / n \quad (2)$$

According to Cheng, Leu (27), SMART can be used to quickly obtain a total weighted score, which is represented by

$$P = \sum_{j=1}^{12} W_j u_j \quad (3)$$

where  $P$  is the total weighted score;  $w_j$  is the weight of the criterion  $C_j$ ; and  $u_j$  is the value of the criterion assigned by participants. For the purpose of this study, the value,  $u_j$ , is ranged from 1 – not important at all to 3 – average to 5 – very important.

If the total weighted score is less than a set threshold value ( $< \alpha$ ), then the suggestion for the trade contractors is not to adopt IBS. If the score is equal or higher than the value ( $\geq \alpha$ ), then the trade contractors are suggested to not only carrying out their existing trade works, but also to learn and adopt IBS method of construction. With 4 criteria to be evaluated ( $C_1$  to  $C_4$ ) and a fuzzy set value ranged from 0 to 1, the threshold value  $\alpha$  was determined to be 6.0. Ways to determination of the threshold value  $\alpha$  can be found in Chen, Okudan (48), after evaluating several completed prefabricated buildings based on pre-screening attributes and a consensus of industry members who had rich experiences in construction method selection processes.

This is then followed by interviewing 8 main contractors who are involved in the same project cases for validation purpose. Enquiries are made to the main contractors for the solutions to mitigate issues faced by the trade contractors. Prior to the interviews, a list of success factors for the trade contractors to enter the IBS market is identified through literature review. During the structured interview sessions carried out with the main contractors, they are requested to respond to the listed success factors in relation to the

trade contractors' capability and then, provide their views about participation of trade contractors in IBS projects.

### 4. Results and Findings

In this section, views of 23 trade contractors and suggestions from 8 main contractors of 8 cases were reported. Responses of the trade contractors about implication of IBS to their business are used as a basis to assist in the construction method selection. Using a combination of Fuzzy Set Theory and Simple Multi-attribute Rating Technique (SMART), the selection of either to remain the traditional construction method or to adopt IBS method is determined. On the other hand, responses from the main contractors anchor the quantitative results obtained from the trade contractors.

### 4.1. Responses from the Trade Contractors

On the whole, all trade contractors agreed that the adoption of IBS will have implications to their existing operations. According to them, the needs of some conventional wet trades are reduced with the increase use of IBS in the local construction industry. As a result, business volume of the related trades is affected.

Based on the qualitative answers responded by the 23 trade contractors during interview sessions, Table 1 shows fuzzy numbers for each linguistic variable while Table 2 indicates the value and ranking of each criterion defined by the trade contractors (TC) based on Table 1. Besides responding the degree of implication of IBS to the trade contractors, other linguistic variables include number, types and amount of business affected are also included. Fuzzy set numbers are classified based on 3 categories, i.e. high, medium and low.

Table 1: Fuzzy numbers for linguistic variables

Implication Degree (C <sub>1</sub> )	Number of projects affected (C <sub>2</sub> )	Number of trades affected (C <sub>3</sub> )	Percentage of business loss (C <sub>4</sub> )	Fuzzy Number
Low (L)	less than 2	1	less than 35%	(0.0, 0.1, 0.2, 0.3)
Medium (M)	2 to 5	2	at least 35% but less than 70%	(0.3, 0.4, 0.5, 0.6)
High (H)	more than 5	3	70% and above	(0.7, 0.8, 0.9, 1.0)

Table 2: Value and ranking of criteria

Criteria	Median, U <sub>j</sub>	TC1	TC2	TC3	TC4	TC5	TC6	TC7	TC8	TC9	TC10	TC11	TC12
C <sub>1</sub>	5	H	M	H	L	L	L	H	M	L	H	H	H
C <sub>2</sub>	3	H	L	H	L	L	L	H	M	L	H	H	H
C <sub>3</sub>	2	M	L	L	L	L	L	L	L	L	H	M	M
C <sub>4</sub>	5	H	M	H	L	L	L	H	M	L	H	H	H

Criteria	Median, U <sub>j</sub>	TC13	TC14	TC15	TC16	TC17	TC18	TC19	TC20	TC21	TC22	TC23
C <sub>1</sub>	5	H	M	L	M	M	M	H	L	M	M	L
C <sub>2</sub>	3	H	M	L	L	M	M	M	M	L	M	L
C <sub>3</sub>	2	M	M	L	L	L	L	L	L	L	M	L
C <sub>4</sub>	5	H	M	L	M	M	M	H	L	M	M	L

Based on Table 1 and Table 2, fuzzy matrix for the implication of IBS to the trade contractors is established as shown in Matrix 1 in the Appendix.

