

IBS PROVISION IN LOCAL AND INTERNATIONAL STANDARD FORM OF CONTRACTS

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RUNNING HEAD: IBS PROVISION IN LOCAL AND INTERNATIONAL CONTRACTS

Abstract: Industrialized Building System (IBS) has been introduced for over 40 years in Malaysia, with well-documented benefits and strong support from the government. Unfortunately, the pace of adaptation of IBS is still slow and below the government's target. Construction players are still facing various issues and challenges when adopting IBS particularly on contractual and procurement aspects, thus it contributes to the low adoption of IBS in Malaysia. As of to date, there is still the lack of provisions in the Malaysia standard form of contract to suit the IBS construction approach. Therefore this research will attempt to investigate and compare a number of standard forms of contract locally and internationally in order to identify and highlight what international standard form of contract have provisions to suit IBS construction approach. Literature review and documents analysis were used in the data collection exercise. The study revealed that there are six (6) provisions that the local standard form of contract can enhance to suit the IBS construction approach. The findings will be useful in order to enhance the local standard form of contract to suit IBS construction approach hence able to accelerate the adoption of IBS construction in Malaysia.

Keywords: IBS; Standard form of contract; Contract; Procurement; Malaysia

Introduction

Malaysia has experienced significant economic growth over the past five (5) years at a steady rate of 6% per annum as reported by Construction Industry Development Board (CIDB) (2015a). The construction industry also offers large scale positive spillover effects onto both the manufacturing and services sectors. Based on the report by the Construction Industry Development Board (CIDB) (2015b), the construction industry accounts for 15% of the total output of Malaysia's manufacturing sector. The construction industry has been a real catalyst for the economic development enjoyed in recent years, as infrastructure development has been at the core of both the Economic Transformation Program (ETP) and the Tenth Malaysia Plan. Back in September 2015, CIDB presented the Construction Industry Transformation Programme 2016 – 2020 (CITP). CITP'S vision is to transform the construction industry to become highly productive, sustainable and globally competitive while raising the professional bar in the industry. One of the key initiatives in raising the productivity of the construction workforce is to drive higher technology adoption used in advanced construction methods (IBS). Malaysia government has always been committed to addressing the IBS as national agenda based on the findings by Kamaruddin et al., (2013). Numerous initiatives have been done throughout the years namely Construction Industry Master Plan (CIMP) in 2006, IBS roadmap in 2010 and CITP in 2015. Although numerous efforts have been done to push IBS adoption, the adoption rate is still low as reported by (CIDB), (2010). Many types of research have been conducted on IBS but the focus is more only on product, construction process and technical aspects. According to Abd Jalil et al., (2016) that there is an evident lack of research on procurement for adopting IBS construction approach. Therefore, this paper will focus on the provision in the local and international standard form of contract for IBS construction approach. This research will give an insight of information and

guidance to all the related stakeholders such as CIDB, Public Works Department (PWD), expert panels, academicians and related IBS players. The challenges in boosting the adoption of IBS projects would be looking at the enhancement of the standard form of contract for IBS construction approach. It will give a value-added impact on the adaptation of IBS construction approach. This was supported by CIDB (2006) stated that a suitable standard form of contract for IBS will invariably expedite the project success.

This paper is structured into three parts. Firstly, the review covers a broad range of literature providing an overview of the construction industry, IBS scenario in Malaysia and the standard form of contract that widely used in the industry. The second part discussed the methodology used for this research. The last part discussed findings and conclusions derived from evidence from the literature review and the document analysis.

The Construction Industry

The construction industry is one of the complex industries and a challenging sector. It needs to be conducted properly and wisely to avoid the emergence of problems that can affect the overall project. The nature of the complex construction industry also requires an efficient work process and a strong relationship between the parties involved in the construction industry as stated by Zakaria et al., (2013). According to Harmon (2003), it can derail a project and lead to complicate dispute, increased costs, delay and breakdown in parties communication and relationship. Furthermore, Hellard (1997) stated that the causes of dispute are all because of the complexity and nature of the project, contract and the contractual relationship between each other that consequently lead to misunderstanding and failure of performing. It is supported by Broome & Hayes (1997) reported that contractual conflicts or disputes seem to be inevitable in the construction industry especially on issues concerning interpretation and understanding of construction contracts. Heap et al., (2011) stated that construction industry stakeholders always use a standard form of contract to regulate their contractual obligations and expectations during the contract administration process. It is during this process that a vast amount of contract provisions are referred to.

