Managing IBS Project: The evolving roles and competencies of project manager

Izatul Laili Jabar[1], Faridah Ismail[1], Nur Mardhiyah Aziz[2]

[1] Faculty of Architecture, Planning & Surveying,
Universiti Teknologi MARA, 40000 Shah Alam, Selangor, Malaysia.
[2] Faculty of Built Environment, Universiti Malaya, 50603 Kuala Lumpur Malaysia

izatul_laili@salam.uitm.edu.my, farid346@salam.uitm.edu.my, nurmardhiyah@gmail.com

Abstract

The purpose of this paper is to investigate the initial information related to the roles and competencies required for a project manager who managed IBS construction projects in the Malaysian construction industry. Semi-structured interviews were conducted with the project managers who have experience in managing an IBS construction project. The finding reveals unanimously agreed that the project managers who managed IBS construction projects have to undertake extra roles which required additional competency as compared to the generic construction projects. It is hoped that the findings from this research will assist the project managers in their career development.

Keywords: Competence; Construction; Project manager; Industrialized building system

http://dx.doi.org/10.21834/ajbes.v3i11.107

1.0 Introduction

Industrialized Building System (IBS) is not a new technology adopted in our country. IBS implementation can be seen as early as in 1960's in Malaysia. The first IBS pilot project in Malaysia started 50 years ago which situated at Jalan Pekeliling. Nearly 22.7 acres of land were developed in 17-storey flats (300 units of low-cost flat and 40 shop lots). The second IBS project constructed at Jalan Rifle Range Penang in 1965 which consists of six blocks 17-storey flats and three blocks 18-storey flats (Kamar et. al., 2007). Despite the early adoption, IBS in Malaysia only became prominent in 1998, it began with an IBS Strategic Plan endorsed by the Cabinet of Ministers, which plays a role as the blueprint for the total industrialization of the construction sector. Since then, the Construction Industry Development Board (CIDB) has been actively promoting the use of IBS in Malaysian Construction Industry (Mohamad et al., 2009).

IBS can be described as the construction technique that involved the using of prefabricated construction components that are manufactured in a controlled environment, transported, positioned and assembled with minimal additional site work (Hamid, et. al., 2008). The introduction of Industrialized Building System (IBS), adding to the variety of systems, technologies and methods to be implemented in the Malaysian construction industry. IBS is a building system promoted by the Malaysian government to encourage the systematic construction process (Hamid et al., 2008). According to Nadim & Goulding (2011), industrialization is a business strategy that transforms the traditional construction process into a manufacturing and assembly process to reduce cost, time, and improve the quality of the product. This approach achieved by engaging pe**o**ple, embracing new technologies and translating clients' needs into building requirements through new contractual working relationships across the supply chain. The use of IBS will overcome the issues of repetitive part of the building, but difficult, time-consuming and costly labor at the site

As reported by IBS Centre CIDB (2007), the highest IBS score for the IBS project in the Klang Valley is 83 while the lowest is 21.5, average IBS score is 62. The percentage indicates that most of the IBS construction projects are still consolidating with the traditional construction method. Due to the combination of these two approaches, IBS project can be assumed as a multi-task and complex project. Moreover, the IBS construction process consolidated with many issues (Jabar et al., 2013), thus managing IBS project required a qualified and experienced organization led by a competent project manager to achieve successful deliveries (Clements & Gido, 2012). On the other hand, Skulmoski et al., (2010) stated that the competencies required by a project manager varied according to project type and project phases. Accordingly, in addressing the knowledge gap in the construction level, this paper will present a semi-structured preliminary interview findings concerning the roles and competency required for a project manager in managing the construction process of IBS projects.

2.0 Literature Review

A project manager is a business entity that facilitates the use of the construction management project delivery system on a construction project. According to Zwikael (2011), a manager who managed the construction project, is the person held accountable for the provision of the project's outputs and for meeting the project's constraints. They may initiate, plan, execute, monitor and close a whole project or just part of the project. The term project manager is also used to identify individual practitioners that are part of the construction management organization. In the context of this research, a project manager can be defined as a person (owner or salaried employees) of the construction company overseeing the construction management of a project. Sufficient competencies enable the project manager monitor and control the progress of the project smoothly. One of the important tasks of a successful project manager is to be able to handle unexpected situations efficiently (Isa, 2007). Therefore, a project manager must possess required competency in term of skills, knowledge and behavior (Crawford, 2000). The construction process consists of five stages in project management which are initiating, planning, executing, monitoring and closing and it deal with various participants. The primary role of project manager is to coordinate the activities within the project management process with the different team members to ensure that they perform the right tasks at the proper time (Clements & Gido, 2012). A project manager has to make sure that those who work on the project have the appropriate knowledge and resources, to accomplish their assigned responsibilities (Sutton, 2011). Isa (2007) stated that the project manager roles started as early as in the initial stage, where the project manager required to evaluate and determine appropriate construction methods and the most cost-effective plan and schedule.

