

LEVEL OF ACCEPTANCE TOWARDS INDUSTRIALISED BUILDING SYSTEM (IBS) IN MALAYSIA

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ABSTRACT

Construction practices towards conventional method is still being practiced widely even there were many researchers have done the studies on the inefficient of that method. On the other view, innovative construction had been the solution to improve the construction process flow. The need for innovation in construction industry is to enhance the efficiency for the success of project delivery. This could change the paradigm of norm construction practice which depends on conventional methods and a lot of non-value adding activities occur on that process flow. Industrialised Building System (IBS) is a method introduced to Malaysian construction players and it seem significance to the industry. This concept creates a new improvement for the successes of construction project by emerging techniques and materials in efficient way. This study shows the level of acceptance toward IBS concept comparing with conventional method. Interviews and questionnaires survey were done in getting data and analysed to get the factors relating time reduction, wastage and barriers of implementing it. Result shown the perception of construction players for IBS and it will provide to all parties the credits in choosing IBS concept for the project.

Keywords: *Industrialised Building System (IBS), level of acceptance, innovative construction*

1.0 INTRODUCTION

Malaysian construction industry is being innovated currently. It proved by contemporary or modernizing construction that being used in certain project implementation. The utilization of Industrialised Building System (IBS), innovative materials, efficient construction plants and modern machineries make construction phase excellence. Somehow, excellence in construction phase can help raised productivity and change the paradigm of the conventional method. IBS is being as practical approach in construction industry. Many of construction players and researchers stated that IBS will help the construction phase towards greater concentration on achieving a better construction which meets the needs of the client rather than conventional method which contributes waste. This paper will discuss on the issue of acceptance level from construction players towards IBS. The reason is to see the factors or barriers of implementing IBS and the reason of not being used widely in Malaysia.

2.0 LITERATURE REVIEW

2.1 THE USAGE OF INDUSTRIALISED BUILDING SYSTEM (IBS) IN CONSTRUCTION

The needs for increased efficiency in construction have been discussed widely among construction players and also academicians. However, the efforts have shown to be slower and the practice less successful [1]. The needs to be a greater concentration on achieving a better

construction which meets the needs of the end user have to be focus as an improvement aspect on conventional construction process. Modernizing construction using Industrialised Building System (IBS) seem to be one of construction improvement aspect in Malaysia. IBS is a construction system that is built using pre-fabricated components. The general view of the construction process is that it is in ordered, linear phenomenon, which can be organized, planned and managed top down. The frequent failures to complete construction projects on budget and schedule give rise to thinking that the process maybe not is as ordered and predictable in its nature as it may look [2]. A closer examination reveals that construction is indeed a complex, non-linear and dynamic phenomenon which often exists on the edge of chaos. Construction projects are in general rich in plan failure, delays, cost overruns and grief, indeed more so than successes. The project itself as an assembly-like process was often more complicated, parallel and dynamic. The mistake is the ordered view of the surrounding world. All supply chains are believed to be made in accordance with the project's schedule. All resources such as equipment's and workers are supposed to standby, ready for the project's beck and call. However, this is not the way the world operates. This happened because of the concept of site production. Every item seems to be done in-situ. Since 1998, the Construction Industry Development Board of Malaysia has been actively promoting the use of Industrialised Building System (IBS) in the Malaysian construction industry. The existing of IBS is to realign and change the paradigm of the conventional construction process which was lack of efficiency.

2.2 BRINGING MANUFACTURING PRACTICE IN CONSTRUCTION

Construction is a huge industry. For the improvement, the way looking on manufacturing practice is one of the actions towards modernising construction itself. By implementing Industrialised Building System (IBS), it brings the manufacturing principles along the process. The key element is prefabrication. Prefabrication actually increases standardisation and repetitiveness both in processes and products and also yields a progress of a construction process that is more comparable to manufacturing than on-site construction [3]. Thus, the development of prefabrication or industrialisation is a development that brings construction closer to manufacturing. Hence, industrialisation of construction through seems to be as a contribution of manufacturing principle to construction scenario towards value in construction. Figure 1 show the prefabrication context in construction practice.

