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Analysis of Personal Characteristics and Cognitive Abilities of Project Managers

Dimitrios Ntaliaris
(Msc, Aristotle University of Thessaloniki,Thessaloniki,Greece)

Georgios N. Aretoulis
(Lecturer, Aristotle University of Thessaloniki,Thessaloniki,Greece)

Panagiotis Papaioannou
(Professor, Aristotle University of Thessaloniki,Thessaloniki,Greece)

Glykeria P. Kalfakakou
(Professor, Aristotle University of Thessaloniki,Thessaloniki,Greece)

Abstract

The role of a project Manager is of special importance to the economic prosperity and viability of construction enterprises. This research is aiming at defining the Greek project Managers' dominant cognitive abilities and personality characteristics. An effort is made to identify key attributes associated with successful project manager performance and career development. A new survey was conducted using a structured questionnaire, which was based on Aretoulis et al. (2014). The questionnaire was based on international literature and extensive interviews with Greek project engineers. The study statistically analyzes and identifies the most significant attributes. The outcome of the study creates a profile of the competent project manager, and would be important for career orientation of future engineers and at the same time provides insight for academic study courses.

Keywords

Project Manager, Cognitive Abilities, Personality Characteristics, Statistical Analysis

1. Introduction

Muller and Turner (2007) emphasize that different types of projects require project managers to be selected with appropriate competencies. According to Smyth and Morris (2007), a unified theory of the management of projects does not exist. Projects are context-specific and located in open-systems. Nevertheless, Crawford (2000), Stevenson and Starkweather (2010) suggest that the importance of the project manager in the delivery of successful projects has generated a considerable amount of rhetoric and a smaller body of research based literature. Crawford (2000) emphasizes that literature focuses on the knowledge, skills and personal attributes required of an effective Project Manager (PM).

Nowadays, there is also a growing awareness and understanding of the relationship between achieving project success and construction project managers' (CPMs) competences (Ahadzie, Proverbs and Olomolaiye, 2008; Cheng, Dainty and Moore, 2005).

Sayles and Chandler (1971) cited in Pheng and Chuan (2006) listed five critical success factors for a project. These are project manager's competence, scheduling of activities, control systems and responsibilities, monitoring of project and continual involvement in the project.

The paper presents a literature review with the common held views of the project managers' attributes, then the research methodology is analyzed and its results' discussed. Finally, conclusions and further work are highlighted.

2. Literature Review

The effectiveness and productivity of organizations have been always dependent heavily on the quality of their workforce, or their human capital (Wolf and Jenkins, 2006; Dainty et al., 2003). The term project manager (PM) is used in the general sense of applying to the person, who has responsibility for managing the whole or some major part of a total project (Pilcher, 1994). It is a fact that the issue of the project managers' profile has attracted and keeps attracting a lot of research interest, due to their key role in every project. That is the reason why, the available literature is quite extensive dealing with the knowledge, skills and personal attributes required of an effective project manager (Pilcher, 1994; Crawford, 2000; Aretoulis et al. 2009a; Aretoulis et al. 2009b; Aretoulis et al. 2010; Aretoulis and Triantafyllidis, 2014; Aretoulis et al. 2015). Martin (1976) cited in Pettersen (1991) divides project managers' qualifications in two main categories, which are namely: personal characteristics and skills.

Typical responsibilities of a project manager are coordinating and integrating of subsystem tasks, assisting in determining technical and manpower requirements, schedules and budgets, measuring and analyzing project performance regarding technical progress (Jha and Iyer, 2006; Royer, 1974). In doing so, project managers devote attention to both the hard and soft systems, namely the formal system of rules and procedures and the potential informal / human system of motivation and leadership, in order to maximize the probability of achieving a successful project (Liu and Fang, 2006). One important subject is the identification of the right project manager for a construction project. Ogunlana et al. (2002) suggest that different projects require different skills and capabilities on the part of the project manager. Therefore project stakeholders are on the look-out for the few good project managers available.

Briner, Hastings, and Geddes (1996), cited in Dainty, Cheng, and Moore (2004), suggest that managers must fulfill a number of roles including those of facilitator, coordinator, motivator and politician. This demanding and multifaceted role has necessitated the development of more sophisticated approaches to managing the performance of project managers. Notably, construction organizations have sought to develop evaluative criteria that can be used to measure managers' performance, provide a basis for reward, determine training and development needs, provide a basis for succession planning and perhaps most significantly, facilitate goal setting amongst their project managers (Dainty et al. 2003).

