REVIEW ON CONSTRUCTION PROJECT MANAGER SELECTION CRITERIA AND METHODS

Keywords: Construction; Decision making; multiple criteria decision making; Project manager selection

Abstract

The success of a construction project depends on several critical success factors. One important factor is supervision by a competent project manager with proven leadership skills. Therefore, the selection of a project manager for construction projects is, by nature, one of the most important and, at the same time, most complicated decisions to be made. Selecting the best project manager among many candidates is a multi-criteria decision making (MCDM) problem. Choosing a project manager for a construction project is a critical project decision. The scope of this paper deals with the decision making process concerning selection of the finalists for position of construction project manager. This article reviewed the corresponding methods in different stages of multi criteria decision making for construction project manager selection. Also, it provides an overview on various criteria used. This paper provides useful insights into the MCDM methods for construction project manager selection and suggests a framework for future attempts in this area for academic researchers and practitioners.
Introduction

Leadership studies in the construction industry, with few exceptions, concentrate on investigating the motivational factors and the personal characteristics of project managers (PMs). In recent years, the number of construction projects has been growing rapidly. Therefore, it is very important to find the right project managers for such projects (Zavadskas et al., 2008a). The role of construction project manager is very important in the process of construction. Recruiting the right project manager is an important challenge for organizations. The project manager is the person responsible for accomplishing project objectives. The project manager manages the project through identifying project requirements; establishing clear and achievable objectives; balancing the competing demands for quality, scope, time and cost; adapting plans and approaches to the different concerns and expectations of the various stakeholders; and managing projects in response to uncertainty. It is widely acknowledged that the final outcome of the project depends mainly on the project manager; therefore, the selection of the project manager is one of the two or three most important decisions concerning the project (Ahsan et al., 2013).

As part of human resource management policies and practices, construction firms need to define competency requirements for project staff, and recruit the necessary team for completion of project assignments (Shahhosseini and Sebt, 2011). Traditionally, potential candidates are interviewed and the most qualified are selected. Precise computing models, which could take various candidate competencies into consideration and then pinpoint the most qualified person with a high degree of accuracy, would be beneficial. There are two main phases for establishing personnel selection models: developing the decision making hierarchy and selecting the methodology to be used. The former employee selection problem studies have developed decision making criteria based on job analysis. In addition, competency criteria hierarchies that have been studied in literatures are for general employees, and personnel of construction companies are not investigated in specific (Gilan et al., 2012).

Multi-Criteria Decision Making (MCDM) methods have received much attention from researchers and practitioners in evaluating, assessing and ranking alternatives across diverse industries. In recent years, many studies have examined the application of MCDM modeling methods in decision-making processes, particularly in the construction industry (Torfi and Rashidi, 2011). Decision making using multi-criteria decision making (MCDM) just provides a method to eliminate the difficulty and it has attracted the attention of decision makers for a long time. It is an operational evaluation and decision support approach that is suitable for addressing complex problems featuring high uncertainty, conflicting objectives, different forms of data and information, multi interests and perspectives.
This literature review was undertaken to identify articles in high ranking journals that provide the most valuable information to researchers and practitioners studying live issues concerning the project manager selection method. With this scope in mind, we conducted an extensive search for “Construction project manager selection” in the title, abstract, and keywords of scholarly papers. The key words or combinations thereof used to search for relevant literature included: competency; project manager; project management; construction industry; skill. We particularly targeted library databases: Elsevier, Springer, Taylor and Francis, Emerald, John Wiley, IEEExplore and EBSCO, covering major journals in operation research and management sciences.

Developing project manager competency

As part of project HRM policies and practices, construction firms need to define competencies requirement for all project personnel and obtaining the team necessary to complete project assignments (Gilan et al., 2012). Competency is the knowledge, skills, and behaviors a person needs to fulfill his or her role. Construction projects tend to be characterised by crisis, uncertainty and suspense, which combine to test the ability and performance of the manager. Project success is, therefore, dependent upon the leadership qualities of project managers and their ability to bring the best out in their team (Dainty et al., 2005). The success of a construction project depends on several factors, one of which is the competencies of project managers. Their personalities, characteristics, skills and leadership styles also impact on project outcomes; with the latter being essential for construction projects. Project managers must be able to handle unanticipated problems competently (Ogunlana, 2008). There is a growing awareness of the relationship between achieving project success and construction project managers’ competences. Realizing the significance of modeling PM competency has led to substantial interest from academics and industry practitioners seeking vital qualities of exceptional PMs (Zhang et al., 2013). Although there have been numerous frameworks to evaluate PMs, literature reveals that computing the relative importance of PM competencies has been based on subjective rather than data-driven techniques.

