

IDENTIFYING AND PRIORITIZING BEHAVIORAL COMPETENCIES OF PROJECT MANAGERS IN MASHHAD METRO PROJECTS

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Ali Reza Afshari

Islamic Azad University, Department of Construction Management, Shirvan Branch, Shirvan, Iran

Dragan Čockalo

University of Novi Sad, Technical faculty “Mihajlo Pupin”, Zrenjanin, Republic of Serbia

E-mail: dragan.cockalo@tfzr.rs

ABSTRACT

This study examines the behavioral competencies of project managers in Mashhad metro projects using the Fuzzy Analytical Hierarchy Process (FAHP). Due to the complexity of urban railway projects and the involvement of multiple stakeholders, behavioral competencies are considered important for effective project management. The study combined literature review, expert evaluation, and FAHP analysis based on the opinions of 10 experts with experience in metro construction projects. The results show that Communication Competencies represent the most important category, followed by Interaction and Leadership Competencies. At the individual level, Creating Positive Interactions, Negotiation Ability, and Crisis Management ranked as the most important competencies. The findings highlight the importance of communication and interaction-related competencies in the selection and evaluation of project managers in large-scale infrastructure projects.

Keywords: Behavioral Competencies, Project Manager, FAHP, Metro Projects.

INTRODUCTION

Large-scale urban infrastructure projects, particularly metro systems, are among the most complex and capital-intensive construction projects due to their technical demands, multiple stakeholders, long implementation periods, and high financial investments (Moradi et al., 2019). In Iran, metro development projects such as the Mashhad metro system play an important role in improving urban transportation, reducing traffic congestion, and increasing public transport efficiency (Tabasi & Abubakr, 2018). However, such projects frequently face delays, budget overruns, coordination problems, and stakeholder-related challenges, where the role of the project manager becomes especially important (Safaei & Arizaei, 2013; Turner, 2019).

Traditionally, project manager selection in the construction industry has focused mainly on technical competencies such as planning, cost estimation, scheduling, and contract management (Bagheri & Jafari, 2019). Nevertheless, previous studies indicate that behavioral competencies—including communication, negotiation, leadership, conflict resolution, crisis management, and emotional intelligence—also significantly influence project performance, particularly in complex construction environments (Dainty et al., 2005; Crawford et al., 2012; Spencer & Spencer, 2023). These competencies support effective interaction with project teams and stakeholders and improve managerial responses in uncertain project situations.

The concept of competency has been widely discussed in human resource and project management literature since the work of McClelland and later competency-based management approaches (Boyatzis, 1982). International frameworks such as the Project Management Institute (PMI) competency framework and the IPMA ICB4 standard also recognize behavioral competencies as an important dimension of project management practice (PMI, 2017; IPMA, 2018).

Despite the recognized importance of behavioral competencies, limited research has specifically examined their prioritization in Iranian metro construction projects. Existing studies have mainly focused on technical competencies or general construction management issues (Mombini & Norouzi, 2019). In addition, the absence of structured competency evaluation models may contribute to subjective project manager selection processes and reduced managerial effectiveness (Alizadeh & Ghorbani, 2019; Khoshnevis & Azizi, 2014).

Accordingly, this study aims to identify and prioritize the behavioral competencies of project managers in Mashhad metro projects using the Fuzzy Analytical Hierarchy Process (FAHP). FAHP, developed from the traditional AHP approach introduced by Saaty (1980), incorporates fuzzy logic principles to support decision-making under uncertainty (Buckley, 1985). The method is considered suitable for evaluating subjective and qualitative criteria such as behavioral competencies (Azar & Faraji, 2006; Hsieh et al., 2004). The research combines literature review, expert evaluation, and fuzzy analysis to determine the relative importance of key behavioral competencies relevant to large-scale metro projects. The findings may support project manager selection and evaluation processes in infrastructure organizations and construction projects (Varajao & Cruz-Cunha, 2023).

LITERATURE REVIEW

Competency-based approaches have been widely discussed in human resource management and project management literature since the work of McClelland and subsequent competency models developed in organizational studies (Alvani, 2017; Boyatzis, 1982). Competencies are commonly understood as combinations of knowledge, skills, abilities, and behavioral characteristics associated with effective job performance (Turner, 2019; Rahiminia et al., 2012). Various authors have also linked competencies with motivation, personality traits, communication abilities, managerial effectiveness, and superior work performance (Whiteman & Marshall, 2016; Mousavi Nik et al., 2012). Over time, competency-based approaches have become important tools in personnel selection, performance evaluation, succession planning, and managerial development.

In project management, competency frameworks developed by organizations such as PMI and IPMA recognize behavioral competencies as an important dimension alongside technical and managerial competencies (PMI, 2017; IPMA, 2018). According to these approaches, project manager competencies include not only technical knowledge, but also communication, leadership, negotiation, interpersonal relations, conflict management, and behavioral effectiveness. Previous studies have also linked project manager competencies with project success criteria such as time, cost, quality, stakeholder satisfaction, and organizational effectiveness (Westerveld, 2003; Wateridge, 2018; Kerzner, 2019; Qazi Moradi et al., 2015). Fram (2017) additionally emphasized the coordinating and knowledge-transfer role of project managers in complex projects.

In construction projects, behavioral competencies are particularly important because project managers must coordinate multiple stakeholders, manage conflicts, respond to uncertainty, and maintain effective communication within dynamic project environments (Crawford et al., 2012). Several studies in Iran have also emphasized the importance of managerial competency, resource management, and organizational effectiveness in construction and industrial projects (Rezaeian et al., 2014). Previous research further suggests that project success depends not only on technical expertise, but also on interpersonal and behavioral capabilities, especially in large and complex infrastructure projects.