IBS in Malaysia

According to CIDB (2014), IBS is defined as a construction technique in which components are manufactured in a controlled environment (on or offsite), transported, positioned and assembled into a structure with minimal additional site work. Various previous researches done by (Construction Research Institute of Malaysia (CREAM) 2011), (Sarja 1998), (Gibb 2001), (The UK government Department of Trade and Industry (DTI) 2004), (Nawi et al. 2011), (Kamar et.al, 2009), (CIDB), 2015a), (Mohammad 2013), (Shukor et al. 2011), (Musa et al. 2015), (Halil 2015) and (Kamaruddin et al. 2013) have proved that using IBS it able to offer huge benefits in terms of cost and time certainty, attaining better construction quality and productivity. Although IBS has been introduced for over 40 years in Malaysia, with well-documented benefits and strong support from the government, the pace of implementation and usage of IBS is still slow and below the government's target as reported by CIDB (2015a) and Nawi et al., (2011). This was agreed by Abd Jalil et al., (2016) reported that the adoption of IBS has been recognized but the progress of adaptation has been very low and slow. Previous research was done by Mohamad Kamar et al., (2009) concluded that since there is no specific procurement method for IBS projects, many problems on the project delivery system have arisen thus becoming barriers for IBS adoption. Industry players do not have any reference or guidelines for IBS construction approach. This was agreed by Abd Jalil et al., (2016) stated that the reference and guideline they have are only related to product based information. This scenario will lead to confusion and dispute during the construction period. According to Chung & Kadir (2007), stressed that IBS players need to refine and adapt the existing contract and procurement options chosen, to suit the new IBS construction approach adopted in the projects. While Abd Hamid et al., (2011) highlighted that

performance of the project may be badly affected if the client chooses unsuitable procurement methods.

According to Mohd Fateh et al., (2016) and Mohamad Kamar et al., (2009) stated that the construction players are still facing some issues and challenges in contractual aspects when adopting IBS, thus it contributes to the low adoption of IBS in Malaysia. Based on the preliminary study being done by Mohd Fateh et al., (2016) stated that all respondents agreed that it is a necessity to enhance the existing Malaysia's standard form of contract to suit IBS construction approach. Therefore, this research is to enhance the existing provision in Malaysia's standard form of contract to suit IBS construction approach, hence propel the acceleration adoption of IBS construction approach parallel with the CITP's vision.

Standard Form of Contract

The standard form of contract can be defined as a printed form and published by an authoritative body of the industry, which recognized by both parties in the contract reported by Singh (2011b), Kalsum et al., (2011) and Mahdi (2001). The forms set out the terms or condition on which the contract between the parties is to be carried out. According to Singh (2011b) even as a small country, Malaysia boasts of quite a number of standard form of contract in the construction industry to name a few Public Work Department (PWD) series, Pertubuhan Arkitek Malaysia (PAM) series and Institute Engineer Malaysia (IEM) series. Each series offers different project owner/employer, type of project as well as the nature of project activities and financing involved reported by Zakaria et al., (2013). As highlighted by Singh (2011a) and Zakaria et al., (2013), the purposes of the standard of form contract are as follows:

- Provide the basic legal framework evidencing the legal relationship between the parties.
- Furnish a mechanism for regulation the conduct of the commercial relationship between parties.
- Put in place the administrative procedures necessary to effect the legal and commercial relationship between parties. □
- Establish the ambit of powers and duties of the contract administrators under the contract between the parties. □
- To facilitate the contractual arrangements between all players in a project.

In summary, the standard form of contract is multifold governing not only legalities but also administrative issues to ensure that both parties are able to discharge and can actually discharge their side of the bargain through full performance as stated by Singh (2011b) and Zakaria et al., (2013). According to Wilkinson & Scofield (2010) identified that the choice of the standard form of contract is as having a significant impact on the achievement of time, cost and quality targets for a project. Zakaria et al., (2013) also add up that the selection forms of contract depend on the basis of pricing and the contract strategy that best meet the project objectives. Different types of a contract offer different ways of handling pricing, risk transfer, responsibility for performance, cost certainty, and complexity. Among the primary reasons attributed to these problems are the lack of clarity and use of legalese in the contract clauses as reported by (Heap et al. 2011). Therefore, understanding and using the suitable standard form of contract is necessary to ensure the process of managing the project goes smoothly.

