Pertinent Internal and External Issues in Industrialised Building System (IBS) Construction Business in Malaysia

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ABSTRACT

Industrialised Building System (IBS) construction business has emerged as one of the potential business ventures as the Malaysian construction industry is in a constant need to shift from conventional method of construction to IBS adoption aligning to Construction 4.0 Strategic Plan 2021-2025 and The National Entrepreneurship Policy 2030 (NEP 2030). In line with boosting the IBS implementation, a brief exploratory study has been conducted to validate several IBS construction business issues among IBS contractors in Malaysia, internally and externally. From selected online databases such as Google Scholar, Scopus and Web of Science, 397 articles were extracted from the "Industrialised Building System (IBS) Issues in Malaysia" keywords. A set of semi-structured questionnaires was developed and pre-tested before flowing it to 25 respondents from different backgrounds in construction business related to IBS. Internally, it is discovered that the easy access to cheap labours, substantial start-up capital and ineffective IBS knowledge transfer among construction players are internal challenges that IBS contractors must endure. Concurrently discovered, IBS contractors are externally challenged by heavy Chinese-led and big boys construction project monopoly, government's weak push for IBS technology, securing smooth payment delivery, and the unstable political climate in the Malaysian political scenarios. This paper aims to validate and outreach the challenges IBS contractors face internally and externally to strategize the business plan systematically.

***Keywords**: Industrialized Building System (IBS), Issues in IBS Construction Business, Construction Business Issues, IBS Issues, Exploratory Study*

INTRODUCTION

Regardless of being the critical harbingers of economic growth, the construction industry helped to catalyse the other sectors; it still lingers by various issues that affect its overall business performance. Responding to this, the Malaysian construction industry needs improvement by introducing the Industrialised Building System (IBS). Although IBS has been submitted and mooted into the Malaysian construction industry since the 1960s, IBS is still unfavourable as the construction method is glued to various issues. The contractors' inability to leap from the conventional approach is a significant setback despite the advantages of the IBS technology being various in every aspect. From the previous studies, huge attention has been given to the issues towards the technicality of the IBS implementation (Yunus & Yang, 2012) and the IBS adoption strategy in the Malaysian construction industry, apart from discussing the general issues in the Malaysian construction industry. This scenario provides limited scrutiny to the IBS construction business issues in the Malaysian construction industry. Hence, this paper aims to peel the challenges face by the contractors; internally and externally and get better insights on matters that affecting the IBS construction business.

MALAYSIAN CONSTRUCTION INDUSTRY

The construction industry contributed to Malaysian's Gross Domestic Product (GDP), and the track record has been excellent as one of the significant industries that affect other sectors like the manufacturing and transportation industry. The construction industry has been the backbone of the national income for catering to the housing and commercial building demand to boost the economy apart from infrastructure construction. This industry plays a huge role in developing a nation, and it keeps striving to positively influence many sectors aligned to Industry Revolution 4.0 (IR 4.0).

As a significant domain in catalysing the economic sector, the construction industry needs constant advancement in the construction technology field (Rafee, 2021) to keep up with IR 4.0 and detangle numerous issues such as high construction costs (Ramli et al., 2016), productivity degradation (Alaloul et al., 2021), delay in delivering the project (Zidane & Andersen, 2018), poor quality of work done due to project complexity (Janipha & Ismail, 2013), mismatch of supply and demand (Tobi et al., 2020), various payment issues (Dzulkalnine et al., 2018) and many more.

INDUSTRIALISED BUILDING SYSTEM (IBS) CONSTRUCTION IN MALAYSIA

The introduction of IBS technology in the 1960s is anticipated to replace the conventional method, which has known to be a dirty, dangerous and difficult (Hadi et al., 2017). IBS is first experimented to cater to the housing demand such as Pekeliling Flats, Rifle Range Flats, and various more using numerous systems adopted from other countries like Germany, Japan, Dutch and United Kingdom (Al-Aidrous et al., 2021). The penetration of IBS in the Malaysian construction industry is well aligned to IR 4.0 and has gained a tremendous increase in research and practice; as it has various advantages such as faster project delivery, reduced amount of construction wastage at the site, fewer workers usage, minimize the total cost of construction (Dzulkalnine et al., 2018; Zairul, 2021)