Applying Equation (1), the average fuzzy score matrix for each criteria is obtained as follows:

$$A = \begin{pmatrix} 0.348 & 0.448 & 0.548 & 0.648 \\ 0.304 & 0.404 & 0.504 & 0.604 \\ 0.109 & 0.209 & 0.309 & 0.409 \\ 0.348 & 0.448 & 0.548 & 0.648 \end{pmatrix}$$

The average fuzzy score matrix is applied into Equation (2) and hence, the weightage of each criteria, W<sub>j</sub> is shown as:

- C1 = 0.498
- C2 = 0.454
- C3 = 0.259
- C4 = 0.498

By applying Equation (3), P, or total weighted score is obtained as 6.86. This value is greater than the threshold value fixed as mentioned (α = 6.0), hence suggesting that the trade contractors have to acquire skills and knowledge to adopt IBS in order to sustain in the construction industry.

### 4.2. Responses from the Main Contractors

Basically, the main contractors observed the necessity of hiring trade contractors in their future projects. All of them indicated that traditional working method has not been completely eliminated from the IBS supply chain. There are works that require the traditional trade contractors, subject to the requirement of the project. The respondents indicated that trade contractors play significant role in any construction project even though majority of the works

are to be completed by using IBS method. With this, further detailed suggestions are acquired on success factors for the trade contractors in IBS market.

Findings indicated that the engaged the trade contracting companies are not new in the construction industry. They are the existing construction companies that have established long term relationship with the main contractors. All main contractors hire trade contractors with more than 5 years experiences. Definitely, the initial set up of the businesses were not focusing on IBS business.

Interviewed main contractors are neutral that the trade contractors remain in the IBS market as a private limited company by either continuing their original operation mode or permuting to undertake new works by using IBS method. Many trade contractors are still required in the construction site for a portion of 'wet' trades that are essential in the completion of a project. Due to limited resources available, they are unable to undertake a large portion of the IBS scope of work because of high initial cost. However, they are able to sustain themselves in sub-contracting works from the G7 main contractors.

With the implementation of IBS in the construction industry, the trade contractors remain as business entities that provide labour and skills in completing tasks stated in the subcontract. They enter the IBS market either by continuing their existing core business or shifting to adapt the new technology. According to the one of the main contractors, these traditional tradesmen are highly required in the site for specific activities that are needed to complement the IBS components that are installed. A respondent described that the trade contractors are described as skilled employees who employ semi-skill workers.

In terms of mode of operation, the trade contractors are observed as not a user of technology. They only undertake job scope within their core business area. So, the existing trade contractors are suggested to enter into IBS market by continuing providing their services in their areas traditionally. On the other hand, trade contractors that permute to adapt to new technologies are not only cover-

ing their original traditional scope of work, but also offering IBS method of construction. A main contractor commended its traditional brick laying trade contractor for his willingness to learn new method of construction. This can be evidenced by the erection of block walls by a traditional trade contractor with supervision and guidance provided. All respondents agreed that the trade contractors should adapt and offer wider scope of services in their operations so that they will not be left out on very thin profit in future.

Resources of the trade contractors are insufficient to plan for investment and embrace the production of IBS components. All respondents commented that huge amount of initial capital is needed to invest in the production of IBS components. As a result, the small and inexperienced trade contractors refused embrace IBS method of construction. However, they are able to sustain themselves financially and technically with their core business, i.e. to provide workmanship for the construction activities. The main contractors responded that they do not need to worry about their long term relationships with the trade contractors as they have the capability to hire and pay the qualified workers. Half of the participants suggested the small sized contracting companies to join or integrate to increase their business capabilities.

All of them agreed that the trade contractors need to keep abreast with the updated technology that can enhance the productivity and quality of work as they are not aware or keen to change their working method. They are suggested to undertake several courses organized by CIDB or to update themselves with the IBS installation skills from the installers. Most of the respondents suggested that the existing trade contractors to register themselves as a certified components installer. This enables the companies to accelerate their learning curve and leads to more business opportunities. The main contractors view that they do not need to hire more sub-contractors if the existing ones are equipped with both conventional and IBS skills of construction.

In addition, a small number of the main contractors recommended the trade contractors to switch into manufacturing field to manufacture small sized prefabricated components. They suggested that flexible bank loan or attractive financial package can be offered to the trade contractors by the government. One of the participants expressed his willingness to join with trade contractors to be a component manufacturer.

## 5. Conclusion

Improvement and industrialization process lead to the advancement of technology followed by changes in business structure and the supply chain within market. In the Malaysian context, the significance of IBS to the construction industry is incontrovertible with the mandatory instructions and urges by the government. However, some researchers argued that IBS causes a paradigm shift to the construction players in a construction supply chain. The existing construction companies are currently being challenged to adapt to change to IBS method of construction. In short, the trade contractors who are less innovative and used to carry out trade works at the construction site are undeniably affected by the change in method of construction. Aside from the technical and social implications of IBS which have been studied widely by others, the study focuses on the implications of IBS from the business perspective.