According to Zakaria et al., (2013) the selection forms of contract are a crucial factor in the performance of a construction project. It shows that the use of contract documents is dependent on the project owner/employer, type of project as well as the nature of a project and financing involved. According to Jack Ramus (1996), choosing an inappropriate standard form of contract will increase disputes as the objectives of the project are not fully achieved in term of time, cost and quality. Usually, the selection is done based on the project owner or respective agents familiarity on the forms as rather on a predetermined criteria as reported by Ting & Chin (2013). Based on the questionnaire survey

done by Ting & Chin (2013), the most important selection criteria is the nature of work which includes size, the level of complexity, type, and source of funding of the project. According to Jaafar & Radzi (2012) concluded that the procurement system in Malaysia has not evolved greatly since the colonial British era. Many clients in the local industry prefer to choose procurement systems considered familiar, even though the criteria and purposes or every project are different. Previous research by Mohd Fateh et al., (2016) stated that every project is unique and dynamic in term of processes, resource allocation, risk exposure and responsibilities between all parties, therefore, there is a necessity to enhance the existing Malaysia standard form of contract for IBS construction approach in Malaysia. This was agreed by Jaafar & Radzi (2013) suggested that when there are changes in the method of construction, there is also a need to adopt a new procurement system. Using unsuitable procurement methods in IBS will not only affect the progress of the project but also will affect the construction team in term of understanding and interpretation of the regulation. According to Gandu et al., (2009) and Lutz Preuss (2009) concluded that the system of procurements is considered as the key to project success. Blismas & Wakefield (2009) also agreed to this, that in producing a successful IBS project, the procurement approach must be suitable. Findings by Abd Jalil et al., (2016) highlighted that a specific procurement system is required as IBS construction approach involves special producers and processes which are different to traditional construction. Previous researchers had concluded that the current traditional standard form of contract was not suitable for IBS construction approach especially in term of payment and project coordination as reported by Abd Jalil et al., (2016). This was agreed by Mohamad Kamar et al., (2009) reported that the existing standard form of contract does not favor the industry players that want to adopt IBS construction approach. IBS Centre (2007) also highlighted that several of the barriers factors that hinder the adoption of IBS construction approach are the lack procurement method and provision in the standard form of contract.

As of to date, there is still a lack of provisions in the Malaysia standard form of contract to suit the IBS construction approach as reported by Mohd Fateh et al., (2016). This was agreed by Abd Jalil et al., (2016) stated that despite the varies Government's efforts in pushing IBS as national agenda (IBS roadmap, CIMP and CITP), there are not detailed IBS building guidelines or standard regulations for procurement systems or contract documents in term of tendering, design, construction and operation have been produced. Research by Abd Jalil et al., (2016) add up that current standard form of contract has not addressed this very pertinent issue. Therefore this research will attempt to investigate and compare a number of standard forms of contract locally and internationally in order to identify and highlight what other standard forms of contract have provisions to suit IBS construction approach.

Methodology

Literature review and documents analysis were used in the data collection exercise. For the first phase, literature review derived from relevant books, journals articles, thesis and dissertations, conference proceedings and reports were examined. For the second phase, seven (7) standard form of contract were analyzed for documents analysis as follow:

1. PWD 203A (Malaysia)
2. PWD DB (Malaysia)
3. PAM 2006 (Malaysia)
4. PS 2014 (Singapore)
5. FIDIC 2010 (Switzerland)
6. AS 4300 (Australia)
7. JCT 2011 (UK)

The document analysis was done to investigate and make the comparison on each standard form of contract in term of provision for IBS. By doing so, the findings able to understand the full spectrum on how standard forms of contract from other countries incorporate provision for IBS construction approach. However, since this research is still

ongoing as this paper is being written, the data presented in this paper is only based on the summary findings from the literature review and document analysis.

Results and Discussion

PWD series standard form of contract (Malaysia)

PWD series was the initial sets of the standard form of contract were drafted by the various government agencies working in public sector as reported by Singh (2011b). It is being modeled on the Royal Institute of British Architects (RIBA) back in 1931. According to Ashworth (2006), this type of contract separate the construction and design activities. The design team is contracted by the client, and they shall provide the contractor with a complete design for construction. Over the years, the standard form of contract was modified to suit local conditions and to keep up with the industry developments.