However, despite countless advantages of IBS adoption; the adoption rate is still low due to the resistance to change from the conventional method, lack of technology transfer, limited feasibility study of IBS application (Kamar et al., 2009) and the failure of early closed-fabricated systems (Din et al., 2012) of where Kamar et al. (2012) concluded that the system was unsuitable with Malaysia's climate and social practise. A study conducted by Al-Aidrous et al., (2021), supports that the western system adopted has neglected the element of culture and climate that resulted in poor implementation of prefabrication industrialised construction and eventually caused the implementation to be somewhat unfavourable. The failure of IBS; although the construction players are open to the idea of the adoption (Mohamad et al., 2016), they are still opting for the conventional method of construction instead and are resistant to change (Mohamad et al., 2016) due to poor image of IBS (Ahmad et al., 2017). Also, some challenges of IBS adoption hinder the rapid implementation of the IBS (Mohamed et al., 2018) and; in this case, internally and externally. The internal and external challenges are derived to emphasize and acknowledge the challenges towards a construction organisation in their venture into IBS, within their control and outside their control. The scope of literature highlighted in this research paper is tabulated as shown in the following **Table 1:** Internal and External IBS Contractors' Challenges

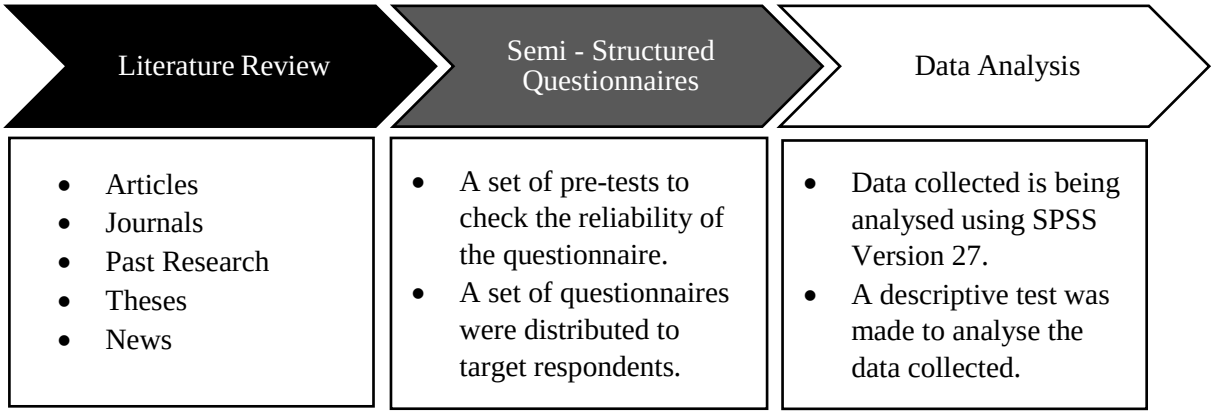
Table 1: Internal and External IBS Contractors' Challenges

	IBS Contractors Challenges		Sources
Internal	Foreign Labour Issue	Cheap construction labours are conveniently accessible; hence the usage of IBS is not feasible.	Kamar et al., 2009; Mohamed et al., 2018
	Fragmentation Issue	There is integration fragmentation in managing IBS construction, causing difficulties in managing & planning IBS projects.	Janipha & Ismail, 2013; Mohamed et al., 2021
	Financial Issue	IBS construction needs a huge financial capital start-up.	Mohamed et al., 2021; M. N. M. Nawi et al., 2011
	Risk Issue	IBS is a high-risk approach due to uncertainties in the IBS Plan of work, including planning, capital, time, quality, political scenario, etc.	Hamid et al., 2013; Rahim & Qureshi, 2018; Yap & Cheah, 2020
	Knowledge Transfer Issue	Ineffective knowledge transfer among contractors causes a different level of understanding of IBS usage in construction.	Hadi et al., 2017; Jaffar & Lee, 2020; M. N. M. Nawi et al., 2011
Extemal	Incentive Issue	Lack of incentive – incentive strategies is at an unfavourable percentage (%) of levy exemption – 0.125% from contract value is not encouraging.	Al-Aidrous et al., 2021; Kamar et al., 2012; Lou & Kamar, 2012; Rahim & Qureshi, 2018
	Competition Issue	Monopoly - Heavy Chinese-led infrastructure and real estate projects involvement, causing less construction business opportunity for local contractors.	Bhavan Jaipragas, 2017; Kamar et al., 2009; M. I. Mohamad et al., 2015
	Political Climate Issue	The uncertain political climate that affects regulation and construction scenario – i.e.: ECRL, HSR etc.	Al-Aidrous et al., 2021; Kamal & Flanagan, 2014; Yap & Cheah, 2020
	Government Issue	The government's weak push for IBS technology due to the availability of cheap labours causes low adoption of IBS.	Hisyam, 2016; Rahim & Qureshi, 2018
	Payment Issue	Non-Payment & Late Payment Problem - The role of CIPAA 2012 is important in ensuring smooth delivery of payment.	Dzulkalnine et al., 2018; Salleh et al., 2021; Yap & Cheah, 2020

