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The Framework of Factors for the Improvement of the Significant Clauses in the Standard Form of Contract for the IBS Construction Approach in Malaysia

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Abstract: The Industrialised Building System (IBS) was introduced over 10 years ago in Malaysia, with well-documented benefits and strong support from the government. Apparently, the adoption and implementation of IBS is still low and below the government target. When adopting IBS, construction players mostly face different issues and challenges, particularly on contractual aspects, which contribute to the low adoption of IBS in Malaysia. There is also a lack of provision in the significant clauses of the Malaysian standard contract form to fit the development of IBS to date. The aim of this paper is thus to establish a system of factors underpinned by Deming's Theory for the improvement of the significant clauses in the standard contract form for IBS construction in Malaysia. A multi-method approach was used to achieve its aim, including an extensive literature review, findings from the previous study via document analysis, preliminary survey, questionnaire survey and semi-structured interviews. The research revealed that there are five significant clauses with important factors that can be improved in the existing Malaysian standard form of contract in relation to the IBS construction. The research also developed a framework that would be able to assist the policy and decision-makers in understanding what the improvement factors that need to be considered in the significant clauses in the standard form of contract in relation to the IBS construction. The research output (the framework) was validated by the prominent industry players on the practicality, suitability to its purposes for the related stakeholders. The developed framework would be able to accelerate the adoption of IBS construction in parallel with the initiatives (P3) in the Construction Industry Transformation Programme (CITP).

Keywords: Industrialised Building System (IBS), standard form of contract, significant clause

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1. Introduction

The construction sector is one of Malaysia's key economic drivers and a major enabler of the Economic Transformation Programme, as highlighted by Hussain (2015). Based on the report by the Construction Industry Development Board (CIDB), (2015a), the construction industry is a key economic engine for the overall economy where it forms a significant component of Malaysia's GDP, 4.5% in 2018 (Bank Negara, 2019). Beyond this, the local construction industry offers significant positive spillover effects. Nevertheless, the construction industry records low productivity levels relative to other sectors in Malaysia, as reported by (Mohd Fateh, 2019). The relatively low productivity is a reflection of limited modernization of construction methods and practices as well as the reliance on low-skilled labour. IBS construction is able to offer huge benefits as reported by CIDB (2015a), but Malaysia still has a low take-up rate of Industrialised Building Systems (IBS) in construction. A number of reports (Mohd Fateh et al., 2016; Mohd Fateh & Mohammad, 2017; Mohd Fateh & Nijar, 2019) stated that the adoption for the IBS construction approach is relatively low due to lack of provision in the significant clauses in the standard form of contract for the IBS construction approach in Malaysia. From this scenario, it provokes this research to be conducted in line with findings from the literature reviews and Construction Industry Transformation Programme (CITP) as reported by (Construction Industry Development Board (CIDB), 2015b). This research is focused on the development of a framework for the factors for the improvement of the significant clauses in the standard form of contract for the IBS construction approach in Malaysia. This research will give an insight of information and guidance to all the related stakeholders such as CIDB, Public Works Department (PWD), academicians and related construction players.

This paper is structured into three parts. The review covers a broad range of literature providing an overview of the construction industry. The second part discusses the methodology used for this research. The last part discusses findings and conclusions derived from evidence from the literature review.

1. Construction Industry and IBS

A key issue faced by the construction industry is low workforce and technology productivity levels, which directly provides an impact to the quality of construction products and services as reported by (Mohd Fateh, 2019). The Malaysian construction industry has a low starting position for productivity relative to other sectors in Malaysia and to other developed countries. Skill gaps are prevalent, both at the skilled trade and professional services level, due to potential gaps in the academic curricula and their relevance to industry requirements, as well as a lack of student exposure to practical on-the-job training over the course of their studies. Beyond this, a key factor in limiting the productivity of the workforce in construction is the limited adoption of technology used in advanced construction methods such as IBS. In the Malaysian context, many of the globally accepted benefits of IBS have yet to be fully realised. CIDB (2015a) reported that the industry players face several challenges in implementing IBS including a broad definition of IBS; poor contractual arrangements, as it currently includes many on-site methods that differ from those used in traditional construction, and a lack of industry-wide and well-defined standard components limiting the economies of scale. This was agreed by (Mohd Fateh et al., 2016) stating that that the industry is still facing issues in terms of contractual aspect when adopting IBS construction. The study also found that formulating a standard form of contract for IBS construction approach is necessary to ensure smooth implementation as the activities are different from a normal construction approach. Based on the findings from the literature review, Mohd Fateh & Mohammad (2017) identified five (5) significant clauses in the standard form of contract that the can be improved to suit with construction IBS namely:

- Definition of unfixed material and goods
- Evaluation of interim payment
- Inspection, testing of material, goods and equipment
- Submission of the supervision report
- Extension of time (relevant events)

This was highlighted by Mohd Fateh & Nijar (2019) in their study, where all of their respondents agreed that all the five (5) clauses should be improved. Report by Mohd Fateh et al. (2020) stated that all the respondents did not have a different opinion on these matters thus, illustrating the issues as genuine and valid.