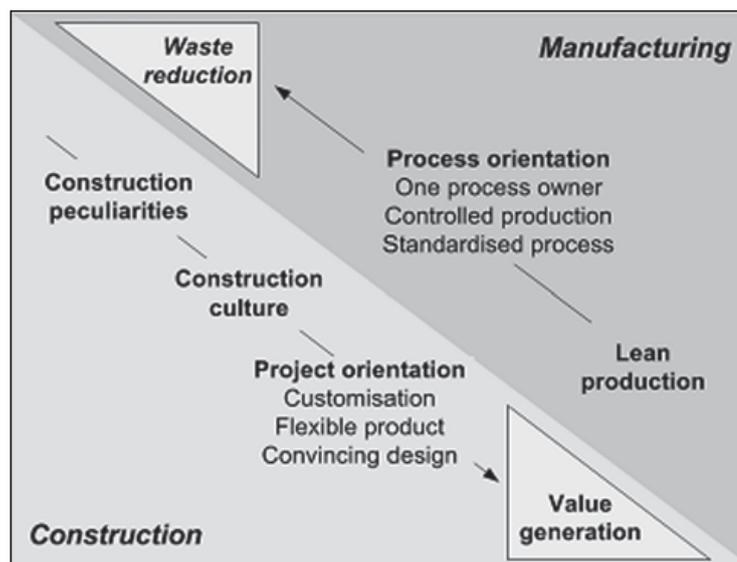


Figure 1: The prefabrication context in construction incorporates both manufacturing and construction [3]

The prefabrication context in construction thus edified by project or construction orientation that enable value generation in a construction environment and process orientation that enable waste reduction in a manufacturing environment.

2.3 INDUSTRIALISED BUILDING SYSTEM (IBS) IN MALAYSIA

The usage of IBS has been implemented stage by stage in the building industry [4]. The construction industry and private sector assume an important role in generating wealth and improving the quality of life for Malaysians through the translation of the government's socio-economic policies into social and economic infrastructures and building [5]. Meaning to say that construction industry in Malaysia was not stand alone sector but it brings together many others related sector including manufacturing. That's why the usage of IBS should tremendously been implement to change the norm of practiced. In Malaysia, the usage of IBS gives the opportunity to the construction industry to be more matured and it can be consider as modernizing method. The IBS, which enables on-site prefabricated or building components manufactured at factories, will enable cost saving and quality improvement through the reduction of labour intensity and construction standardization. Apart from this, it offers minimal wastage, less site materials, cleaner and neater environment, controlled quality and lower construction cost. Table 1 show the benefits of IBS compare from conventional construction system.

Table 1: Benefits of IBS From Literature

Item	Benefits	Supporting Statement
1	Reduce remittances by foreign workers	The Malaysian government aimed to achieve 100 percent usage of IBS and to reduce 15% of foreign workers in the construction industry [6]
2	Enhance efficiency	Construction industry is driven towards the adoption of integrated and encouraging key players in the construction industry to produce and utilize pre-fabricated and mass production of the building at their work sites. This will help to enhance the efficiency of construction process, allowing a higher productivity, quality, time and cost saving [7].
3	Produce better product	IBS promises elevated levels of expertise throughout the industry, from manufacturers, installers, engineers, planners, designers and developers. The benefits of IBS will ultimately produce better products for the population [8].
4	Reduce wastage, less site materials, costs, cleaner and neater environment	Enables on-site prefabricated components manufactured at factories offer that benefits [8].
5	Higher quality of component	Attainable through careful selection of materials, use of advanced technology and strict quality assurance control.
6	Reduce labour at site	Prefabrication takes place at a centralized factory, thus reducing labour requirement at site. This is true when high degree of mechanization is involved [9].
7	Faster completion	Casting of precast element at factory and foundation work at site can occur simultaneously. This provides earlier occupation of the building, thus reducing interest payment or capital outlays [10].
8	Not affected by adverse weather condition	Construction operation is not affected by adverse weather condition because prefabricated component is done in a factory controlled environment [10].
9	Flexible design	Allows flexibility in architectural design in order to minimize the monotony of repetitive facades [9]. IBS provides flexibility in the design of precast element as well as in construction so that different systems may produce their own unique prefabrication construction methods [11].