METHODOLOGY

This exploratory study aims to assess the challenges and issues lingering around IBS Contractors in the Malaysian construction industry. Semi-structured questionnaires were distributed among IBS players from December 2019 to January 2020. Phases conducted in this exploratory study is shown in the following diagram (Figure 1: Research Flow).

Figure 1: Research Flow



Literature Review

The first phase consisted of a literature search and papers focused on IBS issues in the Malaysian construction industry.

Preliminary Questionnaire

After a thorough literature review visit, a preliminary questionnaire is outlined to pre-test aimed to find out if there was any possible confusion and to discern the presence of any offensive questions in the questionnaire.

Semi-structured Questionnaire

A set of 5-point Likert scales ranging from 1 “strongly disagree” to 5 “extremely agree” flowed out to forty-five (45) respondents who are come from various IBS backgrounds who experienced IBS development.

Data Analysis

A descriptive analysis was made to provide basic information on the data collected from the questionnaire. SPSS Version 27 has been used to run the study of the data.

RESULTS AND FINDINGS

Out of forty-five (45) respondents, twenty-four (24) valid responses were collected and analyzed to validate the challenges faced and tabulated as the following Table 2.0: Data Collection - IBS Contractors’ Internal and External Challenges. The result is tabulated as the following, whereby there are 2 (two) types of challenges faced by IBS Contractors; internally and externally.

Table 2: Data Collection – IBS Contractors' Internal and External Challenges
1 – Strongly Disagree | 2 – Disagree | 3 – Neutral | 4- Agree | 5 – Strongly Agree

Item	Statements	1	2	3	4	5
	Internal Challenges faced by IBS contractors					
A.1	Cheap construction labours are conveniently accessible; hence the usage of IBS is not feasible.	1	5	6	7	5
		25%		**25%**	**50%**	
A.2	There is integration fragmentation in managing IBS construction, causing difficulties in managing & planning IBS projects.	0	7	7	7	3
		29%		**29%**	**42%**	
A.3	**IBS construction a huge financial capital start-up.**	**1**	**2**	**1**	**12**	**8**
		13%		**4%**	**83%**	
A.4	IBS is a high-risk approach due to uncertainties in the IBS Plan of work, including planning, capital, time, quality, political scenario, etc.	1	4	7	10	2
		21%		**29%**	**50%**	
A.5	Ineffective knowledge transfer among contractors causes a different level of understanding of IBS usage in construction.	1	2	2	14	5
		13%		**8%**	**79%**	
	External Challenges faced by IBS contractors					
B.1	Lack of incentive – incentive strategies is at an unfavorable percentage (%) of levy exemption – 0.125% from contract value is not encouraging.	0	6	5	11	2
		25%		**21%**	**54%**	
B.2	Monopoly - Heavy Chinese-led infrastructure and real estate projects involvement, causing less construction business opportunity for local contractors.	0	3	7	4	**10**
		13%		**29%**	**58%**	
B.3	Uncertain political climate effects in regulation and construction scenario – i.e., ECRL, HSR etc.	0	3	5	9	7
		13%		**21%**	**67%**	
B.4	The government's weak push for IBS technology due to the availability of cheap labours causes low adoption of IBS.	1	5	7	6	5
		25%		**29%**	**46%**	
B.5	**Non-Payment & Late Payment Problem - The role of CIPAA 2012 is important in ensuring smooth delivery of payment.**	0	1	5	12	6
		4%		**21%**	**75%**	

Internally, 83 per cent (%), equivalent to 20 respondents, agreed that IBS Contractors are challenged financially due to a huge capital start-up as IBS construction requires complex machinery apart from providing advance payments made. Besides, 79% (19 respondents) agreed that the inefficient of IBS knowledge due to lack of research on soft issues is one of the internal challenges that IBS contractors are dealing with. Next, 50% (12 respondents) equally agreed that the availability of cheap labour and the perception of IBS is a high-risk business venture; respectively contribute to the internal issues that IBS contractors are dealing with. Also, IBS contractors agreed by 42% (10 respondents) that the fragmentation problem in IBS construction is one of the internal issues IBS Contractors have to deal with. Internally, it can be concluded that finances have the most significant slice of problem that IBS Contractors need to tailor their business model to cope with their financial and technical knowledge capabilities to survive in the IBS construction market.