Analysis of the case studies and interviews indicated that implementation of IBS affects the trade contractors' businesses. As a whole, almost identical number of trade contractors has responded that IBS has high, medium and low implication respectively. The degree of implication is subjected to the trade works performed by the trade contractors and their readiness to involve in IBS projects. Higher degree of implication is observed on the major traditional trades, such as carpentry work while a lower degree of implication occurs in finishing works to the structures. Involvement of trade contractors is not entirely eliminated when IBS is adopted. They enter the IBS market by operating as existing businesses or they alter to also undertake works that require IBS method of construction.

Some degree of involvement of trade contractors in IBS projects are suggested based on the threshold value set earlier by comparing the established matrix score with the data collected from the trade contractors. This is then agreed by a group of 8 main contractors who are interviewed. A set of success factors needed for the trade contractors in IBS market is identified via literature review and the main contractors were asked to provide opinion. Overall, the main contractors abide that it is significant for the trade contractors to obtain skills for IBS method besides their existing crafts. Furthermore, the trade contractors are suggested to register themselves as IBS components installer as this does not involve high investment capital or they can join the other companies to increase their technical and financial capacity.

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## Appendix

**Matrix 1:** Fuzzy matrix for the implication of IBS to the trade contractors

	(0,7,0,8 0,9,1,0)	(0,3,0,4 0,5,0,6)	(0,7,0,8 0,9,1,0)	(0,0,0,1 0,2,0,3)	(0,0,0,1 0,2,0,3)	(0,0,0,1 0,2,0,3)	(0,7,0,8 0,9,1,0)	(0,3,0,4 0,5,0,6)	(0,0,0,1 0,2,0,3)	(0,7,0,8 0,9,1,0)	(0,7,0,8 0,9,1,0)	(0,7,0,8 0,9,1,0)	(0,7,0,8 0,9,1,0)	(0,3,0,4 0,5,0,6)	(0,0,0,1 0,2,0,3)	(0,3,0,4 0,5,0,6)	(0,3,0,4 0,5,0,6)	(0,7,0,8 0,9,1,0)	(0,0,0,1 0,2,0,3)	(0,3,0,4 0,5,0,6)	(0,3,0,4 0,5,0,6)	(0,0,0,1 0,2,0,3)	(0,3,0,4 0,5,0,6)	(0,3,0,4 0,5,0,6)	(0,0,0,1 0,2,0,3)
A =	(0,7,0,8 0,9,1,0)	(0,0,0,1 0,2,0,3)	(0,7,0,8 0,9,1,0)	(0,0,0,1 0,2,0,3)	(0,0,0,1 0,2,0,3)	(0,0,0,1 0,2,0,3)	(0,7,0,8 0,9,1,0)	(0,3,0,4 0,5,0,6)	(0,0,0,1 0,2,0,3)	(0,7,0,8 0,9,1,0)	(0,7,0,8 0,9,1,0)	(0,7,0,8 0,9,1,0)	(0,7,0,8 0,9,1,0)	(0,3,0,4 0,5,0,6)	(0,0,0,1 0,2,0,3)	(0,3,0,4 0,5,0,6)	(0,3,0,4 0,5,0,6)	(0,7,0,8 0,9,1,0)	(0,0,0,1 0,2,0,3)	(0,3,0,4 0,5,0,6)	(0,3,0,4 0,5,0,6)	(0,0,0,1 0,2,0,3)	(0,3,0,4 0,5,0,6)	(0,3,0,4 0,5,0,6)	(0,0,0,1 0,2,0,3)
	(0,7,0,8 0,9,1,0)	(0,3,0,4 0,5,0,6)	(0,0,0,1 0,2,0,3)	(0,0,0,1 0,2,0,3)	(0,0,0,1 0,2,0,3)	(0,0,0,1 0,2,0,3)	(0,7,0,8 0,9,1,0)	(0,3,0,4 0,5,0,6)	(0,0,0,1 0,2,0,3)	(0,7,0,8 0,9,1,0)	(0,7,0,8 0,9,1,0)	(0,7,0,8 0,9,1,0)	(0,7,0,8 0,9,1,0)	(0,3,0,4 0,5,0,6)	(0,0,0,1 0,2,0,3)	(0,3,0,4 0,5,0,6)	(0,3,0,4 0,5,0,6)	(0,7,0,8 0,9,1,0)	(0,0,0,1 0,2,0,3)	(0,3,0,4 0,5,0,6)	(0,3,0,4 0,5,0,6)	(0,0,0,1 0,2,0,3)	(0,3,0,4 0,5,0,6)	(0,3,0,4 0,5,0,6)	(0,0,0,1 0,2,0,3)