*Extract literature from Haron et. al., 2009 [4]

The common consensus of all the stakeholders of construction in Malaysia is that the IBS implementation in construction industry is still very low compared to the conventional methods. This is due to several reasons as in Table 2.

Table 2: Summary of barriers to adoption of IBS in Malaysia

Item	Barriers	Supporting Statement
1	Return investment	Wide swings in building demand, high interest rate and cheap labour cost, make it difficult to justify large capital investment. At present there is an abundance of cheap foreign workers in Malaysia and contractors prefer to use labour intensive conventional building system because it is far easier to lay off workers during slack period.
2	Lack of manpower skilled	Fully prefabricated construction system requires high construction precision. Malaysian labour force still lack of skilled workers in IBS implementation.
3	Nature practices	The construction industry is very fragmented, diverse and involves many parties. Consensus is required in the use of IBS during planning stage.
4	Knowledge based	Lack of R&D in the area of novel building system that uses local materials. Majorities of IBS in Malaysia are imported from developed countries, thus driving up the construction cost. Engineering degrees in local universities seldom teach about the design and construction of IBS.
5	Low quality	The use of IBS in Japan and Sweden are so successful due to high quality and high productivity but it is the opposite in Malaysia. Previous projects constructed with IBS concept were of low quality and high construction cost.
6	Lack of incentive and awareness	Due to lack of incentive and promotion from government in the use of IBS, many architects and engineers are still unaware of the basic elements of IBS such as modular coordination.
7	Lack of scientific information	An IBS can only be accepted to practitioners if its major advantages are valuable compared to the conventional system. However, up to date, there is inadequate corroborative evidence to substantiate the benefits of IBS system. It is therefore, arguable that the implementation of IBS is particularly hindered by lack of scientific information [12].
8	Wastage of material	Standardization of building agreements faces resistance from the construction industry due to aesthetic reservation and economic reason. One good example of this is when a 300mm thick modular standardized floor slab has to be used although a 260mm thick floor slab can achieved the similar structural performance. This results wastage of material [10].

*Extract literature from Haron et. al., 2009 [4]

3.0 OBJECTIVES

Industrialised Building System (IBS) is the way forward for construction players to make leaps and bounds progress in the construction industry. To get the level of acceptance for IBS among construction players, this paper will flow with the objectives of:

- i. To study the impact of IBS in construction process flow;
- ii. To identify the perception from construction players regarding the improvement aspects by implementing IBS; and
- iii. To evaluate the level of acceptance for IBS implementation in Malaysia.

4.0 METHODOLOGY

The main aim of this paper is to get the perception of Industrialised Building System (IBS) implementation from construction players like consultant, architect, contractors and clients. Methodology and procedure have been identified in figure 2 for the success of this paper.