PAM series standard form of contract (Malaysia)

Parallel with the government sector, the private sector also developed their own standard form of contract. The Pertubuhan Akitek Malaysia (PAM) takes the initiatives by delivering the PAM series mainly for the building works as stated by Singh (2011b). The PAM series are used extensively in the Malaysian building industry. It is estimated that 90% of the building works in the private sector used the PAM series as reported by Rajoo et al., (2010), Malcon (2012) and Zakaria et al., (2013). Research by Zakaria et al., (2013) also add up that, the risks are known to the local industry players and widely used by the building contractor. The PAM series also has been through review and amendments over the years to suit the construction industry needs.

AS series standard form of contract (Australia)

According to Sharkey et al., (2014) the range of standard forms available in Australia has its origins in the forms promulgated by professional bodies in the late 19th and early 20th centuries in the United Kingdom. The Australian Standards (AS) major works standard forms are used across all sectors (other than for residential building with a private individual as principal) and across all contracting values as reported by Sharkey et al., (2014). Typically, the standard forms have evolved by a process whereby a consensus is forged among various industry interest groups and reflected in a standard form, that form becomes increasingly the subject of amendments and revision.

PSSCOC standard form of contract (Singapore)

In Singapore, the Public Sector Standard Conditions of Contract (PSSCOC) was developed to enable a common contract form to be used in all public sector construction projects. Standardization will increase familiarity among users, reduce tendering efforts and promote greater efficiency in contract administration. The PSSCOC is widely used for public sector construction projects. First published in 1995, second and third editions were launched in July 1999 and January 2004 respectively. The fourth edition was launched in March 2005 as reported by Building & Construction Authority (2015).

FIDIC standard form of contract (Switzerland)

The International Federation of Consulting Engineers (FIDIC) which its headquarters located in Geneva, Switzerland in association with the European International Federation of Construction (FEIC) produces a whole series of standard form of contract for use worldwide with amendments if necessary to suit legal system of the country of a particular application

as stated by Singh (2011b). According to Mushtaq (2007) stated that FIDIC is recommended for building or engineering works designed by the employer, or by his representative, the engineer. The contractor will construct the work based on the design by the employer which includes civil, mechanical and electrical works. FIDIC standard form of contract has been applied worldwide, especially in the projects invested or financed by the World Bank, Asia Development Bank and African Development Bank as stated by Zakaria et al., (2013).

JCT standard form of contract (United Kingdom)

The Joint Contracts Tribunal (JCT) forms in 1931 is an affiliation of interest groups within the British construction industry which operates as a forum for discussing and determining the content of the clauses of the standard form of building contracts as stated by Singh (2011b) and The Joint Contract Tribunal Limited (2016). The usage of JCT goes back further to the 19th Century reported by The Joint Contract Tribunal Limited (2016). It regularly amends the standard form of contracts with supporting documentation and practice notes. Even though JCT standard forms of contract have been rarely used in Malaysia but it is widely used in the United Kingdom. JCT is the leading provider of contract documentation, which not only covers standard forms of main and sub-contracts for each of the key procurement methods, but also guidance documents, homeowner contracts, partnering documentation, collateral warranties, and agreements as stated by The Joint Contract Tribunal Limited (2016).

Documents Analysis

Seven (7) standard form of contract were chosen for the documents analysis as stated in the methodology section. The justification is because the standard form of contract is current and widely used in the respective countries. Clauses by clauses from each standard form of contract were examined and interpreted in order to get a better understanding. From the analysis, there are six (6) provisions that the local standard form of contract can enhance, therefore it able to tailor the IBS construction approach. Table 1 illustrates the summary of findings from the document analysis.

i. Definition of unfixed material and goods

For all Malaysia's standard form of contract, the unfixed material and goods need to be onsite. While all international standard form of contract acknowledges that the unfixed material and goods can be onsite or offsite. For PSS 2014, it stated that it can be at the place of manufacture, fabrication or preparation or onsite or at such other place specified in the contract. In AS 4300, it stated for the unfixed material and goods can be offsite provided that the contractor furnishes information such as the mode/ place of manufacturer, the source of supply, the performance capacities and other related information required by the client. While in JCT 2011, it stated as, for material and/or prefabricated items (offsite), it needs to be listed by the client. This is a good provision because, in IBS construction approach, most of the activities will be done offsite or prefabrication. It can be either at a factory or fabrication yard.

