

Project Manager Success Factors in Managing Green Buildings in Malaysia: Knowledge and Skills

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Abstract

Malaysia is very committed in moving towards a greener future and increasing the growth of sustainable construction and green development. Green development can reduce energy consumption, increase productivity and improve environmental wellbeing. However, the green construction approach often faces challenges in terms of the adoption of new processes and technologies. Therefore, skills and knowledge areas are essential in overcoming the challenges in green construction. The main objective of this paper is to identify the project manager's success factors in terms of knowledge and skills in managing the green construction. Data were obtained by using questionnaire survey distributed among 103 (74%) Bumiputera developers in the Klang Valley and data was subsequently analyzed by using SPSS 20.0 to generate results. Survey outcome indicates that most project managers possess a good level of knowledge and skills in managing green construction in Malaysia. It is believed that when the project manager has a good level of knowledge and skills in the green area, it may help to reduce and overcome challenges during the construction of green projects.

Keywords: Green Construction, Project Manager, Knowledge, Skills

1.0 Introduction

Since the launch of the Construction Industry Master Plan 2006-2015 (CIMP) in Malaysia, the demand for environmental sustainability is necessary to achieve and sustain economic growth and social development (CIDB, 2007). According to Hwang (2012), the fast changing environment of the construction industry along with challenges such as skills shortages, communication technologies, and climate change, requires improvement of the project manager's skills. The impact of unexpected changes in project scope on the performance of project teams were normally in terms of project method, schedule, and quality. This means that there is a need to better understand and improve knowledge base and skill in order to manage green construction projects (Edum-Fotwe and McCaffer, 2000). Hwang (2012) believed that under such circumstances, project managers tend to encounter situations in which critical decisions must be made in a timely manner based on limited information in order to ensure that the project runs smoothly. With green building construction gaining popularity in the construction industry in Malaysia, many new green technologies are developed. Technology plays a very important role in sustainable development because it is one of the most significant ways in which we interact with our environment (Osman, 2012). Lack of experience and skills in adopting green technologies and methods in construction will present issues and challenges to the project manager. Therefore, the project manager must first possess skills and gain experience of on technical aspects of the industry. Tagaza and Wilson (2004) suggested that one of the main challenges in green building is the technical difficulties experienced during the construction process. Shafii et al. (2005) pointed out that there are many impediments to develop green building in Asia such as lack of awareness among people, lack of training and education about sustainable or green design, higher cost, special materials, rules and regulation, lack of technology and lack of demand. Hence, the green technologies are usually more complicated than conventional technologies, and so the project manager needs to be familiar with the system. Ling (2003) believes that the project manager has to deliver the project with the required standards and quality specified by the client; and unfamiliarity with the performance of green technologies may affect the performance outcome. Therefore, the main objective of this paper is to identify the project manager's success factors in terms of knowledge and skills in managing the green construction.

2.0 Project Manager's Success Factor

Mahmood (2006) defined a project manager as a person who is responsible for the overall success of delivering the owner's physical development within the constraints of cost, schedule, quality and safety requirements. Kerzner (2009) and George (1969) described the project manager as the person who is responsible for coordinating, planning, scheduling and integrating the activities necessary to execute the project plan and also acts as a decision maker, delegate, director, motivator and scheduler of others' work (Armstrong, 1999). Therefore, a project manager must have knowledge on general management as well as technical skills or specialized background in the project. As a leader, the project manager should guide the team members by identifying their roles and responsibilities for the project. Besides that, he or she should inspire the team members successfully in completing the project task for the good of the project. Working closely with a range of other professionals, project managers organise, plan, schedule, and control the work and are responsible for getting the project completed within established time and cost limitations (Sears, 2008). Frank (2002) and Hwang (2012) believe that, the project manager plays an important role in determining project success. Thus, it is essential to identify the critical knowledge and skills of a project manager to effectively execute a green construction project.