Crawford (2000) highlighted that, to perform satisfactorily, a project manager is expected to have accurate knowledge and understanding of their roles. A project manager has to combine the required technical knowledge and behaviors that may stimulate effective teamwork and communication to achieve favorable outcomes (Dainty et al., 2005). According to Ahsan (2011), a competency can be defined as a cluster of related knowledge, skills, and behaviors that affect a significant part of one's job correlates that individual needs to perform roles on the job. It can be measured against well- accepted standards and can be improved via training and development. When applied to project management, competence is the ability to perform activities within a project environment to expect and recognized standards. Yepes et al., (2012) stated that nowadays, more challenges faced by the project manager as the magnitude of complexity of a construction project increase, thus, it hence the requirement of additional competencies. Ahsan (2011) and Crawford (2005) stated that, to be competent the project manager are required to satisfy the three dimensions of competency which are knowledge competence, performance competence and personal competence. On the other hand, Omran et al., (2012) have outlined the concept of project manager competency which consists of personal characteristics (self-reflection; leadership / team management), attitudes (personal values; organization / project / events), knowledge competence (organizational context, scope, quality, risk, value, time, cost, materials and human resource management) and skills competence (project / event process, communication, leadership).

Meanwhile, Fotwe & McCaffer, (2000) grouped the primary and secondary competency required by the project manager in delivering a project management activity into several clusters under knowledge and skills category. It includes technical, managerial, financial, legal, communication and general.

3.0 Methodology

To examine the required roles and competency for the project manager who managed IBS construction projects, a semi-structured interview was conducted. A total of seven (7) face to face interviews carried out with the project managers who have experience in managing an IBS construction project. The interviews reached a saturated point after the seventh interview session. A semi-structured interview questionnaire began initially with sixteen (16) questions. The questions were divided into three (3) sections, section A- background of the interviewee; Section B- the project manager's roles and Section C-the project manager's competencies. A set of questionnaire was presented to each interviewee by email before the interview for better understanding and communication during the interview session. The results of the interviews analyzed by using the content analysis method in the form of the matrix table in Microsoft Excel format. The data were then identified into themes and developed into a pattern.

4.0 Results and Discussions

General information relating to the interviewees involved in this research was compared as summarized in Table 1. The majority of interviewees possesses a degree as their academic qualification and has more than ten years working experience with a total number of construction projects handled more than 16 projects. A lengthy duration may be reflective of the long period of experience needed to attain a status of a manager. However, most of the interviewees only experienced in managing 3 and fewer numbers of IBS construction projects, reflexing IBS method regarded as a nonpopular choice in the Malaysian construction industry. The table also indicates that the most popular IBS components used are precast concrete and steel framing system.

Table 1: Overview of the interviewees

Interviewee	A	B	C	D	E	F	G
Designation	Project Manager	Project Manager	Project Manager	Project Engineer	Project Manager	Project Manager	Project Manager
Academic Qualification	Degree	Degree	Degree	Degree	Diploma	Degree	Diploma
Gender	Male	Male	Male	Male	Male	Male	Male
Years of experience	More than 10	5-9 years	More than ten years	5-9 years	More than ten years	More than ten years	More than ten years

No of construction project handled	10-15	6-9	16-20	1-5	16-20	16-20	16-20
No. of IBS project handled	6	6	3	1	2	3	2
IBS component used	Precast concrete, blockwork system, formwork system, steel framing.	Blockwork system, formwork system, steel framing system, Timber framing system	Blockwork system, formwork system, steel framing system	Precast concrete system, steel framing system	Precast concrete system, formwork system	Precast concrete system, steel framing system	Precast concrete system, formwork system

From the interview sessions, the majority of the interviewees agrees that time is the most critical factor in managing the IBS projects compared to the conventional projects. In IBS construction process, managing time as per schedule is important to ensure the delivery of the components is within the estimated time. Determining the components time arrival is necessary for the plants and machinery to get ready to receive the components. Any delay in delivery schedule will affect the utilization of plants and machinery, indirectly incurred the cost. Simultaneously, the plant and machinery should be prepared to handle the component arrival and installation, failure to prepare the plant and machinery will result in the problems of double handling, storage and time delay which later will affect the cost. Other than the plant and machinery arrangements, ensuring the in-situ works are ready before the installation is crucial to ensure immediate installation upon components arrival on site. Only one interviewee stated that planning as a critical factor in managing the IBS projects. According to interviewer E, having a good planning is essential as the construction project manager should be well versed about the sequence of construction activities. Furthermore, IBS project is not like the conventional project, where changes can be made at a minimum cost. IBS projects are not flexible; thus, it requires a proper planning to ensure that the site and machine are ready and prepared to receive the components and installation.