ii. Evaluation of interim payment

A typical evaluation for interim payment in the standard form of contract usually will look on two (2) things to determine the amount of payment to the contractor, progress of work done and material on site. For IBS construction approach, this practice is not suitable. It is because most of the work will be done offsite. For example a conventional construction, it may take around eight (8) month to complete the structure elements (column and beam). During that 8 months, the contractor is eligible to claim for the progress of work done and material on the site. By doing so, it helps directly to the contractor's cash flow. On the other hand for IBS construction approach, the fabrication process is done offsite and deliver to the site

within (6) month. Within that 6 months, the contractor does not entitle to claim anything for the interim payment because there is no progress of work done and material on the site. Worse it up, the contractors are required to pay up front to the IBS manufacturers by using their own money before the contractors can claim the amount from the client as reported by Abd Jalil et al., (2016). According to Mohamad Kamar et al., (2009) highlighted that payments from the contractors are expected to be made to the manufacturers before starting fabrication of the IBS components, not when the components are delivered to the site. Findings by Abd Jalil et al., (2016) add up that the current standard form of contract was not suitable for IBS projects because payments to IBS manufacturers will only be made upon delivery of the components to the site, not when the precast components were being manufactured. Based on the report by Abd Jalil et al., (2016) and Blismas & Wakefield (2009) concluded that IBS construction approach demands high initial investment capital for fabrication processes. This will lead to a very tight cash flow and may propel other problems. Due to this problem, IBS construction approach is viewed as threats to their business instead of potential opportunity. This was agreed by Abd Shukor et al., (2011), stated that more than half of IBS manufacturers were very concerned about payment issues and worry about the commitment and capability of the contractors and clients based on current payment mechanism. From the study, it shows that majority of the international standard forms of contract allow for material offsite as part of the interim payment. This provision will help the contractor in the cash flow management. In PS 2014, the contract allows to claim material offsite with certain conditions, such as invoices and receipts of the material offsite to be submitted to the client, the material offsite are intended for inclusion in the permanent work of the contract and the material offsite need to be at the premises where they are manufactured or assembled with appropriate storing space complete with visible marked indicated that it is for the permanent works of the contracts. For AS 4300, the contractor needs to list all unfixed material offsite in the 'Annexure Part A' section. The client shall be obliged to pay the material offsite listed in the 'Annexure Part A' section in the condition that the contractor has paid for the item, properly stored, labeled and adequately protected. While in JCT 2011, all material offsite are itemized in the 'listed item' section. The interim payment shall include the value in the 'listed item' section following strict conditions have been fulfilled such as the 'listed item' are insured against loss or damage for their full value, 'listed item' are at the premises where it have been manufactured or assembled, complete with visible marks by predetermined code for references purposes and their delivery destination.

iii. Inspection, testing of material, goods and equipment

The local standard form of contract (PWD 203A) is in line with the international form of contract in this aspect. The majority of the international standard form of contract allow that the inspection, testing of material, goods and equipment of the works can be done even though that the works are not yet incorporated onsite. In PWD 203A and JCT 2011, the client may inspect and test any works material, goods and equipment whether already incorporated in the works or not. While in FIDIC 2010, the client has full access to examine, inspect, measure or test any material, goods and equipment during the fabrication at the site or elsewhere. This is suitable for the IBS construction approach as most of the fabrication are being done offsite and all the components are stored in the fabrication yard may not incorporate in works onsite yet. This provision is giving the client the authority to access the offsite premises to inspect or test any material, goods and equipment that relates to the project during the fabrication process.

iv. Insurance/bond

The majority of the international form of the contract required the contractor to take insurance/bond for the unfixed material offsite. This will act as a guaranteed mechanism for the client if the contractor fails to deliver. The client also will be more secure and comfortable to pay for the material offsite since everything is being insured/bond. In AS 4300, the contractor needs to take insurance that covers things in storage on and offsite including the transit journey to the site. For JCT 2011, the contractor needs to insured all the unfixed material offsite against loss or damages in full value starting from fabrication process, storing period until delivering it to the site.

v. Submission offsite supervision report

As a client, it is a good practice to monitor the progress not only onsite but also offsite activities. For IBS construction approach, most of the fabrication works are done offsite, therefore monitoring offsite is consider crucial to ensure the contractor manage to fabricate and deliver the IBS components based on the stipulated time, cost and quality. Most of the standard form of contract only required producing onsite supervision report. Only one (1) standard form of contract (FIDIC 2010) required the contractor to submit supervision on and offsite supervision report. For the offsite progress, the contractor needs to furnish certain information such as the name of the manufacturer, location of manufacturer, commencement of manufacturing, percentage progress, expected date of shipment and arrival at the site. This provision can be adopted for the local standard form of contract as offsite supervision report that can be monitor closely by the client.

vi. Extension of time

In certain cases, the contractor extension of time is needed due relevant events occurred. Most of the standard form of contract only acknowledged if the relevant events happened onsite. As for IBS construction approach, it is appropriate to consider relevant events occur offsite too as most of the construction activities are done offsite. In PAM 2006, PS 2014 and JCT 2011, there is a provision for extension of time stated that if there are civil commotions, strike or lockout affecting any of the trades employed upon the work or any trades engages in the preparation, manufacture or transportation of any material and goods requires for the works. This provision is highlighting that the offsite activities need to be considered as the whole construction progress. It is suitable for IBS construction approach, where the contractor feels secure and comfortable to adopt the IBS construction approach.