1.1 The Framework

The encouragement for the acceleration of IBS adoption in the construction industry has been highlighted in the CITP (CIDB, 2015b). However, there was neither data nor a framework to clearly elaborate on the key factors needed to improve the significant clauses in the standard form of contract in relation to IBS construction. Therefore, the outcome of this research reveals the framework for the key factors needed to amend the significant clauses in the standard form of contract for the IBS construction approach.

WebFinance (2018) defines a framework as a theoretical structure of assumptions, principles and rules that hold together the ideas comprising a broad concept. Meanwhile, Nizam (2018) defines a set of things to be done in stages or phases. In the context of this research, the framework is based on findings from various research methodologies. The framework is unpinned under the 'The Deming Cycle Management Approach' that was introduced by William Edwards

Deming back in 1950. It consists of four (4) phases: Plan, Do, Study and Act (Mohammad, 2007). This was accepted by Moen (2009), who stated that the four (4) stages should be rotated continuously to ensure the con sistency thus, creating a cycle. Nizam (2018) and Mohammad (2007) reported that the Deming Cycle Management Approach is considered the most suitable theory to use when developing a systematic framework to plan, analyse, solve problems and ensure continuous improvement. Tague (2005) stated that the Deming Cycle Management Approach could be used as a model for continuous improvement, for developing new or improved processes, products or services, for planning data collection and analysis in order to verify and prioritise problems or root causes, and for implementing any changes. The researcher also looks into other theories before choosing the Deming theory to underpin the conceptual framework such, as Lewin's theory and Kotter's 8 step change theory. Both of the theories were developed back in the 1950s and 1990s respectively, as stated by Hayes (2018). In the context of the research, both of the theories are not suitable because the theories promote fast change transaction phase. When the changes are involved with a standard form of a contract, changes cannot be done overnight. It may take months or even years for the industry players to initiate and accept the changes. Hayes (2018) and Cameron & Green (2015) reported that this theory is usually used for an organisational change. This includes team buildings and motivating the organisation as a whole. On the other hand, the Deming theory is flexible on the usage. The theory has been used in the manufacturing sector, the IT sector and the construction industry sector itself. Previous researchers (F. M. Mohammad, 2007) and (Nizam, 2018) used Deming Theory to develop a framework on the selection of the procurement arrangement and framework on remodelling the Standard Method of Measurement (SMM). Due to this justification, the Deming theory is the chosen one to underpin the framework.

The framework is useful for both public and private sector clients as guidance for enhancing the significant clauses in the standard form of contract for IBS construction. Policy- or decision-makers are clearly defined for each significant clause along with the key factor for each clause according to the client (government or private) and contractors. The framework will be able to help policy- and decision-makers understand the factors that they need to consider in the significant clauses in the standard form of contract for the IBS construction approach. It will also be a guide for the policy and decision-makers in the industry in identifying the key factors concerning the impact of the significant clauses in the standard form of IBS contract on construction-specific needs. The proposed framework is developed based on findings from varies research methodology. It is also being supported by an extensive literature review, document analysis and validation process. Therefore, the outcome is considered reliable, valid and unbiased.

3. Methodology

The development of the framework consists of five (5) stages. It starts with the literature review (Stage 1). In this stage, the critical inputs are information regarding the nature of the construction industry, the IBS construction, the standard form of contract and procurement arrangements. Next is the findings from (Mohd Fateh et al., 2016), preliminary survey (Stage 2), the critical inputs are findings from the respondents on perceptions of the current issues and the nature of the industry. Then in the findings from (Mohd Fateh & Mohammad, 2017), document analysis (Stage 3), the critical inputs are the significant clauses in relation to IBS construction after comparing seven (7) standard forms of contract and the understanding of the important factors for each significant clauses. Moving on to the findings from (Mohd Fateh & Nijar, 2019) questionnaire survey (Stage 4), the critical inputs are the findings from the respondents regarding the frequency and percentages analysis on the significant clauses and the findings from the Kruskal-Walis test whether there are differences of opinion between the three (3) groups (private clients, government and contractors). Lastly, the findings from (Mohd Fateh et al., 2020) semi-structured interview (Stage 5), the critical inputs are able to fill the gaps in the findings from the previous stage (questionnaire survey). In this stage, the findings from respondents in the sense of opinion, words, reactions response are the critical inputs in the process of development of the framework.