3.0 Knowledge

Knowledge management is identifying, organizing, transferring or sharing the information and knowledge within the organization to support strategic objectives (Gamble, 2001). In other words, knowledge can be defined as strategies or processes in identifying, capturing and sharing information in order to enhance performance. The project manager that is managing a green project must have adequate knowledge area in order to achieve a sustainable built environment. There are fourteen (14) knowledge areas that have been identified which are essential for project managers in managing green building projects. These include:

1. *Scheduling and Planning Management*

Katz and Thamhain (1983) stated that planning skill involves the preparation of the project summary plan before the project starts. The project manager is responsible for managing the plan and scheduling the work program. He or she is also required to have scheduling and planning management knowledge in order to review and update the program schedule each month.

2. *Cost Management*

Project Management Body of Knowledge (PMBOK) (2013) stated that cost management includes the processes required to ensure that the project is completed within the appropriate budget. Cost management includes cost estimating, cost budgeting and cost control. A good project manager needs to understand basic cost management concepts in order to help control the budget (Houston, 2011).

3. *Quality Management*

Quality management involves the processes required to ensure that the project satisfies the needs for which it was undertaken (PMBOK, 2013). It consists of quality planning, quality assurance and quality control. Houston (2011) stated that the quality planning process includes identifying the quality standards that are related to this specific project and how they will be approached. Project managers have to ensure that the project meets the requirements especially when there are changes in the product or material in the Green Building project that needs to identify its quality standards.

4. *Scope Management*

Scope Management involves the processes required to ensure that the project includes all the work required and is completed successfully (PMBOK, 2013). For example, implementation of scope planning where the process of progressively elaborating on and documenting the project work can produce the best product. Project managers have to ensure that the whole team has the same understanding of the scope and how the final outcomes will be delivered properly (Houston 2011). In a Green Building project for instance, the stakeholder must understand the scope of the project especially in terms of building design itself. Therefore, the knowledge on scope management is essential for a project manager.

5. *Stakeholder Management*

Stakeholder management focuses on continuous communication with stakeholders to understand their needs and expectations, managing conflicts and developing appropriate management strategies (PMBOK, 2013). According to Bourne (2006), the project manager must develop ongoing relationships with project stakeholders. This is to ensure that the strength of the relationships is created through effective communication with all of the stakeholders. Therefore, essential knowledge area of stakeholder management is important for the project manager.

6. Risk Management

Risk management involves the process of identifying, analyzing and responding to risks throughout the project (Houston 2011). Most construction projects involve many risks and uncertainties. Therefore, it is essential for a project manager to recognize risk elements, understand risk accountability, and know how to manage risk effectively (Fadilah, 2007).

7. Time Management

Time management involves the processes of ensuring that the project is completed on time. The project manager must ensure that everything is going according to schedule. Houston (2011) stated that time is the one true constant and continues no matter what happens to the project. Any changes to the project can affect the schedule but not all the changes will increase the timeline. Therefore, a project manager must be able to control the situation in order to complete the project on time.

8. Procurement Management

Procurement management may also be referred to as contract management. The project manager must have knowledge area in procurement management. This is to ensure that the project manager is able to handle all the processes of preparing proposal calls and tender documents, and calling for proposals or for tenders, in accordance with agreed procedures (The Association of Construction Project Managers, 2001).

9. Human Resources Management

Human resource management includes the processes required to make the most effective use of the people involved with the project (PMBOK, 2013). These knowledge areas of human resources are vital for all project managers. The Association of Construction Project Managers (2001) stated that the basic role of the project manager in terms of human resource management is to monitor suitable key people assigned by participating organizations to establish an adequate project team.

10. Conflict and Dispute Management

Conflict and dispute often starts from people wanting to win a point or control of a matter (Young, 2008). Conflict management is part of the project manager's core responsibilities. The project manager must avoid conflicts in projects from the start. Verma (1998) pointed out that the project manager must identify, analyze and evaluate both positive and negative values of conflict and their effect on performance. Thus, conflict management plays an important role in determining whether such conflict will lead to beneficial or destructive outcomes.

11. Health and Safety Management

The project manager is not exempted from responsibilities involving health and safety especially at the construction site. Hinze (1997) as cited in Smallwood (2001) believed that 90% of injuries are caused by worker's action and 10% of injuries by unsafe conditions in the work environment. These are supported by Holt (2005) stated that about 80 fatalities a year happen to workers at the construction site. Therefore, by playing a role in injury and illness prevention, a project manager can ensure that scheduling, costs, productivity, health and safety are all managed successfully.