Conclusion

From the study conducted, it clearly shows that Malaysia's standard forms of contract are still lacking in the provision for IBS or prefabricated construction activities. It creates uncertainty and potential risk to the industry players thus low adoption in IBS construction approach. For IBS construction approach to be effective, attention needs to be placed not only on the technical part but also in the procurement aspect. It requires a fairer and practical standard form of contract to tailor to IBS construction approach. It needs to consider not only on onsite but also offsite activities and progress. To ensure that IBS construction approach can be adopted effective and efficiently, few provision which suits the interest of IBS construction approach are required. Previous researches and findings from the document analysis show that the current standard form of contract does not provide enough provision for the IBS construction approach. Therefore, it is necessary to enhance the standard form of contract to suit IBS construction approach hence accelerate the adoption of IBS construction. The output of this research will hopefully illustrate good insights to the industry and help to accelerate the adoption of IBS construction in Malaysia as a whole.

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References

- Abd Hamid, Z. et al., 2011. Industrialised Building System (IBS) Construction Supply-Chain Strategies of Malaysian Contractors. *6th International Conference on Construction in the 21st Century*. Available at: <http://www.vertilite.asia/f/2012/11/IBS-Supply-Chain-Strategy-for-Contractor.pdf>.
- Abd Jalil, A. et al., 2016. A new procurement method for housing projects implementing IBS modular system CIDB, ed. *IBS DIGEST*, pp.12–17. Available at: <https://www.facebook.com/JomIBS/>.
- Abd Shukor, A.S. et al., 2011. Supply chain management in IBS in Malaysia Construction Industry. *The Build Environment Review*, 4(Special Issue 1), p.108.
- Ashworth, A., 2006. *Contractual Procedures in the Construction Industry* illustrate., Pearson/Prentice Hall.
- Blismas, N. & Wakefield, R., 2009. Drivers, Constraints and the Future of Offsite Manufacture in Australia. *Construction Innovation*, 9(1), pp.72–83.
- Broome, J. & Hayes, R., 1997. A comparison of the clarity of traditional construction contracts and of the new engineering contract. *International Journal of Project Management*, 15(4), pp.255–61.
- Building & Construction Authority, 2015. Public Sector Standard Conditions Of Contract (PSSCOC). Available at: https://www.bca.gov.sg/PSSCOC/psscoc_construction_works.html [Accessed October 18, 2016].
- Chung, L. & Kadir, A., 2007. *Implementation Strategy for Industrialized Building System.*, Johor Bahru.
- CIDB, 2014. *IBS-Roadmap 2011-2015*, Kuala Lumpur. Available at: http://www.cidb.gov.my/cidbv4/?option=com_content&view=article&id=594:ibs-roadmap-2011-2015&catid=57&Itemid=577&lang=en.
- Construction Industry Development Board (CIDB), 2006. *Construction Industry Master Plan 2006-2015 (CIMP 2006-2015)*.
- Construction Industry Development Board (CIDB), 2015a. *Construction Industry Master Plan 2 (CIMP 2 2016-2020)*. , (January 2015).
- Construction Industry Development Board (CIDB), 2010. *IBS Road Map*. , (72).
- Construction Industry Development Board (CIDB), 2015b. *Input-Output Table*.
- Construction Research Institute of Malaysia (CREAM), 2011. *Proceedings of 1st IBS Roundtable Workshop*. Vasa, p.19. Available at: <http://medcontent.metapress.com/index/A65RM03P4874243N.pdf>.
- Gandu et al., 2009. Bidding model for sustainable projects using the traditional procurement method By. *The Information Manager*, 9(2), pp.36–43.
- Gibb, A.G.F., 2001. *Pre-assembly in Construction: A review of recent and current industry and research initiatives on pre-assembly in construction* In *Construction Research & Innovation Strategy Panel CRISP Consultancy Commission 00/19*, London.
- Halil, F.M., 2015. SUSTAINABLE VALUE TFIROUGH THE IMPLEMENTATION OF STRATEGIC PARTNERING IN DTDUSTRIALISED BUILDING SYSTEM (IBS). In *International Symposium in Developing Economies: Commonalities Among Diversities*. pp. 188–200.
- Harmon, K.M.J., 2003. Resolution of Construction Disputes: A Review of Current Methodologies. *Journal of Leardership and Management in Engineering*, 3(4), pp.187–201.