The framework has also been tested through the industry validation to ensure its suitability, practicality and sufficiency and to obtain any general feedback to improve or amend the final framework. The framework aims to support the decision-making process by the policy- or decision-makers for the significant clauses in the standard form of contract for the IBS construction approach. Six (6) validators who are experts and experienced in the area of research, were selected and invited to validate the framework. The participating validators were representatives from the government sector, private clients and contractors who agreed to participate in the validation process. Nevertheless, all validators requested that the company name should not be mentioned in the report or any form of publication. This was made to avoid any misleading use of the information given that might jeopardise their interests and damage any business relationships in the industry. All the validators were involved in this research for the first time. They were not involved in the previous data collection exercise (questionnaire survey or semi-structured interview). This was intended to maintain the integrity of the validation process and ensure, as far as possible, that the comments from the validators are genuine and unbiased towards the research. All validators suggested that the researcher should explain the proposed framework briefly before the semi-structured interview session began. By doing this method, the validators would have a better understanding and be able to query for any clarification, thus being able to provide genuine and constructive feedback accordingly.

4. Result and Discussions

In the context of this research, the framework illustrates the factors for the improvement of the significant clauses in the standard form of contract for the IBS construction approach in Malaysia. As stated in the previous section, the framework is underpinned by the Deming Cycle Management Approach, which is divided into four (4) phases (plan, do, study and act). Within these phases, there are various activities, as shown in Figure 1.

4.1 The Plan Phase

According to The Deming Cycle Management Approach, this is where planning the objectives and preliminary needs take place. In the context of this research, in this phase, the policy- or decision-makers need to identify whether the IBS project is a local or international contract. If it is an international contract, the policy- or decision-makers need to use either JCT, ICE or FIDIC standard forms of contract. The scope of this research does not cover international IBS projects; therefore, it will not be discussed further. On the other hand, if the project is local, the policy- or decision-makers need to identify whether it is a government of private sector project. If it is a government contract, the policy- or decision-makers need to use the appropriate PWD series standard form of contract. However, if it is a private contract, they need to use the PAM series standard form of contract.

4.2 The Do Phase

The Deming Cycle Management Approach states the need to execute the plan using a systematic approach in this phase. In the context of this research, this is where the policy- or decision-makers will identify the significant clauses in relation to IBS construction. From the findings of this research, there are five (5) significant clauses in relation to IBS construction. Each significant clause conveys different uses and functions to the construction project. Each significant clause has factors of improvement that the policy- or decision-makers need to look into and address. All the details and further elaboration on the factors for the improvement for the significant clauses can be found in (Mohd Fateh, 2019). The factors of improvement for each significant clause are hoped to able to make the existing standard form of contract more favourable to the IBS construction approach thus, accelerating its adoption in Malaysia.

4.3 The Study Phase

The Deming Cycle Management Approach states the need to study and check the outcomes against objectives and methods in this phase. In the context of this research, this is where the policy- or decision-makers need to study and look into the potential project implications. When there are changes and improvements in significant clauses, there will be potential project implications. The potential implications such as a favourable payment mechanism can accelerate IBS adoption.

4.4 The Act Phase

In this phase, the policy or decision-makers are recommended to review the project. The outcome of this post mortem can be positive or negative; nevertheless, there is always the potential for improving upcoming projects. This phase will be as part of a continuous cycle to identify the improvements in the significant clauses in the standard form of contract for the IBS construction approach in Malaysia.

