

Project management knowledge and skills for green construction: Overcoming challenges

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Abstract

A competent project manager is vital to project success. While many studies have examined competency of project managers, few have done so in the context of green construction. Therefore, this study aims to identify challenges faced by project managers who execute green construction projects and to determine the critical knowledge areas and skills that are necessary to respond to such challenges. Through literature review, surveys and interviews with project managers, this study will help establish a knowledge base for project managers to be competitive and to effectively execute sustainable projects.

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1. Introduction

A competent project manager is vital to project success, and several studies have highlighted critical skills (Avots, 1969; Belassi and Tukel, 1996; Crawford, 2000; Sayles and Chandler, 1971). Ahadzie (2007) also confirmed the industry's growing awareness of the relationship between achieving project success and construction project management competencies. Successful construction organizations now focus on ensuring that project managers acquire the core competencies required to be successful in their assignments. According to Frank (2002), the project manager has direct influence over 34–47% of project success. Based on these previous studies, it is clear that project managers play an important role in determining the success of a project.

An organization can maximize its probability of consistently attaining project success by recruiting, developing, nurturing and retaining superior project managers. Working closely with a range of other professionals, project managers organize, plan,

schedule, and control the work and are responsible for getting the project completed within established time and cost limitations (Sears et al., 2008). To manage the project professionally and successfully, a project manager needs to possess the required skills and knowledge. Widespread research studies have documented managerial skills necessary for efficient project performance. Fryer (1985) listed social skills, decision-making skills, problem-handling skills, ability to recognize opportunities, and management of changes as key personal attributes affecting project success. Given the fast changing environment of the construction industry with challenges such as skills shortages, the rapid advancement of information and communication technologies, and the increasing prioritization of issues such as sustainability, environmental protection and climate change, the role of the project manager needs to be adapted.

With the mounting global concern for the negative impacts brought upon on the environment by human activities in recent years, many industries are steering towards sustainable development and implementing green measures. Building construction companies from various regions around the world have integrated green concept into their construction plans to mitigate the impacts

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to the environment (Hwang and Tan, 2010). In fact, Singapore has made sustainable development a key national priority (Lutchmeeduth et al., 2010; Singapore Green Building Council, 2009).

As the industry changes, project managers find themselves confronted by new issues and must undertake roles that have not traditionally been part of their responsibility (Edum-Fotwe and McCaffer, 2000). Both Ceran and Dorman (1995) and Russell et al. (1997) recognized the changing role of construction project managers and argued that they must supplement their traditional functions with non-engineering knowledge and skills to meet today's professional demands. Today's project manager fulfills not only traditional roles of project management but also must manage the project in the most efficient and effective manner with respect to sustainability.

As the green building construction phenomenon continues to grow and gain popularity, there is a need to better understand the pivotal attributes that project managers should possess to manage green construction projects. Despite numerous studies on a project manager's competency, few have specifically examined what critical knowledge and skills are required for the project manager to successfully deliver a sustainable project. As a result, with the intent to enhance sustainability efforts without compromising the competitiveness of project managers, this study aims (1) to identify the essential knowledge and skills required to be a competent project manager of green construction projects; (2) to discover the challenges that project managers encounter in managing green construction projects and determine critical knowledge areas and skills that can respond to the challenges; and finally, (3) to provide a comparison of critical knowledge areas and skills between traditional and green construction projects.

2. Competency of the project manager

Dogbegah et al. (2011) cited many studies such as Chen et al. (2008) and Veres et al. (1990) that focused on project management competence and aimed to identify determinant factors and/or criteria for a competent project manager. Chen et al. (2008) used two principal traditional approaches, worker-oriented and work-oriented, to distinguish project management competencies. The former emphasizes workers' attributes, such as knowledge, skills and abilities, and personal traits, while the latter treats work as existing independently of the worker, definable in terms of the technical requirements of work tasks (Holmes and Joyce, 1993). While competencies can embody an array of different characteristics, behaviors, and traits necessary for effective job performance (Abraham et al. 2001), Crawford (2000) provided an in-depth understanding by proposing three classifications, namely input competencies, personal competencies and output competencies. According to Crawford (2000), input competencies refer to the knowledge and skills that a person brings to a job. Personal competencies are the personal characteristics underlying a person's capability to execute a job, while output competencies relate to the performance that a person exhibits at the job place. These classifications are combined to assess competence. The classification proposed by Crawford bears some similarities with the classification proposed by

Ahadzie et al. (2008), especially in relation to personal and output competencies. Ahadzie et al. (2008) presented a contextual task typology in which contextual performance behaviors are those discretionary job-related acts which contribute to organizational effectiveness but are not formally recognized as part of the job (Ahadzie et al., 2008; Chen et al., 2008). Contextual performance behaviors act much like personal competencies, which contribute to the effectiveness of the job, but are not formally recognized as part of the job and are best predicted by interpersonal facilitation and job dedication (Ahadzie, et al., 2008).

Task performance behaviors on the other hand are job-specific and rewarded normally. A project manager demonstrates task performance competency through functions such as organizing, planning, coordinating and controlling. Task performance behaviors are best predicted by cognitive ability, job knowledge, task proficiency and experience. Borman and Motowidlo (1993) asserted that the major sources of variation in task performance are attributable to human characteristics such as knowledge, skills and abilities.

The implication of accepting the contextual-task distinction is the recognition that the knowledge, skills and habits associated with these two kinds of behaviors are likely to be different (Ahadzie et al., 2008). In fact, the evidence suggests that task performance behaviors are best predicted by individual differences in, for example, cognitive ability, job knowledge, task proficiency, and job experience (Ahadzie et al., 2008; Gellatly and Irving, 2001). Alternatively, contextual performance behaviors are best predicted by individual differences in job dedication and interpersonal facilitation (Conway, 1999). Job dedication is defined as the motivational foundation for job performance that drives people to act with the deliberate intention of promoting an organization's best interest and includes self-disciplined behaviors such as following rules, working hard, and taking initiative. Interpersonal facilitation refers to those attributes that help maintain the interpersonal and social context needed to support job effectiveness (Van Scotter and Motowidlo, 1996).

While personality traits can also be used to predict the performance of the construction project manager, a key benefit of using behavioral competencies is their ability to provide insight into the underlying dispositions effecting the project manager's professional development (Borman and Motowidlo, 1993; Hayes et al., 2000). Unlike general traits, behavioral competencies are more likely to be amenable to change through training, for example. That is, behavioral competencies are learned rather than inherent characteristics (Skipper and Bell, 2006). In summary, the attributes of a project manager for this paper comprises of project management knowledge areas and skills.

3. Knowledge areas and skills of project manager

Project Management Institute (PMI) first documented its nine knowledge areas (Integration, Time, Cost, Procurement, Quality, Communication, Human Resource, Scope and Risk) in the Guide to the Project Management Body of Knowledge (PMBOK Guide) in 1987 in an attempt to document and standardize generally accepted project management information and practices (PMI,

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