



Key success factors for team integration practice in Malaysian Industrialised Building System (IBS) construction industry

Mohd Nasrun Mohd Nawi¹, Mohamed Nor Azhari Azman², Wan Nadzri Osman¹, Kamaruddin Radzuan¹,
Mazri Yaakob¹

¹School of Technology Management and Logistic, Universiti Utara Malaysia, 06010 Sintok Kedah, Malaysia, ²Faculty of Technical and Vocational Education, Universiti Pendidikan Sultan Idris, 35900 Tanjung Malim, Perak, Malaysia

Correspondence: Mohd Nasrun Mphd Nawi (email: nasrun@uum.edu.my)

Abstract

Industrialised Building System (IBS) has been recognized as synonymous with industrialisation of the construction industry. In Malaysia, the domination of traditional method in IBS project has gained much attention not only from researchers but also construction industry practitioners as the implementation of IBS through traditional approach almost always led to the rise of construction problems such as increasing project time and cost, redesigning, ineffective supply chain, and others. Fragmentation process in traditional method is not a line with the concept of IBS which is required a high communication and collaboration among the project stakeholders. This study took closer look at current practice of IBS projects in Malaysia, at the need for an integration approach, and at the availability of integrated approaches in IBS projects with the objective of identifying critical success factors for integrated teams in IBS construction projects. The findings from the Focus Group Discussion (FGD) among construction industry stakeholders revealed the main barriers to the IBS adoption in Malaysia's construction industry to be poor integration among project stakeholders during the planning and design phase. This was due to the domination of the fragmentation concept of the traditional method.

Keywords: construction industry, fragmentation concept, Focus Group Discussion (FGD), Industrialised Building System (IBS), success factors, team integration

Introduction

The involvement of industrialisation is understood in a number of terms in past studies such as Modern Method of Construction (MMC) (BURA, 2005), Offsite Construction (OSC), Offsite Manufacturing (OSM) and Offsite Production (OSP) (Goodier & Gibb, 2006), Preassembly (Gibb & Isack, 2003), Prefabrication (Tatum, 1987) and Offsite prefabrication (Gibb, 1999). However, Industrialised Building System has been recognized as synonymous with industrialisation of the construction industry (CIDB, 1999). In Malaysia, IBS term of IBS is has been defined as "the utilisation of technique, product, component, or building system through prefabricated process and on-site installation the building component" (CIDB, 2003). The advantages of IBS towards enhancing the construction process has been widely addressed across the globe such as United Kingdom, Finland, Australia, Germany, Netherlands, Canada, Sweden, Hong Kong, and others (Chiang, Hon-Wan Chan & Ka-Leung Lok, 2006; Jaillon, Poon & Chiang, 2009; Thanoon, Peng, Kadir, Jaafar & Salit, 2003). Therefore, till dates there are tremendous of advantages of IBS has been reported in literature. Table 1 below illustrates some of the advantages of IBS in construction industry.

Table 1. Advantages of IBS

Author	Advantages
Bing et al, (2001)	- optimum use of material - Less wastage of construction project
Nawi et al (2011); Shaari & Ismail (2003); Thannon et al 2003b)	- High quality of building component - Employment skilled workers
Nawi et al (2014a); Thanoon et al 2003a)	- Reduced construction time and overall cost
Warszawski (1999)	- Reducing labour requirement
Nawi et al (2014b); Shaari & Ismail (2003)	- Less impact towards environment/ environmental friendly

The existence of IBS has gained much attention from Malaysia government especially through its agencies such Construction Industry Development board (CIDB) and Public Work Department. Tremendous of effort has been taken such as development of IBS Roadmap 2003-2005, 2007-2010 and 2011 to 2015. The development of IBS Roadmap has significantly useful as a solid reference that cover 5M (manpower, material-component, machines, management-process-methods, monetary and marketing) to construction practitioners to embrace IBS approach in their project. However, the adoption of IBS among the construction practitioner is still far from mature. For example, the objective IBS roadmap 2003-2007 is to achieve at least 50 percent of completed project through IBS. But, IBS Roadmap review in 2007 has revealed only 10 percent of the government target is completed. This figure has attracted much attention from researchers in construction domain. Till date, several of studies has been conducted in past to investigate the barriers of IBS adoption.

For example, cost, poor skill and knowledge, logistic and supply chain, lack of technology and readiness issues, lack of resources and manufacturing capability, lack of government incentive, misunderstanding of building regulation and lack of communication and integration in design stage (Kamar, Alshawi & Hamid, 2009; Nawi et al., 2014a) However, this paper will only focus significant of team integration on communication and integration through design stage in order to identify critical success factor of integrate project team in Malaysia IBS project.