Fischer (2001) examined the relationship among skills and behavior concerning people management by project managers. His investigation identified the following skills: Understanding behavioral characteristics, leading others, influencing others, Authentizotic behavior, Conflict management and Cultural awareness. Eskerod (2010) examined the challenges related to further development of project management competencies in a company by involving project managers in action learning in a competence development program.

Available literature is quite extensive dealing with the knowledge, skills and personal attributes required of an effective project manager (Pilcher, 1994; Sunindijo and Zou, 2011; Crosby, 2012; Sunindijo and Zou, 2012; Chang and Torkzadeh, 2013; Catanio, Armstrong and Tucker, 2013).

Furthermore, Yang et al. (2011; 2012) examined the association among PM's leadership style with team interaction, and their impact on project performance. Their findings indicate that the PMs who adopt transformational leadership may improve team communication and at the same time high levels of transformational leadership should have positive influences on team collaboration. Finally, the PMs were asked to rank the managerial skills that they thought they personally possessed, in order of importance for effective management. The combined order, from the most to the least important was (Fraser, 2000): social skills, decision making, handling problems, recognizing opportunities, managing change.

3. Methodological Approach and Findings

The structured questionnaire developed by Aretoulis et al. (2014, 2015) was used in order to evaluate the importance of various cognitive abilities, personality characteristics and body of knowledge of PMs. The survey lasted for one year. During this year of the survey a questionnaire regarding the cognitive abilities, personality characteristics and knowledge of the project manager was dispatched. The survey was addressed to engineers from Greece. In addition, the survey participants are required to have experience in managing construction projects. The questionnaires were completed through interviews and email. Descriptive statistics were estimated and correlation analysis took place. Correlation analysis defined the relationship among participants' profiles and their responses.

3.1 Questionnaire Structure and Sample

The questionnaire similarly to Aretoulis et al (2014, 2015) consists of the following three main parts, namely: profile of the survey's participants, personality characteristics and cognitive abilities of project managers and essential or required knowledge of project managers.
The first part of the questionnaire is devoted to the participants, which have to deal with 13 personal questions, ranging from age to academic and professional background. The total characteristics regarding cognitive abilities and personality sum up to 47 elements. The majority of the answers are collected through check boxes and use of a predefined ranking, ranging from 1 to 5. One point represents the lowest value and five points represent the highest value.
The survey collected 110 answers from engineers of various disciplines in Greek construction enterprises and public authorities. From the total of 110 participants, 19 respondents had more years in highway projects, 41 in building projects, 12 in hydraulic projects, 14 in geotechnical projects and 24 in other projects. As far as their activity is concerned, 52 are designers engineers, 16 are constructors, 29 are project managers and 13 are contractors. Finally, the male participants are 71 whereas the female ones are 39.

3.2 Descriptive Statistics

Descriptive statistics are estimated using SPSS v.20. The answers of the questionnaires were parameterized and a database was created. The frequency results concerning the cognitive abilities and personality characteristics of project managers are in Table 1. Based on the calculated frequencies of the maximum score per attribute, the tables provide a ranking of each cognitive ability and personality characteristic. As far as the cognitive abilities are concerned promptness on solution provision is the most important and creativity is the less essential one. Generally the attributes identified in this research appear similar to the attributes identified in the international literature and in previous research by Aretoulis et al. (2014, 2015).

Table 1: Aggregated results from the answers of 110 engineers about personal characteristics and cognitive abilities of project managers