The recent studies have attempted to centralize the competency concept and focused more on classifying the competencies according to the different natures of projects. Crawford (2005) provided further insight towards enabling a more in-depth understanding of the potential dimensions of the term competency by proposing three interesting classifications, namely input competencies, personal competencies, and output competencies. Input competencies as defined by Crawford refer to the knowledge and skills that a person brings to a job. Personal competencies are the core attributes underlying a person’s capability to execute a job. Output competencies relate to the demonstrable performance that a person exhibits at the job place. Suikki et al. (2006) emphasized the
administrative, leadership, and business skills of project managers. Wu and Lee (2007) combined fuzzy logic and decision making trial and evaluation laboratory (DEMATEL) to segment required competencies for better promoting the competency development of global managers. Ahadzie et al. (2008) studied the construction projects and developed competency-based measures for evaluating the project managers in mass house building projects. Patanakul and Milosevic (2008) studied the multi-project environments and proposed a list of competencies that multiple-project managers should possess. Liu et al. (2010) examined the relationship between competency and success in the information systems project environment. They modeled the link between general task completion competency and performance of development teams with two crucial antecedents built by other stakeholders, the contribution of users and controls established by management. Müller and Turner (2010) focused on the leadership competency profiles of successful project managers in different types of projects. They prepared a Leadership Development Questionnaire (LDQ) and sent it to various experts and received 400 responses. The obtained results were used to profile the intellectual, managerial, and emotional competencies for project managers. Shahhosseini and Sebt (2011) proposed a competency-based model for the selection and assignment of construction project personnel, which are classified into four types: Project Manager, Engineer, Technician, and Laborer. By consideration of main personnel competency, they developed a two-stage model representing complete project staff evaluations. The model was trained with a number of actual data taken with a series of interviews.

During the early 2000s, many researchers heavily investigated and attempted to define the term competency with regard to job assessment (Hanna Awad et al., 2016). Chen and Partington (2006) used a phenomenographic research approach to determine that CPMs conceived construction project management as: planning and controlling, organizing and coordinating, and predicting and managing potential problems. These concepts were converted into key competencies that CPMs needed to accomplish construction activities. For instance, four abilities are needed to understand planning and control; these include the ability to plan, having adequate knowledge of construction, the ability to communicate and the ability to manage a team. Mahmood et al. (2006) continued exploration into the field of PM competency by examining five related job competency models and devising a new job competency model for PMs. Their model consists of 198 job competencies, concluding that different professions require a different mix of core competencies. In the same year, Shao (2006) developed a PM quantitative selection methodology using 102 competencies identified by the Project Management Institute (PMI). He used a web-based survey to ask 16 experts about their opinions regarding the relative importance (weights) of each of the competencies. Offering a new perspective, Patanakul et al. (2007) emphasized the significance of considering PM competencies while matching PMs to projects. During the same year, PMI
updated its 2002 edition of the Project Manager Competency Development (PMCD) framework, outlining impactful competencies of their defined dimensions of project management: knowledge, performance, and personal.

Ahadzie et al. (2008) argued that a contextual task model has empirical relevance for application in project-based sectors of the construction industry where the relative abilities of construction project manager were identified. Their study highlighted PMs’ soft skills as more critical predictors of PMs’ performance than hard skills. More recently, Ehsan et al. (2010) highlighted that exceptional PMs must possess particular uniqueness that enhances team performance based on competencies in nine different areas, including integration management, cost management, and quality management. Zhang et al. (2013) identified the key social competencies for Chinese construction project managers. Hanna et al. (2016) distinguish outstanding PMs from average ones and reflect on the relative importance that professionals in the construction industry attribute to each competence of a PM. By using an additive model in their research, they consider that a PM’s particular deficiency in a competence area could be compensated by another where this same PM has greater success. In this case, whatever important competencies for success that PMs have in a given project could be balanced by others that are less necessary.