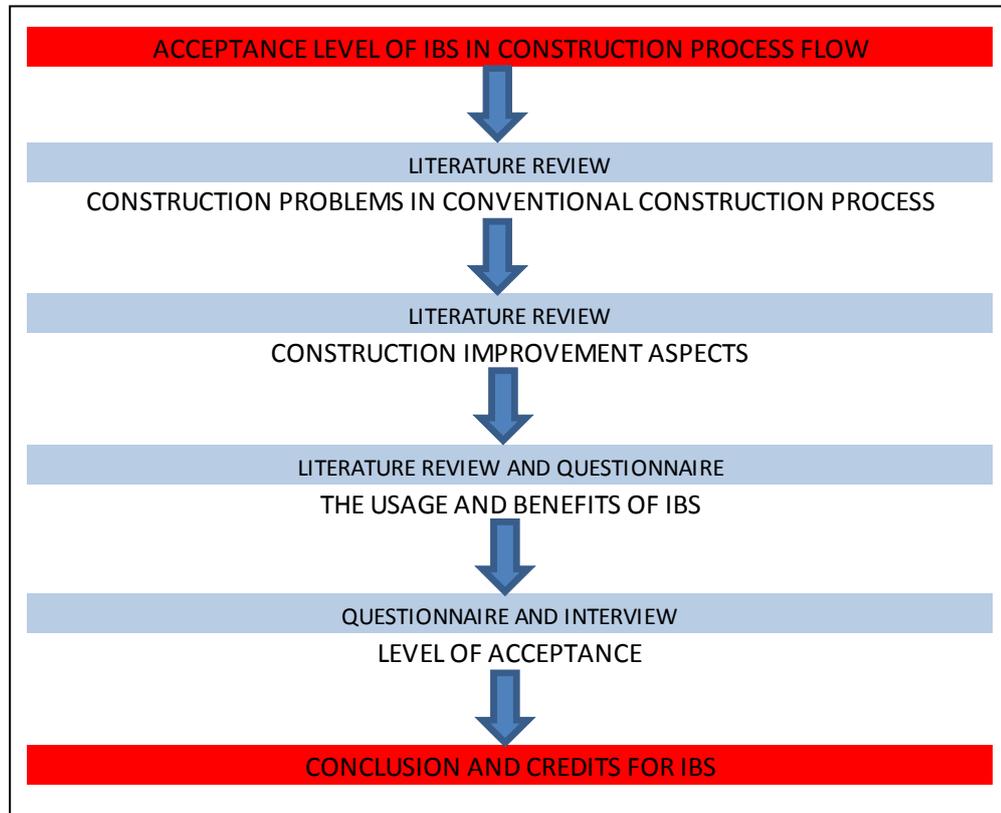


Figure 2: Methodology chart

Construction problems were defined using questionnaires and 5 top issues were list accordingly to the mean calculation. These issues were the key data in developing the method for construction improvement. The benefits of IBS also have been determined from the questionnaires. From the various credits for IBS, the levels of acceptance were calculated using average numbers towards time reduction and wastage of activities. The level of acceptance were rank using scale 1 to 10 which represent less acceptance level to high acceptance level of agreement.

5.0 ANALYSIS AND RESULT

The respondents that involves in this study are the individual that related to construction industry. They were called as construction player. Figure 3 show the percentage of respondent's position that involve in the questionnaire survey.

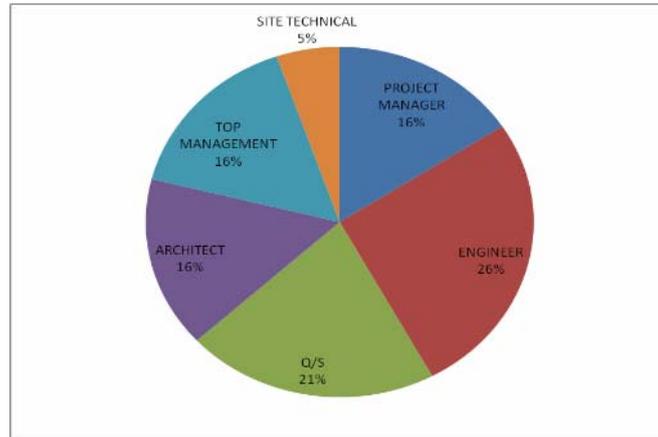


Figure 3: Percentage of respondent's position that involved in questionnaire survey

Majority of the construction players in Malaysia know about IBS. From the survey, all of respondents (100%) have knowledge about IBS. They also agree that there is the time to change the paradigm of the conventional construction process. 74% of respondents have their said that conventional construction need to be improved using IBS. This is because the conventional construction has many problems and table 3 show top five of the problems from the survey.

Table 3: Conventional construction problems from respondent's perception

Rank	Conventional construction problem	Mean
1	Conventional construction using huge number of workers	4.05
2	Conventional construction activities complicated	4.00
3	Conventional construction always performs in low quality output	3.89
4	Conventional construction contributes lot of non-value activities	3.68
5	Conventional construction always delay	3.21

IBS seems to be a concept that can improve the conventional construction. The practice have been used by construction players but not widely practiced. There were some credits to IBS as in table 4.