	N	Range	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
ORGANIZATIONAL SKILL	110	2,00	3,00	5,00	500,00	4,5455	,58477	,342
PERCEPTION OF THE WHOLE PICTURE	110	2,00	3,00	5,00	493,00	4,4818	,63147	,399
SCHEDULING CAPABILITY	110	3,00	2,00	5,00	488,00	4,4364	,67085	,450
EFFECTIVENESS	110	2,00	3,00	5,00	483,00	4,3909	,67858	,460
CAPABILITY OF RISK EVALUATION	110	2,00	3,00	5,00	481,00	4,3727	,76457	,585
COLLABORATIVE TEAM SPIRIT	110	2,00	3,00	5,00	480,00	4,3636	,63140	,399
CONFLICT MANAGEMENT	110	3,00	2,00	5,00	479,00	4,3545	,84143	,708
RESPONSIBLE	110	2,00	3,00	5,00	479,00	4,3545	,72424	,525
CAPABILITY OF CONSIDERING ALTERNATIVE SCENARIOS	110	3,00	2,00	5,00	476,00	4,3273	,70528	,497
DECISIVENESS	110	3,00	2,00	5,00	475,00	4,3182	,76544	,586
COMMUNICATION SKILLS	110	3,00	2,00	5,00	474,00	4,3091	,76321	,582
CAPABILITY OF OUTSOURCING	110	3,00	2,00	5,00	474,00	4,3091	,73877	,546
LEADERSHIP CAPABILITIES	110	4,00	1,00	5,00	472,00	4,2909	,84967	,722
PRACTICAL WAY OF THINKING	110	3,00	2,00	5,00	472,00	4,2909	,79385	,630
PROMPTNESS ON SOLUTION PROVISION	110	3,00	2,00	5,00	472,00	4,2909	,77039	,593
PUNCTUALITY	110	3,00	2,00	5,00	472,00	4,2909	,84967	,722
PERCEPTION OF TIME	110	3,00	2,00	5,00	466,00	4,2364	,74103	,549
METHODICAL	110	4,00	1,00	5,00	465,00	4,2273	,83126	,691
CAPABILITY OF PREDICTING	110	4,00	1,00	5,00	463,00	4,2091	,85773	,736
INTEGRITY	110	4,00	1,00	5,00	461,00	4,1909	,93353	,871
EXPERIENCE	110	4,00	1,00	5,00	453,00	4,1182	,90596	,821
PERSISTENCE	110	4,00	1,00	5,00	452,00	4,1091	,81663	,667
PROMPTNESS ON DECISION MAKING	110	3,00	2,00	5,00	451,00	4,1000	,84539	,715
PERCEPTION OF SCALE	110	3,00	2,00	5,00	451,00	4,1000	,83446	,696
STRATEGIC CAPABILITY	110	4,00	1,00	5,00	448,00	4,0727	,92577	,857
SELF CONFIDENCE	110	4,00	1,00	5,00	447,00	4,0636	,94118	,886
DILIGENT	110	4,00	1,00	5,00	446,00	4,0545	,87615	,768
FLEXIBLE	110	3,00	2,00	5,00	443,00	4,0273	,87219	,761
CAPABILITY OF ASSIGNING RESPONSIBILITIES	110	3,00	2,00	5,00	443,00	4,0273	,87219	,761
JUSTICE	110	4,00	1,00	5,00	442,00	4,0182	,89834	,807
CONFLICT RESOLUTION	110	3,00	2,00	5,00	442,00	4,0182	,92847	,862
ETHICS	110	4,00	1,00	5,00	441,00	4,0091	1,06224	1,128
RESPECTED	110	4,00	1,00	5,00	439,00	3,9909	,96256	,927
PATIENT	110	3,00	2,00	5,00	434,00	3,9455	,75220	,566
INVENTIVE	110	3,00	2,00	5,00	433,00	3,9364	,82703	,684
HARDWORKING	110	4,00	1,00	5,00	426,00	3,8727	,90977	,828
SELF CONTROL	110	3,00	2,00	5,00	422,00	3,8364	,92397	,854
DYNAMIC	110	4,00	1,00	5,00	421,00	3,8273	,98483	,970
DIPLOMACY	110	4,00	1,00	5,00	405,00	3,6818	1,07458	1,155
COMMITMENT	110	3,00	2,00	5,00	401,00	3,6455	,87353	,763
CAPABLE OF PSYCHOLOGICAL EVALUATION	110	4,00	1,00	5,00	393,00	3,5727	,91330	,834
INSPIRATION	110	3,00	2,00	5,00	393,00	3,5727	,95263	,908
CREATIVE	110	3,00	2,00	5,00	391,00	3,5545	,96343	,928
POLITENESS	110	4,00	1,00	5,00	377,00	3,4273	1,03569	1,073
UNDERSTANDING	110	4,00	1,00	5,00	374,00	3,4000	,99724	,994
SOCIAL CONSCIOUSNESS	110	4,00	1,00	5,00	371,00	3,3727	1,02141	1,043
FRIENDLINESS	110	4,00	1,00	5,00	356,00	3,2364	,95713	,916

4. Conclusions and Suggestions

4.1 Research Findings, Assessment and Discussion

The answers of the participants are quite representative regarding which personality characteristics, cognitive abilities and skills are considered to be most important for project managers. The highest ranked and therefore the most important personal characteristics and cognitive abilities of project managers, as resulted from Descriptive Statistics based on the mean value in descending order, are organizational skills, perception of the whole picture of the project, scheduling capability, effectiveness, capability of risk evaluation, collaborative team spirit, conflict management, responsibility, capability of considering alternative scenarios, decisiveness, communication skills and capability of outsourcing. The lowest ranked and therefore the least important personal characteristics and cognitive abilities of project managers, based on the mean value of all the answers in descending order, are diplomacy, commitment, capability of psychological evaluation, inspiration, creativity, politeness, understanding, social consciousness and friendliness.