Construction project manager selection problem

A project is a temporary endeavor undertaken to create a unique product, service or result. Projects help organizations to earn desirable strategic changes in a changeable world. In other words, organizations use projects as a tool for achieving strategic objectives. Project managers are responsible for the leadership role in projects (Müller and Turner, 2010). Therefore, selecting a competent project manager which has the necessary skills for project leadership can be lead to improve the excellence level of project. Here, an important question is that what criteria or skills are needed for project managers to perform projects successfully (Sadeghi et al., 2014). In the last two decades, many researchers have been exploring the general skills that a project manager should possess, as well as those needed to succeed, and the criteria for the selection of project managers.

In the 1990s, several researchers detailed skills of project managers and proposed several frameworks. Thamhain (1991) presented three categories of project managers’ skills, which are leadership, technical, and administrative, while Pettersen (1991) proposed five categories: problem solving, administration, supervision and team management, interpersonal relations, and some other personal qualities of project managers. Technical skills, conceptual skills and human skills are considered by Goodwin (1993), as the main four skills project managers cannot do without. According to Goodwin (1993), conceptual, technical, negotiation, and human resource skills are the four main
skills that a project manager should possess. Berger (1996) highlighted the growing need for civil engineers with management skills and, perhaps, advanced degrees in engineering management. Perini listed the primary qualities of a successful construction project manager as follows: a high level of technical skill; diligence; and the ability to manage the executive team, communicate effectively, pay attention to the client’s demands, prioritize, perform under pressure, ask the right questions, and take responsibility and the necessary risks to achieve goals (Liao, 2007). Collins (1998) takes a holistic view on the project manager candidates, which also includes the addition of any selection criterion deemed relevant to a specific project. The results are scored and, in case of a close score between candidates, the candidates’ availability could help swing the decision. While this has some merit, it must be noted that using the criteria in the table could result in selecting a project manager for the wrong reasons. Collins (1998) states: “The process focuses on the premise that a successful project manager must master two primary skill sets: the project manager’s technical skills and leadership skills.”

Meredith et al. (2011) classified the skills required by a project manager into six distinct groups: communication, organizational, teambuilding, leadership, coping, and technological. Ogunlana et al. (2002) believed that conceptual, human resource, negotiation, and technical skills are the most essential skills for a project manager. Sunindijo et al. (2007) studied emotional intelligence (EI) in the context of project manager selection. The results of these studies revealed that EI is beneficial to both the individual and the organization. Pheng and Chuan (2006) identified the factors that effectively influence the performance of a project manager in the private and public sectors. Dolfi and Andrews (2007) studied the personality characteristics of project manager and formulated a conclusive understanding of the motivations of project managers, especially concerning their work environment. A large number of studies have been conducted on the characteristics and responsibilities of project managers; however, only a few of them deal with the selection of project managers. The traditional method for selecting a project manager for a construction firm is to choose the best candidate after interviewing the potential ones. The interview is usually conducted by the construction firm’s top managers (Jazebi and Rashidi, 2013).