Fragmentation issue in IBS Malaysian construction projects

Due to rapid development of construction industry, construction project has become more complex and required an effective approach particularly in increasing collaboration among multiple stakeholders. Yet, the traditional construction process has been addressed as a drawback due to its fragmentation concept especially in design phase. Although IBS has been introduce in Malaysia over a decade ago, yet most of the IBS project is still based on traditional construction project (CIDB, 2009; [Nawi et al., 2011](#); [Nawi et al., 2014b](#)). Fragmentation concept in construction process is a lethal issue that can negatively affect construction project. The effect of this concept is worsen in IBS project. For example, the absent of manufacture and contractor in design phase can led to problem such as supply chain issues (delay and late of supply). Supply chain problem such as delay or shortage in supply in IBS project has been highlighted as a main barrier in successful of IBS project. This is due to the concept of IBS which is depending on prefabrication project material. Supply chain is not the only problem cause by fragmentation process, it can also led to inefficient information flow, quality, safety, increase error, time, and cost and misunderstanding between designer and contractor ([Love & Sohal, 2002](#)). In addition, situation where planning and engineering are separated can reduce an opportunity to reduce project tine and cost, increase quality of outcome of project (CII, 1996). All the aforementioned issues have illustrates the significant of an effective communication and collaboration between project stakeholders at early stage of planning and design phase. Thus, there are several of studies in past has highlight the needs of team integration in construction process ([Baiden, 2006](#); [Vyse, 2001](#)).

An integration approach in IBS project

Team is a one of the portion group that has been created with a specific and common goal. The term of integration is mostly used to illustrate group, teams or teamwork. In literature, a number definition of integration has been developed (Baiden, 2006; Dainty, Briscoe, and Millett, 2001; [Howell, 1996](#)). However, the term of team integration has been used in construction industry to represent a collaborative work of environment culture create by all stakeholder who involved with project delivery in construction project (Vyse, 2001). Most of the previous studies of team integration in construction domain have widely focused on enhancing project procurement and product delivery process ([Baiden et al., 2003](#)). As a result, delivery team on construction can be addressed as fully integrated if and only;

- The team delivery has single focus, objective and responsibility towards project (Baiden, 2006)
- Has different disciplines working concurrently on processes and has no co-ordinated activities (Love, Mohammed & Tucker, 2004)
- High communication and collaboration among stakeholders towards mutual beneficial objective ([Baiden et al., 2006](#); [Baiden et al., 2003](#))
- Early consideration and fully utilized the collective skills and expertise (Love et al., 2004; Baiden et al., 2006).
- The adoption of no boundaries concept among the various organization members ([Baiden, Price & Dainty, 2003](#))
- Providing an equal opportunity to contributes on delivery process (Austin et al., 2002; Love et al., 2004).
- An effective of information flow among the team member (Vyse, 2001; Baiden et al., 2006).
- The elimination of “blame culture” (Baiden et al., 2006; [Baiden, 2003](#); Vyse, 2001).

In addition, there are several of approach has been proposed for the purpose of team integration in construction project delivery. For example, integrated project delivery approach and building information modelling (BIM) tool have been proposed to increase the collaboration among the project stakeholders in traditional construction process ([Nursal et al., 2014](#)). In addition, an integrated project delivery namely Design and Built (DB) also has been introduced (Bourn, 2001). Not only that, another integrate project delivery as known as Integrate project delivery has also been developed in order to fulfill some of shortcoming previous integrated project delivery ([Nawi et al., 2014c](#); [Khemlani, 2009](#)). Due to increasing of construction project, several of new manufacturing concept such lean manufacturing, concurrent engineering (CE) and Supply Chain Management (SCM) has been utilized in construction industry. This type of concept is based on increasing need of customer either through integrated supply chain or concurrent process for better quality and value (Love et al., 2004). This is in line with the need of supply chain in IBS that required an integrate approach. Although, there has been numerous of studies and approach attempt to improve construction design team towards integration, yet there is no specific study attempt to investigate the critical success factors for integrate project teams in IBS construction project. From literature, there is a need for identification of critical success factors for industry in order to achieve an effective integrates approach. Thus, to fulfill the purpose, it is significant to review a need of integrated approach and the availability of current best practice of integrates procurement, approaches, concept and management strategies. Table 2 has present some of integrated project delivery and few new integrate concept from manufacture towards IBS project.