- Heap, Y.C., Balamuralithara, B. & Chong, S.C., 2011. Construction contract administration in Malaysia using DFD: a conceptual model. *Industrial Management & Data Systems*, 111(9), pp.1449–1464. Available at: <http://eserv.uum.edu.my/docview/895350932?accountid=42599>.
- Hellard, B.R., 1997. *Preventing and Solving Construction Disputes*, New York: Litton Educational Publishing Company.
- IBS Centre, 2007. *IBS Roadmap Review (Final Report)*, Kuala Lumpur.
- Jaafar, M. & Radzi, N.M., 2012. Building procurement in a developing country: A comparison study between public and private sectors. *International Journal of Procurement Management*, 5(5), pp.608–626. Available at: https://www.researchgate.net/publication/264836181_Building_procurement_in_a_developing_country_A_comparison_study_between_public_and_private_sectors.
- Jaafar, M. & Radzi, N.M., 2013. Level of satisfaction and issues with procurement systems used in the Malaysian public sector. *Australasian Journal of Construction Economics and Building*, 13(1), pp.50–65.
- Jack Ramus, S.B., 1996. *Contract Practice for Surveyors 3*, illustr ed., Laxton's.
- Kalsum, U. et al., 2011. (FIDIC CONDITIONS OF CONTRACTS FOR CONSTRUCTION - THE NEW RED BOOK 1999) AND MALAYSIAN'S STANDARD FORM OF BUILDING CONTRACT (PWD 203A). , (December), pp.25–27.
- Kamaruddin, S. et al., 2013. Perception Towards Cost Implication of Mechanisation and Automation Approch in IBS Projects in Malaysia. *29th Annual ARCOM Conference*, (September 2013), pp.213–222.
- Kamaruddin, S.S., Mohammad, M.F. & Mahbub, R., 2013. Enhancing the Quality of Life by Adopting IBS: An Economic Perspective on Mechanisation and Automation. *Procedia - Social and Behavioral Sciences*, 101, pp.71–80. Available at: <http://linkinghub.elsevier.com/retrieve/pii/S1877042813020752>.
- Kamarul Anuar Mohamad Kamar, Mustafa Alshawhi, Zuhairi Abd. Hamid, Mohd Nasrun Mohd Nawi, Ahmad Tarmidzi Haron, M.R.A., 2009. Industrialised Building System (IBS): A Review of Experiences in Uk and Malaysian Construction Industry. *2nd Construction Industry Research Achievement International Conference (CIRAIC)*, pp.1–12.
- Lutz Preuss, 2009. Addressing sustainable development through public procurement: the case of local government. *Supply Chain Management*, 14(3), p.213. Available at: <http://proquest.umi.com/pqdweb?did=1882559691&Fmt=7&clientid=3224&RQT=309&VName=PQD>.
- Mahdi, S.A., 2001. Gateway to Arbitration: Issues of Contract Formation under the U.C.C. and the Enforceability of Arbitration Clauses Included in Standard form Contracts Shipped with Goods. *Northwestern Univeristy School of Law*, 96(1). Available at: <http://heinonline.org/HOL/LandingPage?handle=hein.journals/illr96&div=17&id=&page=>.
- Malcon, 2012. Malaysian Construction and Contract Law. Available at: <https://simplymalaysia.wordpress.com/standard-forms-of-contract/domestic-standard-contract-forms/pam-2006/> [Accessed December 8, 2015].
- Mohamad Kamar, K.A., Alshawhi, M. & Abd Hamid, Z., 2009. BARRIERS TO INDUSTRIALIZED BUILDING SYSTEM (IBS): THE CASE OF MALAYSIA. In *9th International Postgraduate Research Conference (IPGRC)*. United Kingdom.
- Mohammad, M.F., 2013. Construction Environment: Adopting IBS Construction Approach Towards Achieving Sustainable Development. *Procedia - Social and Behavioral Sciences*, 85, pp.8–15. Available at: <http://www.sciencedirect.com/science/article/pii/S1877042813024592>.
- Mohd Fateh, M.A., Mohammad, F.M. & Abd Shukor, A.S., 2016. Review in formulating the standard form of contract for Industrialized Building System (IBS) construction approach in Malaysia. In *International Unimas STEM Engineering Conference 2016*. Kuching: Matec Web of Conferences, p. In press. Available at: <http://www.conference.unimas.my/2016/encon/>.