Also, it can be deduced from Table 3.0 that some external issues linger contributed to the slow rate of IBS adoption in the Malaysian construction industry. The Construction Industry Payment and Adjudication Act 2012 (CIPAA 2012) roles are significant in moderating the construction payment disputes. Its implementation is crucial to ensure smooth payment to avoid delay within IBS construction parties engaged – agreed by 75% (18 respondents). In addition, 67% (16 respondents) agreed that IBS contractors are prone to the risk in their business venture as an unstable political climate may cause policy changes. Next, 58% (14 respondents) agreed that the monopoly issues by foreign competitors from China, Japan and Korea had been footing in the Malaysian construction industry as they have a better capability in handling a complicated project, also contributing to the external challenges endured by IBS contractors. Elevating to that, the existing incentives available are not attractive enough to

intrigue contractors to implement IBS to its full potential is agreed by 54% (13 respondents). The government's weak role in pushing the adoption of IBS is decided by 46% (11 respondents) is also one of the external challenges that IBS contractors have to endure.

DISCUSSION

It is essential to tackle the issue within IBS contractors more specifically to get a better insight into the hindrance factors of the rigorous implementation of IBS in the Malaysian Construction industry. The following Table 3: Data Analysis - IBS Contractors' Internal and External Challenges shows the data analysis of the collected data.

Contractor's Internal Challenges

Huge Financial Capital Issue

The enormous financial capital (Jaffar & Lee, 2020) and economical backup (Mohamed et al., 2018) are IBS contractors' economic challenges that hinder them from transiting from the conventional construction method to IBS with a mean index of 4.00. Due to the high financial risk (Dzulkalnine et al., 2018; Kamar & Hamid, 2011), not many risk-takers are into IBS on a large-scale basis because of the need for hefty capital outlay for the factory operations, warehousing, and purchase of equipment. The absence of economies of scale (Hamid et al., 2013; Lou & Kamar, 2012; Rahim & Qureshi, 2018) contributes to the challenge in considering IBS in their method of construction as there is no business advantage in venturing to non-profit making business. IBS contractors need giant financial capital start-up due to the type of machinery cost and plant set-up causing this industry to be monopolised by prominent IBS players.

Ineffective Knowledge Transfer Issue

The lack of knowledge (Yunus et al., 2016) among IBS players (mean index: 3.83) contributes to the internal challenges from implementing the technology into their construction projects. IBS knowledge and expertise are required (Jaffar & Lee, 2020) in delegating the critical players in strategizing the successful penetration of the system. A study conducted by Mohamad & Zin (2019) found that knowledge has a significant positive impact on a business entity. Authority like CIDB has played its role (Azmin & Kassim, 2020) in providing relevant IBS expertise; one of it is via IBS Centre. Although various efforts by the governments and authorities were initiated to penetrate IBS knowledge into the construction industry, Mohamed et al. (2018) found that the IBS players are still lacking of IBS knowledge. In their study, Ghazali et al. (2016) highlighted that IBS players' lack of involvement in training and short courses provided by authorities causes poor knowledge transfer on IBS.

Cheap Construction Labour Issue

The core value of venturing into construction business is maximising profit, and as a matter of the fact that cheap construction labours are accessible (Kamar et al., 2009 & Amin et al., 2017) has contributed to the lack of interest in transiting from conventional method (Yunus et al., 2016) to IBS. It is more convenient to stick to the traditional method with the availability of cheap foreign construction labours (Hisyam, 2016) with a mean index of 3.42. Accessibility to cheap foreign labours creates the opportunity to maximise the full potential of gaining higher profit and return on investment. The cost of hiring them is not as substantial as the cost of procuring and setting up factories and machinery for the IBS (Mohamed et al., 2018). The hindrance factor of implementing the IBS method also revolves around an expensive skilled, and experienced workforce contrary to the conventional method that is conveniently sufficient just by hiring cheap lesser-skilled foreign labours. This indirectly creates a business advantage that hinders the transition from the traditional way of construction to IBS.