12. Information Technology Management

The main role of information technology (IT) is to help people share knowledge and communicate to achieve complex knowledge transfer (Atrey et al., n.d.). Having basic knowledge of information technology (IT) for the project manager is necessary.

13. Communication Management

Effective communication can ensure that the project manager can get the right information to the right person within reasonable time. Proper communication is vital to the success of a project. According to Kerzner (2009) the definition of effective communication includes an exchange of information, a technique for expressing ideas effectively, the skills of in writing, oral and listening. Basically, the project manager spends most of his or her time communicating with others in order to get things done. Communication management is important to project managers in ensuring that information is communicated effectively to all team members (Hwang, 2012).

14. Material Resources Management

Material management is the process of planning and controlling all of the efforts necessary to ensure that the correct quality and quantity of material are properly specified in a timely manner (Patel et al., 2011). Poor material management will increase the costs of construction. Patel et al. (2011) also added that material represents a major expense in construction, so minimizing the costs will reduce the overall project costs.

4.0 Skills

Edum-Fotwe and McCaffer (2000) stated that acquiring the knowledge inputs for a particular type of project enables the project manager to build two types of skills. These are specific skills and general skills as described in the following:

1. *Technical Skills*

Katz and Thamhain (1983) (cited in Odusami 2002) pointed out that technical skills is the capacity to manage the technological innovation and integration of solutions for the project. As the project manager, they must have the skills to use management techniques, procedures and tools. Technical skills are actually related to specialized knowledge and experience of project management. Technical expertise is necessary for the project manager to evaluate technical concepts and solutions.

2. *Reading and Understanding Drawings*

Reading and understanding are essential skills needed for a project manager. A good project manager must be able to understand the entire document such as drawings, specifications, general conditions and also the bill of quantities. The project manager should acquire skills to identify, lead and guide project teams to achieve high performance of work (PMBOK, 2013).

3. *Conceptual Skills*

Katz (1974) pointed out that, using conceptual skills, managers must be able to see the organization as a whole and understand the relationship among various submits. This means, that conceptual skills consist of the ability to coordinate, integrate and requires the project manager to see the project as a whole and not just a sum of the parts. This skill helps the project manager keep a clear vision of the project.

4. *Leading*

The project manager must be able to motivate and sustain people. The quality of leadership depends on personal experience and credibility within the organization (Kerzner, 2009). Vitella (2001) expressed that leadership skill is the project manager's ability in inspiring others to create a vision and strive to achieve the goals. Therefore, a project manager should have leadership and management skills in order to accomplish the project's goal.

5. *Good Judgment*

Good judgment includes analyzing the problem to identify viable solutions, and then making the best decision (PMBOK, 2000). According to Fadilah (2007) good judgment is based on knowledge of the subject, the ability to solve problems and making decisions. As a project manager, they must be able to know when and how to say no to unreasonable conditions.

6. *Problem Solving*

All the projects are prone to problems. Problem solving involves decision making, since all problems can be attacked in numerous ways (Fadilah, 2007). In solving a problem the project manager must decide which way is the best while managing the project. Communication skills are needed in order to successfully carry out problem solving. It is important to determine whether the project is successful, partially successful or end up a failure. The project manager should be concerned with problems encountered in situations such as project planning, project control and client requirement. Baumgartner (1970) stated that most of the problems in a project can be traced back to faulty planning in scheduling, reports, forecasting or budgeting. Therefore, the project manager may overcome problems through proper planning, scheduling or budgeting.

7. *Negotiation Skills*

According to PMBOK (2000), negotiation involves conferring with others to come to terms with them or reach an agreement. Negotiation can be described as the process of obtaining mutually acceptable agreements with individuals or groups. Project managers have to negotiate on behalf of the organization. These are one of the project manager's responsibilities in managing building construction. Basically, negotiations occur at many time periods and levels of the project, for many issues that may arise.