- Musa, M.F. et al., 2015. The Way Forward for Industrialised Building System (IBS) in Malaysia. , (MAY). Available at: <http://link.springer.com/10.1007/978-981-287-290-6>.
- Mushtaq, A.S., 2007. Overview of The 1999 FIDIC Contract Forms and The Multilateral Developments Banks Contract. In *Proceedings of the Pakistan Engineering Congress*.
- Nawi, M.N.M. et al., 2011. A critical literature review on the concept of team integration in industrialised building System (IBS) project. *Malaysian Construction Research Journal*, 9(2), pp.1–17.
- Rajoo, S., Davidson, W.S.W. & Singh, H., 2010. *The PAM 2006 Standard Form of Building Contract* 2010th ed., LexisNexis. Available at: <http://www.lexisnexis.com.my/store/catalog/apac/productdetail.jsp?&prodId=prod620010#>.
- Sarja, A., 1998. Open & Industrialised Building, CIB (the International Council for Building Research Studies and Documentation).
- Sharkey, J. et al., 2014. *Standard Forms of Contract in the Australian Construction Industry*, Melbourne.
- Shukor, A.S.A., Mohammad, M.F. & Mahbub, R., 2011. Supply Chain Integration Challenges in Project Procurement. *Management and Innovation for a Sustainable Built Environment*, (June).
- Singh, H., 2011a. *Harbans' Engineering and Construction Contracts Management (Law and Principles)* Second., Singapore: LexisNexis.
- Singh, H., 2011b. *Harbans' Engineering and Construction Contracts Management (Pre Contract Award Practice)* Second., Singapore: LexisNexis.
- The Joint Contract Tribunal Limited, 2016. The Joint Contract Tribunals. Available at: <http://corporate.jctltd.co.uk/about-us/our-history/> [Accessed October 18, 2016].
- The UK government Department of Trade and Industry (DTI), 2004. *Modern methods of construction in Germany – playing the off-site rule* In *Global Watch Mission Report*, United Kingdom.
- Ting, S.N. & Chin, L.W., 2013. Selection criteria and the related sub-criteria for the selection of standard form of contract for construction projects in Sarawak. *UNIMAS E-Journal of Civil Engineering*, 4(2), pp.33–38.
- Wilkinson, S. & Scofield, R., 2010. *Management for the New Zealand Construction Industry* 2nd ed., New Zealand: New Zealand: Pearson Education New Zealand Ltd.
- Zakaria, Z., Ismail, S. & Md Yusof, A., 2013. An Overview of Comparison between Construction Contracts in Malaysia: The Roles and Responsibilities of Contract Administrator in Achieving Final Account Closing Success. *Proceedings of the 2013 International Conference on Education and Educational Technologies (EET 2013)*, July 16-19, 2013, Rhodes Island, Greece, pp.34–41.

Table 1. Summaries findings from the document analysis

NO	PROVISIONS	PWD 203A 2010	PWD DB 2010	PAM 2006	PSS 2014	FIDIC 2010	AS 4300	JCT 2011
1	<u>Definition of unfixed material and goods</u>							
	-need to be onsite	√	√	√	√	√	√	√
	-can be offsite				√		√	√
2	<u>Evaluation of interim payment</u>							
	-progress work done	√	√	√	√	√	√	√
	-material onsite	√	√	√	√	√	√	√
	-material offsite				√		√	√
3	<u>Inspection, testing of material, goods and equipment</u>							
	-Already incorporated onsite	√	√	√	√	√	√	√
	-not yet incorporated onsite	√			√	√		√
4	<u>Insurance/Bond</u>							
	-Unfixed material onsite (any loss or damages)	√	√		√	√	√	√
	-Unfixed material offsite (any loss or damages)						√	√
5	<u>Submission offsite supervision report</u>							
	-on site progress		√			√	√	
	-off-site progress					√		
6	<u>Extension of Time (relevant events)</u>							
	-occurred onsite	√	√	√	√	√	√	√
	-occurred offsite			√	√			√