The project manager roles started with defining the scope of works, by identifying the IBS components used and managing the drawing conversion process. Followed by the establishment of the work program which associated with time planning for component delivery, plant and machinery arrangement, labor usage and activity sequencing. The critical part in the planning process is integrating the work program with the supplier (component and plant) and installer programs. For the execution process purposes, the project manager has to make sure the site, plant and machinery are prepared to receive the installation works. There are more works on integration and coordination management here such as coordination of IBS components and plants supplier and make sure the integration of their work. The project manager has to ensure that the technical coordination of dimensional interfacing between IBS components and also with other trades. On the monitoring part, the

component sequencing, alignment, horizontality, verticality and the jointing area should be closed monitor to ensure sound quality achieved. The project manager has to make sure the progress is according to work program by controlling the schedule.

The interviewees have a consensus on the critical phase to manage in IBS construction process is the planning process. The planning by using the work program must be excellent because it will be the guideline not only by the main contractor but also by the supplier and installer. Other than that the delivery schedule and plant and machinery arrangement are critical to ensuring the success of the execution process. Findings from the interviews regarding the roles of construction project manager in managing the IBS construction process was summarized in Table 2.

Table 2: Project manager's roles

Interviewee	A	B	C	D	E	F	G
Critical factor	Time	Time	Time	Time	Planning	Time	Time
Roles of Project manager	• Identify IBS • Convert drawings • Planning. • Integrate • Works sequence	• Work program • Integrate • Final planning • Coordinate Monitor (technical)	• Define scope of work • Establish work program • Quality supervision at factory • Clarify the transportation issue • Control schedule	• Define scope of work • Planning • Coordination, management • Alignment monitoring • Defect rectification	• Define scope & design submission • Work program • Delivery planning, • Prepare work to receive IBS • Quality supervision	• Define the scope • Time & site planning • Sequencing & alignment • Utilization of plant & labor • Quality & progress control	• Drawing conversion defines scope of work • Time planning • Site preparation • Time delivery control • Jointing monitor
Critical phase	Executing	Planning	Planning	Monitoring	Planning	Planning	Monitoring

Findings from interviews show that the majority of the interviewees agreed that the project manager who manages IBS construction projects required additional competency on top of the competencies needed in managing conventional construction projects. Their reasons are IBS construction process are more in managing the plant and machinery, IBS supplier and installer. Further, managing IBS projects require an understanding of the manufacturing, delivering and installation process. According to Crawford (2005), competency can be grouped into three categories;

i. Knowledge and skills,

ii. Performance and
iii. Personal

i. Knowledge and Skills
The most critical additional competency required under the knowledge and skills category is technical knowledge. The project manager should have sound technical knowledge of the installation process, plant selection and quality of material. Other than that, the project management skill is vital in managing time, integrating conventional construction method with IBS construction method, managing resources, and stakeholders. According to the interviewees, the delivery, and the installation of IBS component usually comes with issues to solve. Thus, a project manager should have problem-solving skills in handling the issues arise.

ii. Performance
Performance, on the other hand, is the ability to perform the activities within an occupational area to the level of performance in employment (Crawford, 2005). Thus, the interviewee agreed that the critical activity to perform in ensuring the success of the IBS construction process is the planning process.

iii. Personal
On the other hand, the essential personality of project manager required to possess is good communications. By having good communication, all the necessary information will be delivered effectively to the stakeholders such as supplier and installer. Leadership is stated as a necessary by the interviewee in managing and controlling the stakeholders and direct them to seriously completing their work. Other than that, teamwork, decision making, self-confidence and honesty and integrity are amongst the personality that considered important to acquire by the project manager in managing IBS construction process.

Finally, the interviewees were in the same opinion that the most critical competency that the project manager should possess is under knowledge and skills category. According to the interviewee, the project manager must have adequate technical knowledge of IBS process, project management knowledge, and communication skills to ensure the success of the construction process. Table 3 summarizes the competencies identified during the interviews.