8. *Delegation*

Gushgar et al. (1997) as cited in Odusami (2002) described delegation as the ability to effectively distribute tasks or work to other members of organization. Delegation happens when the project managers offer the opportunity to take on a task or project to their workers. As project manager, they need to be able to delegate any task effectively. It may be useful for the project manager to carry out discussions and generate new ideas with the entire team.

9. Stress Handling

According to Fadilah (2007) the project manager must be able to recognize the consequences of pressure applied to achieve results, concern and control on behalf of his own self and others. As the project manager, they have a huge impact and responsibility for work related stress. The project manager should be able to manage emotions and solve problems to reduce stress at work.

10. Human Behavior

Human behavior involves the skill of motivating other people, communicating effectively, delegating the task and maintain working in a team. It is also required to understand people and their attitudes. According to Odusami (2002) a project manager requires human skills to lead, motivate and also influence team members. El-Sabaa (2001) pointed out that this skill is demonstrated in the way the project manager observes and recognizes the attitudes of his superiors and the way he accordingly behaves. For example, a project manager requires human skill to motivate and lead in order to influence team members.

11. Chairing Meetings

The project manager has the responsibility to manage and handle meetings. A project manager will ensure that every item on the agenda is covered and all the stakeholders have the opportunity to participate during the meeting. For instance, a project manager has to chair a meeting and ensure information is given effectively to all parties involved in the pre-project process including the green specialists and architects (Hwang, 2012). By using the skills required to chair a meeting, the project manager can check on actions that needed to be carried out and discuss the current agenda or issues in the construction project.

12. Team Work

Team work skills include the mix of interactive, interpersonal, problem solving and communication skills needed by a group of people who are working together (Crebert et al., 2011). Team work skills are essential for project managers in order to develop cooperation, collaboration and a supportive working environment. This is also supported by Odusami (2002) who stated that a project manager needs to establish cooperative relationships with the project team members. Conflict and misunderstandings can also be avoided when the project manager has good team work skills.

13. Presentation

Presentation is used to communicate effectively in a formal or professional manner in an organization (Fadilah, 2007). Presentation skills are a part of the communication plan. By using these skills, a project manager may experience improvement in terms of confidence level and skills of negotiating and persuading.

5.0 Research Outcome

Table 1.0 shows the level of knowledge among project managers managing green building projects. The top three knowledge areas of a project manager include schedule and planning management, communication management and quality management.

Table 1.0 : Project Manager’s Knowledge

Item	The level knowledge areas of project manager managing green building projects	Mean Value	Rank	Item	The level knowledge areas of project manager managing green building projects	Mean Value	Rank
1.	Schedule and planning Management	4.19 (Good)	1	8.	Procurement Management	4.04 (Good)	7
2.	Cost Management	4.04 (Good)	6	9.	Health and Safety Management	4.11 (Good)	4
3.	Quality Management	4.13 (Good)	3	10.	Conflict and dispute Management	3.94 (Good)	10
4.	Human resources Management	4.04 (Good)	7	11.	Stakeholder Management	4.11 (Good)	4
5.	Risk Management	3.98 (Good)	8	12.	Information technology Management	3.83 (Good)	11
6.	Time Management	4.06 (Good)	5	13.	Communication Management	4.15 (Good)	2
7.	Scope Management	3.96 (Good)	9	14.	Material resources Management	4.11 (Good)	4

Based on Table 1.0, schedule and planning management (4.19) is ranked the highest knowledge area for project managers. This is supported by earlier research findings from Katz and Thamhain (1983) who stated that planning skills involve the preparation of the project plan before the project starts. Therefore this knowledge is important to enable a project manager to manage the project properly. Besides that, communication management and quality