Table 4: IBS output for construction

Rank	Usage of IBS in construction sector	Mean
1	IBS using less raw materials on site	4.11
2	IBS output are higher in term of specification	4.11
3	IBS produce less pollutant on site	4.05
4	IBS truly reduce material wastage	4.05
5	IBS concept is not complicated	3.89
6	IBS truly reduce overall construction time	3.79
7	IBS can ensure the successful of project delivery	3.74
8	IBS truly reduce non value adding activities	3.74
9	IBS need few workers	3.68

There are some perceptions from construction players that really promote IBS to slot in conventional activities. Figure 4 show the percentage of agreement regarding the experienced of implementing IBS concept.

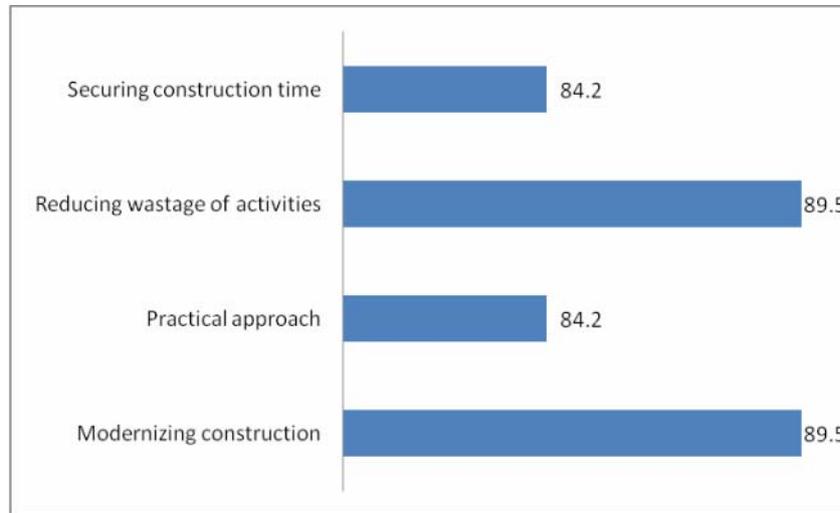


Figure 4: Percentage (%) of general agreement towards implementation of IBS concept in Malaysia

Finally, the main aim of this paper is to get the acceptance level for IBS usage among construction players. It will give credit to IBS implementation and to promote IBS as well. The acceptance level has been divided into two main factors such as “IBS related to wastage of activities” and “IBS related to time”. The level of acceptance will be based on the scale of:

- Low acceptance level if score less than 5; and
- High acceptance level if score more than 5.1.

Result from the questionnaire analysis show that the level of acceptance is high for both factors as table 5.

Table 5: Level of acceptance by construction players from questionnaires

Item	IBS related to:	Score
1	Reduce construction time	7.8
2	Reduce wastage of activities	7.1

The score of 7.8 show that construction players highly accept that IBS was the key driver for improvement in bringing time reduction. It can cut short the duration of each activity involved and therefore securing project completion date. This highly score give the turning point for changes whereby construction players need securing project duration and in the same time dealing with specification. For statement of reducing activities wastage, the score level was 7.1. It also shows that the construction players have a high level of acceptance towards an issue of reducing

wastage of activities. From the IBS sequence of work, it truly reduces many unnecessary and double handling works in conventional construction. Therefore, the whole pictures of this paper show that the numbering of acceptance level for implementation of IBS is high.

6.0 CONCLUSION

From the questionnaire and literature, Industrialised Building System (IBS) really give advantages in performing the improvement of the conventional construction process. Although the long-introduced IBS has promised to solve and improved the current construction method and scenario, but the IBS method has been low in gaining popularity, partly due to lack of awareness and coordination among the relevant parties. Currently, the level of IBS usage is very low as compared to the conventional methods in building construction. In spite of its many benefits, the different perceptions among the construction players and practitioners towards its application in construction industry has led to the low usage of IBS components in the construction industry. Nonetheless, there are still some areas in the IBS management that can be look to conduct a research for further studies and improvement. The finding of this study gives an effective strategy to implement IBS in the current state of the construction industry.

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