5.0 Conclusion
This paper was aimed at providing insight on the requirement of additional competency for project manager in managing the construction process of IBS project. It began with the identification of project manager's roles followed by the competencies required. The survey established that the project manager who managed IBS projects required additional competency on top of the competency needed in managing a conventional construction

project. The most important competency is under knowledge and skills category which consists of technical knowledge, project management skill and problem-solving ability. It is anticipated that the findings of this research may develop an awareness and self-assessment of project manager practice and opportunities for professional development that enhance their competence.

Table 3: Project manager's competencies

Interviewee	A	B	C	D	E	F	G
Additional competency required in managing IBS project	KNOWLEDGE & SKILLS						
	• Planning skill • Technical knowledge • Project management skill	• Communi-cation skills • Problem-solving skill • Coordination skills	• Project Manage-ment skill. • Leadership skill • Problem-solving skills	• Technical knowledge • Leadership skills • Problem-solving skills	• Coordination skills • Technical knowledge • Integration skills	• Technical knowledge • Leadership skill • Coordination skills	• Problem solving • Project management skill • Coordination skills
	PERFORMANCE						
	Planning	Planning	Monitoring	Execution	Planning	Planning	Implementation
	PERSONAL						
	•Leadership •Honesty and integrity •Good communication	• Leadership • Good communication • Self-confidence	• Team building • Decision making • Good communication	• Leadership • Decision making • Energy and toughness	• Leadership • Teamwork • Positive attitude	• Leadership • Good communication	• Good communication • Teamwork
The most critical competency	Behaviour	Knowledge & skills	Knowledge & skills	Knowledge & skills	Performance	Knowledge & skills	Knowledge & skills

References

Aburas, H. (2011). Off-site Construction in Saudi Arabia: The Way Forward. *Journal of Architectural Engineering*, *17* (4), 122.

Alinaitwe, H. M., Mwakali, J., & Hansson, B. (2011). Assessing The Degree Of Industrialisation In Construction: A Case Of Uganda. *Journal of Civil Engineering and Management*, (September 2011), 37–41.

Blismas, N., & Wakefield, R. (2009). Drivers, Constraints And The Future Of Off-Site Manufacture In Australia. *Construction Innovation*, *9* (1), 72–83

Crawford, L. (2000). Profiling the Competent Project Manager. In *PMI Research Conference* (pp. 3–15).

Crawford, L. (2005). Senior management perceptions of project management competence. *International Journal of Project Management*,

Fotwe, F. T. E.-, & McCaffer, R. (2000). Developing project management competency : perspectives from the construction industry. *International Journal of Project Management*, *18*.

Hamid, Z. A., Anuar, K., Kamar, M., Zura, M., Zain, M., Ghani, M. K., Rahim, A. (2008). Industrialized Building System (IBS) in Malaysia: The Current State and R&D Initiatives. *Malaysian Construction Research Journal (MCRJ)*, *2*.

Isa, S. S. B. M. (2007). *A Study On Roles And Tasks Of Construction Managers In Malaysian Construction Industry*. Universiti Teknology MARA.

Ismail, F., Yusuwan, N. M., & Baharuddin, H. E. (2012). Management Factors for Successful IBS Projects Implementation. *ASIA Pacific International Conference on Environment-Behaviour Studies, Giza, Egypt*

Jabar, I. L., Ismail, F., Aziz, N. M., & Janipha, N. A. I. (2013). Construction Manager's Competency in Managing the Construction Process of IBS Projects. In *Procedia - Social and Behavioral Sciences* (Vol. 105, pp. 85–93). Elsevier B.V. Jabar, I. L., Ismail, F., & M

Mustafa, A. A. (2013). Issues in Managing Construction Phase of IBS Projects. In *Procedia - Social and Behavioral Sciences* (Vol. 101, pp. 81–89). Elsevier B.V.

Kamar, K. A. M., Hamid, Z. A., Ghani, M. K., & Rahim, A. H. (2007). Industrialized Building System: Current Shortcomings And The Vital Role Of R&D. *Master Builders*, (2nd Quarter), 62–65.

Mohamad, M. I., Zawawi, M., & Nekooie, M. A. (2009). Implementing Industrialised Building System (IBS) in Malaysia: Acceptance and Awareness Level, Problems and Strategies. *Malaysian Journal of Civil Engineering*, *21*(2), 219–234.

Nadim, W., & Goulding, J. S. (2011). Offsite production: a model for building barriers: A European construction industry perspective. *Engineering, Construction and Architectural Management*,

Omran, A., Bazeabez, A., Gebril, A. O., & Wah, W. S. (2012). Developing Competency Model For The Project Manager In The Libyan Construction Industry. *Journal of Economic Behavior*, *2*.