management were also ranked highly. Communication management (4.15) was deemed the second highest knowledge area because project managers spend most of their time communicating with the stakeholder. Following that, quality management (4.13) was ranked third. As stated by the Project Management Body and Knowledge (2013), the quality management process is required to ensure that the quality standards are met. It was found that knowledge in quality management is important to the respondents. The bottom three knowledge areas of a project manager include scope management, conflict and dispute management and information technology management. Scope management received a low mean value of (3.96) as ranked by respondents. Respondents have to ensure that the whole team has the same understanding of the scope and how the final outcomes will be delivered properly (Houston 2011). Scope management presents challenges to the respondents and affects the ranking of the knowledge area by the respondents. Conflict and dispute management and also information technology management are the lowest ranked knowledge areas. Level of knowledge in conflict management (3.94) received a low ranking by the respondents because possibly, the respondents' experiences are not sufficient enough to handle the issue. Verma (1998) argued that conflict and dispute must be analyzed and evaluated in terms of both positive and negative values of conflict and their effect on performance of the project. Respondents should manage conflict without affecting the progress of work. On the other hand, Information technology (IT) (3.83) was ranked the lowest because the respondents need time for deep understanding of IT management. Besides that, half of the respondents are 41 years old and above and only have basic skills of computing. It takes more time to learn information technology since green building projects involve more specialized technology. Based on the findings above, most respondents show good level of knowledge in managing green building construction with the average mean value of more than 3.50 but not more than 4.50, which falls under the "Good" ranking on the scale.

Table 2.0 shows the level of skills of project managers managing green building projects. The top three skill areas of project managers include reading and understanding drawings, leadership and basic technical skills.

Table 2.0: Project Manager's Skills

Item	The level skills area of project manager managing green building projects	Mean Value	Rank	Item	The level skills area of project manager managing green building projects	Mean Value	Rank
1.	Basic technical skill and technical experience	4.21 (Good)	3	8.	Human Behaviour	4.09 (Good)	7
2.	Reading and understanding drawings	4.40 (Good)	1	9.	Delegation	4.11 (Good)	6
3.	Conceptual Skills	4.04 (Good)	9	10.	Team Working	4.11 (Good)	6
4.	Leadership	4.23 (Good)	2	11.	Stress Handling	3.89 (Good)	11
5.	Good judgement	4.16 (Good)	5	12.	IT skills	3.79 (Good)	12
6.	Problem Solving	4.04 (Good)	9	13.	Presentation	4.00 (Good)	10
7.	Negotiation	4.06 (Good)	8	14.	Chairing Meeting	4.19 (Good)	4

Based on the above table 2.0, reading and understanding drawings (4.40) is ranked as the highest skill that project managers have. The ranking is followed by leadership skills (4.23) and also basic technical and technical experience skills (4.21). As mentioned earlier by Edum-Fotwe and McCaffer (2000), a project manager should be able to handle and inspire people and be capable of using technical skills in order to manage the project. The bottom three ranked skill areas of project managers managing green building includes presentation skills, followed by stress handling and information technology (IT) skills, as shown in Table 4.7. Based on the findings above, presentation skills (4.00) and stress handling (3.89) are skills that are not mastered by the respondents. The level of presentation skills and stress handling among respondents is still low. Project managers should improve their confidence level. Besides that, in terms of stress handling skills, project managers should be able to manage their emotions and problems to reduce stress. IT skill (3.79) is the lowest skill area as ranked by respondents. They have essential knowledge in computing for basic tasks, but in Malaysia, the level of IT skill is still lacking. Based on the results shown, most of the respondents have good level of skills in managing green building projects.

6.0 Conclusion

The most important knowledge areas in green building construction as perceived by the respondents (project managers) include schedule and planning management (1), communication management (2) , and quality management (3). The research outcome is parallel with research done by Hwang (2012), who stated that scheduling and planning management as well as communication management are the basic knowledge areas that

must be mastered by project managers in green building construction. Hwang (2012) also stated that cost management is also an essential knowledge area for project managers in handling green projects. Project managers should have a strong basis in cost management knowledge in order to control the budget to avoid cost overruns. The top skill areas in green building construction as perceived by the project manager includes reading and understand drawings (1), leadership (2) and basic technical skill and technical experience (3). These skills are the most important skills and are highly mastered by project managers in Malaysia. Based on previous research, the results as shown in Table 2.0 was contrary to the research results carried out by Odusami (2002). Odusami found that problem solving is the most important skill area that project managers should master. Odusami also pointed out that decision making or problem solving skills are the most important to mitigate challenges that occur. As a conclusion, it can be concluded that project managers in Malaysia should enhance their knowledge and skills experience in order to overcome and minimize the barriers and challenges in green construction.

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