IBS Contractor's External Challenges

Payment Issues

Delay in construction is very common in the construction progress (Salleh et al., 2021), as it might have been caused by a delay in receiving and securing adequate payment (Azman et al., 2013) (mean index: 3.96) in various stages of construction even for the conventional method of construction – to say nothing to the IBS method of construction. IBS method of construction in nature requires advance payments to be made (Kasim et al., 2019) to the manufacturers before transporting the IBS components to a construction site. This scenario affects the contractors' cash flow (Fateh et al., 2016) in ensuring a sufficient level of liquidity to implement IBS. Some IBS projects adopt unreliable payment mechanisms, where a strong cash flow is needed (Jaffar & Lee, 2020) to ensure the entity's business survival. The absence of an effective payment mechanism in the IBS project increases the hesitancy of the IBS transition from the conventional construction method.

Monopoly Issues; Heavy Chinese-led Project Involvement

The foreign competition (Yap & Cheah, 2020) in the construction market (mean index: 3.88) is one of the external issues lingering around local IBS contractors. They are not as competent and capable as foreign competitors. The monopoly of the big boy's (Kamar et al., 2009) plays a huge role in controlling the price market of IBS implementation; thus, a higher cost of IBS adoption led to the hesitance to use IBS. In addition, it is well known that high costs caused the hindrance of adopting IBS, causing foreign experts that have the more substantial cash flow (Amin et al., 2017; Nasrun et al., 2015) to come in and chop off the local IBS contractor's opportunity to venture into the IBS construction business. Losing out to Chinese and Japanese contractors (Yunus, 2017) and monopoly of the big boy's (Kamar et al., 2012) has affected the IBS adoption. Through this existing domination and monopoly, the price of materials will increase. This will indirectly affect the construction project (Taofeeq et al., 2020) and eventually increase the IBS business risk.

Uncertain Political Climate Issue

The political turbulence (Al-Aidrous et al., 2021) in Malaysian politics also affects the performance of the IBS adoption (Pan & Goodier, 2012) in Malaysia, with a mean index of 3.83. It is crucial to emphasise that political instability (MIER, 2020) affects the construction policies, rules and regulations. The less stable political climate will be causing a higher risk business and eventually lead to a lesser interest in implementing IBS as the rules and policies keep changing. The changes in political stands will affect the rules, regulations, and policies, making IBS business too risky to venture in. A stable political scenario plays a positive role (Hassan et al., 2012; Taofeeq et al., 2020) in affecting the rate of IBS adoption by ensuring the certainty of business decisions to be made among the IBS contractors. Hence, a more significant effort has to be initiated to grasp the confidence in securing and convincing construction players to use IBS.

Table 3: Data Analysis - IBS Contractors' Internal and External Challenges

Internal and External Challenges faced by IBS Contractors			
	Mean	Std. Deviation	N
Internal Challenges			
Cheap Construction Labour	3.42	1.176	24
Fragmentation Problem	3.25	1.032	24
Huge Financial Capital*	**4.00**	**1.063**	**24**
High Risk due to uncertainties	3.33	1.007	24
Ineffective Knowledge Transfer	3.83	1.007	24
External Challenges			
Unfavourable Incentives Strategy	3.38	.970	24
Monopoly - Heavy Chinese-led Project Involvement	3.88	1.116	24
Uncertain Political Climate	3.83	1.007	24
Government Weak Push for IBS	3.38	1.173	24
Payment Issues*	**3.96**	**.806**	**24**

CONCLUSION

IBS construction business has a very bright prospect in the Malaysian construction industry, especially when some enforcement by the government takes place; to make IBS adoption mandatory in Malaysian public and private construction projects. Therefore, the following recommendation has been derived:

- Further studies on strategies in outlining the IBS construction business model.
- Development of an appropriate strategic business modelling framework for IBS contractors.
- Better insight on payment strategy in IBS construction.
- A study on relevant critical business considerations in implementing IBS.
- The potential of Small Medium Enterprise in catalyzing the IBS adoption.

From this exploratory study, it can be concluded that IBS contractors are challenged in ringgit and cents to stay relevant in the Malaysian construction industry. In their research paper, Thanoon et al. (2003) supported an excellent potential for IBS for increased market share. In addition, authorities' role in providing better incentives, policy-making and knowledge sharing is crucial to catalyse the enforcement of IBS technology in the Malaysian construction industry. High adoption of IBS technology in the Malaysian construction industry is still a long way to go. Still, undeniably an excellent prospect to invest in as long as there are favourable pull factors to implement IBS. Hence this research is crucial to peel out the issue lingering around IBS contractors internally and externally.

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