**Table 1. Construction project manager selection review**

<table>
<thead>
<tr>
<th>Citation</th>
<th>Application</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Baykasoglu et al., 2007)</td>
<td>Project team members</td>
<td>Fuzzy multiple objective</td>
</tr>
<tr>
<td></td>
<td>Selection</td>
<td>optimization model</td>
</tr>
<tr>
<td>(Zhao et al., 2008)</td>
<td>Engineering Project Manager</td>
<td>Principal component analysis (PCA)</td>
</tr>
<tr>
<td></td>
<td>Selection</td>
<td></td>
</tr>
<tr>
<td>(Zavadskas et al., 2008b)</td>
<td>Construction Project manager</td>
<td>Grey relational analysis</td>
</tr>
<tr>
<td>Citation</td>
<td>Application</td>
<td>Method</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>(Zavadskas et al., 2008a)</td>
<td>Construction Project manager selection</td>
<td>Complex Proportional Assessment of alternatives with Grey relations (COPRAS-G)</td>
</tr>
<tr>
<td>(Zhao et al., 2009)</td>
<td>Selection of a Project Manager</td>
<td>Fuzzy Comprehensive Evaluation</td>
</tr>
<tr>
<td>(Xing and Zhang, 2006)</td>
<td>Construction Project manager selection</td>
<td>Fuzzy Analytical Hierarchy Process</td>
</tr>
<tr>
<td>(Rashidi et al., 2011)</td>
<td>Construction Project manager selection</td>
<td>Neurofuzzy Genetic System</td>
</tr>
<tr>
<td>(Shahhosseini and Sebt, 2011)</td>
<td>Selection construction project manager</td>
<td>Fuzzy AHP, Adaptive Neuro-Fuzzy Inference System (ANFIS)</td>
</tr>
<tr>
<td>(Gilan et al., 2012)</td>
<td>Project manager selection</td>
<td>Computing with words</td>
</tr>
<tr>
<td>(Afshari et al., 2012)</td>
<td>Project manager selection</td>
<td>Fuzzy Simple Additive Weighting method</td>
</tr>
<tr>
<td>(Zavadskas et al., 2012)</td>
<td></td>
<td>AHP, ARAAS</td>
</tr>
<tr>
<td>(Afshari et al., 2013)</td>
<td>Project manager selection</td>
<td>Fuzzy Integral</td>
</tr>
<tr>
<td>(Torfi and Rashidi, 2011)</td>
<td>Selection of Project Managers in Construction Firms</td>
<td>AHP and Fuzzy TOPSIS</td>
</tr>
<tr>
<td>(Hadad et al., 2013)</td>
<td>Project manager selection</td>
<td>Data Envelopment Analysis</td>
</tr>
<tr>
<td>(Jazebi and Rashidi, 2013)</td>
<td>selecting project managers in construction firms</td>
<td>Fuzzy curves method</td>
</tr>
<tr>
<td>(Varajão and Cruz-Cunha, 2013)</td>
<td>Project manager selection</td>
<td>AHP, TOSB</td>
</tr>
<tr>
<td>(Sadeghi et al., 2014)</td>
<td>Evaluating Project Managers</td>
<td>TOPSIS technique</td>
</tr>
<tr>
<td>(Mohammadi et al., 2014)</td>
<td>Project manager selection</td>
<td>Cybernetic ANP, QFD</td>
</tr>
<tr>
<td>(Keren et al., 2014)</td>
<td>Selecting a Project Manager</td>
<td>AHP and DEA Methods</td>
</tr>
<tr>
<td>(Dodangeh et al., 2014)</td>
<td>Selecting a Project Manager</td>
<td>Fuzzy MCDM</td>
</tr>
<tr>
<td>(Reza Afshari, 2015)</td>
<td>Selection of construction project manager</td>
<td>Delphi and fuzzy linguistic</td>
</tr>
<tr>
<td>(Chaghooshi et al., 2015)</td>
<td>Project manager selection</td>
<td>Fuzzy DEMATEL, Fuzzy VIKOR</td>
</tr>
<tr>
<td>(Cassar and Martin, 2016)</td>
<td>Choose a Project Manager</td>
<td>CLOUD theory</td>
</tr>
<tr>
<td>(Sadatrasool et al., 2016)</td>
<td>Project manager selection</td>
<td>VIKOR and PCA-TOPSIS method</td>
</tr>
</tbody>
</table>

Source: own research

Conclusions and directions for further research

Some of the gaps existing in the literature addressed by this study:
- First, no previous work provides a systematic model for criteria selection in construction project manager selection problem, and further study need to remedy this situation by providing a systematic method for eliciting criteria from panel of experts.
Second, the usage of fuzzy linguistic variables to conduct evaluation will finally enhance the efficiency of decision making by reducing error in utility values.

Finally, group decision making (GDM) is a very important factor for a comprehensive solving of the problem. But it has not been considered in the majority of the reviewed studies (Kelemenis, Ergazakis, & Askounis, 2011). The approach that considers one single decision maker (DM) is not sufficient in conducting a multi criteria decision making. One of the critical tasks for an organization is project manager selection; therefore, more rational decisions are made by a group of people rather than by a single person.

Although some researchers have utilized Neuro-fuzzy systems in construction research area (Jazebi and Rashidi, 2013), application of Neuro-fuzzy systems in this research field is still rare.

It is suggested that researchers provide another effective mechanisms in modeling decision maker’s preferences and to effectively handle the imprecision of the human decision making processes in construction project manager selection problem.

Therefore, further studies must be conducted to deepen how to identify the competencies that construction managers need, keeping in mind the fact those new classes of managers may be required for different projects.

REFERENCES


[6] CASSAR, R. & MARTIN, H. HOW TO CHOOSE A PROJECT MANAGER UNDER UNCERTAINTY. Proceedings of the 32nd
Review on construction project manager selection criteria and methods


Review on construction project manager selection criteria and methods