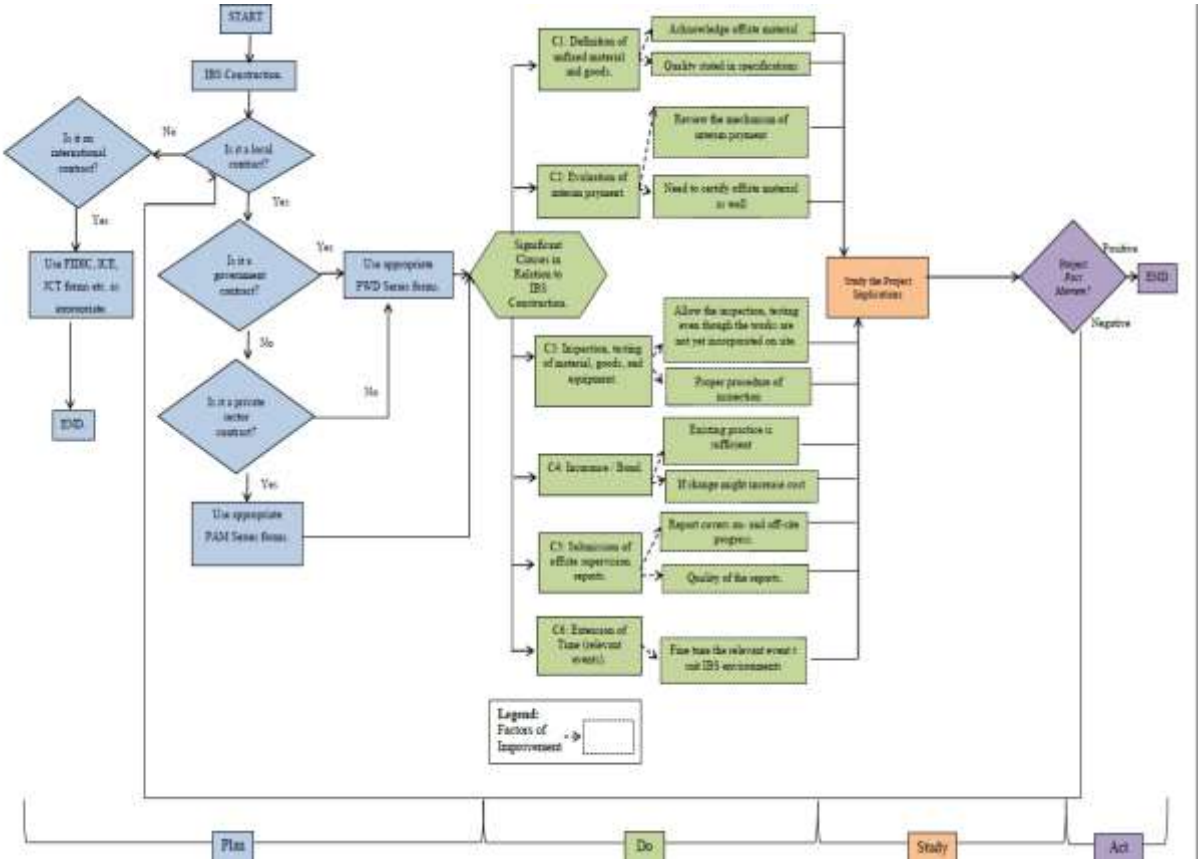
Each clause has the important factors that users need to consider when wanting to exercise the clauses based on the findings from the literature review. Table 1 summarises the important factors that need to be considered for improvements to make the clauses friendlier and favour to IBS construction. The important factors are useful for the policymakers in the process of planning and decision making to improve the standard form of contract to suit with IBS construction that might help to accelerate the adoption rate of IBS construction in Malaysia.

Table 1 - The important factors need to consider for improvements to make the clauses friendlier and favour to IBS construction

No.	Clause	Important factors to Consider for Improvements
1	Unfixed material and goods definition	Recognized material off-site. The quality needs to be stated in the specifications.
2	Evaluation of the interim payment	Review the mechanism of an interim payment. Need to certify off-site material as well.
3	Inspection, testing of material, goods and equipment	Allow the inspection, testing even though the works are not yet incorporated on-site. Proper procedure of inspection
4	Submission of off-site supervision reports	The report covers on and off-site progress. The quality of the reports
5	Extension of time (relevant events)	Fine-tune the relevant event to suit IBS environments

Majority of the comments from the validators are positive and encouraging. The validation process has been able to prove that the framework is significant for the construction industry and able to provide valuable insights and knowledge to improve IBS construction. The validation process is also able to show that the research aim has been achieved. The details of the validation process can be found in (Mohd Fateh, 2019).

Fig 1. The framework of factors for the improvement of significant clauses



5. Conclusion

Due to these arising issues, all the industry players feel unsafe and insecure as many contractual aspects remain vague. There is no proper guideline to refer to if things do not go as planned. Therefore, developing a framework for the factors for the improvement of significant clauses in the standard form of contract for the IBS construction approach in Malaysia is a necessity. Some of these clauses need to be tailored to the IBS processes. For example, clauses on deliverables, payment and materials on site. All the problems stated can be mitigated and addressed by developing a framework for the factors for the improvement of significant clauses in the standard form of contract for the IBS construction approach in Malaysia. There is a lack of provision in the standard form of contract for the IBS construction approach in Malaysia. The CIDB (2015a) reported that low adoption of IBS is due to the broad definition of IBS and lack of standards. All the problems stated can be mitigated and addressed by developing a framework for the factors for the improvement of significant clauses. The introduction of different project procurement systems is needed to ensure more efficient and speedier project delivery systems. This will lead to a better project performance and success factors for IBS adoption in Malaysia, according to (Yusof et al., 2014). All parties involved in the project need to be bound by a formal contract with proper clauses that are tailored to the IBS environment and work process. IBS involves relationships between many organisations and processes, with the evolution of many specialised roles and embedded relationships.

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