Table 2. Available integration approach in IBS

Type of approach	Application in IBS
Design and Build (DB)	Theoretically DB can be considered as potential solution towards communication problem and increasing collaboration between project stakeholders in IBS. This collaborative procurement enables the involvement of contractor and manufacturing in design phase. This can decrease the probability of error in construction project.
Integrate Project Delivery (IPD)	IPD is a new project delivery that based on integration concept. Different with DB, the IPD concept is clearly based on integration of people, system, business structures and practice. This integration is significant in order to optimise overall process in IBS project particularly in planning and design phase.
Lean Manufacturing	Accordingly, a new project delivery system was introduced that can be applied to any kind of construction project but is particularly suited for complex, uncertain, and quick projects such as IBS. Under this new Lean Project Delivery System, major steps have to be taken in order to overcome the issue of fragmentation existing in current Malaysian IBS design processes.
Partnering	Partnering has been proposed in IBS project by offering a “win-win” environment. This approach might be considered as a suitable approach to encourage a good relationship among the project stakeholder. This can automatically enable contractor to involve in design stage and contribute in term of knowledge, skill and experience towards the project.
Concurrent Engineering (CE)	CE is a systematic and multifunctional team approach concept that focuses on client satisfaction. This approach is more emphasizes integrated-product development. Therefore, it has been consider as a potential solution to deal with fragmentation issue in current IBS project delivery.
Supply Chain Management (SCM)	This approach can be fully utilized only through integrated working environment. Although, supply chain management has been address a significant towards supply chain process, yet this approach need is not suitable for IBS project. This is due to the complexity in IBS project life cycle management.

Methodology

The findings obtained in this paper were collected through a focus group discussion (FGD). The focus group discussion in this study has been conducted through collaboration between the Construction Industry Development Board (CIDB); Construction Research Institute of Malaysia (CREAM); IBS Centre; and the Universiti Utara Malaysia. The participants have been divided into six main groups in which represented by multidisciplinary background of IBS construction stakeholders such as designer, contractor, manufacture, government, and developer. The selection of participant in this study based on several criteria such as at least 5 years working experience, completed several of local IBS project, possess sufficient qualification, knowledge and skills in their field.

Research finding

The findings from the FGD shows that all of the participants agreed that personal working attitudes are an essential element for successful integrated design team delivery in Malaysian IBS projects. The

representative from group (2) declared that his group held a similar view to the researcher's statement that "loving what you do at work can be a powerful motivator for group performance including commitment, continuity and positive self-improvement."

At the same time, participant from group 2 said that although there has to be flexibility in the work schedule, the foremost need is for top management to know how to monitor the progress of the work and to align it with the project's schedule. The following statement confirms this sentiment;

'We would not favor forcing people if they don't want to. Give them some flexibility to complete the job because we know everybody has their own method of completing a job. However as managers we need to monitor their work progress constantly'

On the other hand, Group 5 indicated that the power of peer pressure and 'doing a challenging task' will sometimes motivate the individual to become dedicated and to work harder. Group representative added that, building a foundation of mutual respect and understanding over the course of the project is a powerful motivating force for team members to meet commitments. From the perspective of another group they stated that an excellent interpersonal skill among team members helps to develop and improve the effectiveness of the integrated design team. Participants from group also declared that;

'Our group agreed that 'openness of thinking' is the key factor to the team being excellent and working in a collaborative manner'

In respect of the team base accountability factor, all the groups of participants asserted that the 'sense of ownership' attitude is a vital factor in improving team integration in Malaysian IBS projects. According to a representative from group, every project team member should have this attitude. The participant explained that when every project member has this attitude it will indirectly influence them to take responsibility for the results, and hold themselves accountable for their commitment. Participants from group 2 also explained that this ownership attitude encourages people to be creative, take appropriate risks, and show loyalty to the project team. This statement however was criticised by the participants from other groups. Group 3's point of view was that creating this attitude is, however, neither quick nor easy. The representative from the group further mentioned that;

'Every employer or client hopes to have employees or project teams that are run by individuals with a sense of ownership of their place on the project or in the organisation. However, to achieve this aim a project team needs more tolerance between top and lower ranks of staff'

The same participant suggested that the team leader must able to generate some ideas on how to instill a sense of ownership among project team members. The participant then gave some examples of this approach such as; treating all the members as owners, involving employees in critical decisions and sharing information openly among employees including the financial condition of the company.

Conclusion

Research has revealed that one of the main barriers in IBS adoption in Malaysia construction industry is poor integration among the project stakeholders involved during the planning and design phase. This is due to the domination of traditional method in current IBS project that based on fragmentation concept. This adoption of IBS through traditional method has been widely criticised by numerous of researcher and industry practitioners. This is due to the concept of traditional method that led to construction problems such as increasing cost, increasing time, adversarial relationships between parties, ineffective of supply chain, error in design, and others. From literature, there are tremendous of integration effort has been

proposed and discussed such as Design Built, Integration project delivery, Lean construction, Supply Chain Management, Concurrent Engineering, Partnering and others. Although each of this approach can be considered as a potential solution towards fragmentation problem in IBS project process, yet each of them has their own advantages and disadvantages. Thus, this paper has highlighted the need of team integration in IBS construction project from literature review. In addition, this paper also has presented an availability of integrate approach in Malaysia IBS construction project. Thus, this paper has set a foundation for further researches in identification of critical success factors for integrate project teams in IBS construction project.

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