The participants who are project managers as their main activity give us a very interesting insight, because they have more or less years of experience in project management. Therefore, their answers reflect to a significant extend which cognitive abilities and skills are more significant in their profession. Project managers rank conflict management as the single most important characteristic and communication skills is in the second place. Moreover, determination, capability of assigning responsibilities, conflict management, perception of time and ethics all rank in higher positions compared to their ranking from the answers of all the participants. Contrary to this, skills such as capability of risk evaluation, capability of considering alternative scenarios, experience, leadership capabilities, persistence and hard-working are all ranked by project managers in lower positions compared to their ranking from the answers of all the participants. Based on the conditions managers have encountered at their jobs they consider it very important for a project manager to be able to manage crisis and conflicts effectively, possess excellent communication skills and demonstrate determination when necessary. Also, project managers believe that some characteristics such as experience, leadership capabilities and persistence are not essential for an adequate and successful project manager.

A further research was conducted comparing the answers of participants with 0-5 years of experience in projects compared to those with 6-37 years of experience in projects and as a result there have emerged some notable differences between these two groups regarding their perceptions of project managers. On the one hand, engineers with little or no experience in managing projects rank higher some personality characteristics and skills of project managers, such as effectiveness, capability of risk evaluation, communication skills, decisiveness, promptness on solution provision and diplomacy. This probably means they believe that these characteristics and cognitive abilities will help a manager to cope better with the demands of his job. However on the other hand, engineers with more years of working experience in projects rank higher some other personality characteristics and skills of project managers, such as overall perception of the whole project, collaborative team spirit, responsibility, capability of outsourcing, perception of scale, being respected by others and creativity, as they seem to have a better evaluation of all cognitive abilities and characteristics and know exactly which of these are truly needed for project managers to be successful at their jobs.

4.2 Main Conclusions

The objective of this study was to investigate, identify and study the main characteristics and skills of the skilled manager of technical projects and subsequent prioritization of these features, the search for possible correlations arising from the sample answers and finally selecting the most important characteristics, draw conclusions and explain the correlations and trends. Apart, however, from the classification of the main features in descending order, the study, also showed us other things. The most

important is the way the evaluation of these elements depends on the personal data and the individual characteristics of each engineer who participated in the survey.

The comparative evaluation of the responses of engineers who have no or very few years of experience in technical projects in Greece to those who have many years of work experience as engineers, provided differences in the ranking of attributes and skills. These differences are probably due to the fact that the engineers who have many years of experience in technical projects in Greece, have come in the past faced with many problems and have encountered some difficult situations, therefore judge and score with different criteria. While the engineers with very little or no experience in construction in many cases can only imagine what exactly is going to face the manager when he tries to put into practice the knowledge acquired.

From the study of the responses of the total survey sample arose some interesting findings. The most important characteristics and skills that should have a project manager include: organizational ability, planning ability, the ability of perception of the overall image, efficiency, capacity for risk assessment, cooperation, conflict management, accountability, capability to consider alternative scenarios, determination and ability to communicate. These characteristics and skills are ranked in high positions of almost all participating engineers.

But within the overall assessment of the characteristics, it seems that less attention is given to some social elements, such as friendliness, social sensitivity, understanding, kindness, commitment, patience, morality and justice. These social elements can in a first reading provide the impression that they are not necessary to properly do the job of a manager. However, their absence may have some negative consequences such as the inability of understanding the other team members, the poor interpersonal relationships with colleagues, and reduced productivity and efficiency. Therefore, some of these features included in the questionnaire cannot be considered as the key elements that make a successful manager. But the total lack of those may lead to some very unpleasant situations, which ultimately affect or even largely determine the final result of his work.

4.3 Further Research

Further research will focus on engineers from foreign countries in order to consider the views of professionals engaged primarily in technical projects in other countries that may have differing opinions because of the particular circumstances prevailing in each country.

Also, a different composition of the sample could be produced. Research could focus more on the views only of those engineers who work as technical project managers. So the opinion of people who have direct work experience, on the subject of management of technical projects, would be clearer.

Known techniques could be applied for evaluating engineers considering the current study results. This could be done using appropriately designed tests for the evaluation of these characteristics on engineers working on technical projects. Finally, using appropriate software additional analyses could be made, to expand the scope of the study.

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