Recent studies in construction management literature increasingly emphasize people-oriented leadership and interpersonal competencies. Rehan et al. (2024) identified communication, collaborative working, and relationship-building as critical behavioral practices in successful construction projects. Kassa et al. (2024) reported that emotional intelligence and behavioral characteristics significantly influence teamwork and project coordination in construction organizations. Other studies also highlight communication ability, conflict management, problem-solving, interpersonal relations, technical expertise, and leadership capabilities as essential competencies for effective project managers.

Although competency frameworks and previous studies recognize the importance of behavioral competencies, limited research has specifically examined their prioritization in the context of Iranian metro construction projects. To address this gap, the present research focuses on the behavioral competencies of project managers in Mashhad metro projects using the Fuzzy Analytical Hierarchy Process (FAHP).

BEHAVIORAL COMPETENCIES AND THE APPLICATION OF FAHP IN PROJECT MANAGEMENT EVALUATION

Recent studies have increasingly applied fuzzy multi-criteria decision-making methods in project management research. Zia et al. (2024) used the Fuzzy Delphi Method (FDM) and FAHP to identify critical success factors in manufacturing projects, while Mohammed et al. (2025) applied FAHP to evaluate sustainability challenges in construction projects. Rehan et al. (2025) emphasized the importance of leadership and interpersonal behavioral practices in construction project management, and Zemlińska-Sikora (2023) highlighted emotional intelligence and behavioral competencies as emerging requirements for modern project managers. These studies demonstrate the growing relevance of behavioral competencies and fuzzy decision-making approaches in project management research.

The Fuzzy Analytical Hierarchy Process (FAHP) was applied to identify and prioritize the behavioral competencies of project managers in Mashhad metro projects. FAHP combines the traditional Analytical Hierarchy Process (AHP) developed by Saaty (1980) with fuzzy set theory introduced by Zadeh (1965) to support decision-making under conditions of uncertainty and subjective judgment. The method is considered suitable for evaluating qualitative and behavioral criteria where expert opinions are expressed through linguistic assessments rather than precise numerical values (Azar & Faraji, 2006).

Triangular fuzzy numbers (TFNs), represented as lower, middle, and upper values, were used to express expert judgments in pairwise comparisons. Buckley's (1985) geometric mean method was applied to calculate fuzzy weights and determine the relative importance of competencies. The study involved a panel of 10 experts with extensive experience in Mashhad metro projects. Expert evaluations were collected through pairwise comparison questionnaires using linguistic assessment scales. The use of fuzzy logic in competency evaluation has also been discussed in previous studies addressing subjective and multidimensional decision-making problems (Hsieh et al., 2004).

The FAHP procedure included the development of a hierarchical competency structure, design of pairwise comparison matrices, collection of expert judgments, calculation of fuzzy geometric means and fuzzy weights, defuzzification, normalization, consistency checking, and final ranking of competencies. Consistency of pairwise comparison matrices was evaluated using the consistency ratio (CR), where values below 0.10 were considered acceptable. In construction management research, FAHP has previously been applied in areas such as contractor selection, project risk assessment, sustainability evaluation, and competency prioritization.

FINDINGS AND COMPETENCY PRIORITIZATION

This section presents the results of the research on identifying and prioritizing the behavioral competencies of project managers in Mashhad metro projects using the Fuzzy Analytical Hierarchy Process (FAHP). A panel of 10 experts with experience in metro construction projects participated in the analysis. Based on the literature review and expert evaluation process, 13 behavioral competencies were identified and classified into three categories: Communication Competencies, Leadership Competencies, and Interaction Competencies.

All competencies received mean scores above the acceptance threshold in the preliminary expert evaluation and were therefore included in the FAHP analysis. The consistency ratios (CR) for all

pairwise comparison matrices were below 0.10, confirming acceptable reliability and consistency of expert judgments. The geometric mean method was used to aggregate expert responses and calculate the relative importance of competencies.

Communication Competencies achieved the highest normalized weight of 0.687, followed by Interaction Competencies (0.204) and Leadership Competencies (0.109). This indicates that communication-related behavioral capabilities are considered significantly more important than traditional managerial and planning-oriented competencies in the context of Mashhad metro projects.

Within the Communication Competencies category, “Creating Positive Interactions” ranked first with a normalized weight of 0.533, followed by “Negotiation Ability” (0.304). “Interpersonal Communication” and “Effective Communication” received substantially lower values. The findings suggest that experts place greater importance on relationship-building and stakeholder coordination than on routine communication functions.

Within the Leadership Competencies category, “Conflict Management” received the highest weight (0.772), considerably exceeding “Decision Making” (0.129) and “Planning” (0.100). This result reflects the complexity of metro construction projects, where disputes among contractors, design modifications, resource allocation issues, and stakeholder disagreements require continuous managerial intervention and negotiation.

In the Interaction Competencies category, “Crisis Management” ranked first with a weight of 0.570, followed by “Expectation Management” (0.194) and “Risk Management” (0.113). The prominence of crisis management indicates the importance of rapid response and coordination capabilities in large-scale infrastructure environments characterized by uncertainty and operational pressure.

The final overall ranking of behavioral competencies was obtained by combining the weights of the main competency categories and their corresponding sub-competencies – Table 1.

Table 1: Final Ranking of Behavioral Competencies

Competency	Final Weight	Rank
Creating Positive Interactions	0.366	1
Negotiation Ability	0.208	2
Crisis Management	0.116	3
Conflict Management	0.084	4
Interpersonal Communication	0.056	5
Effective Communication	0.055	6
Expectation Management	0.040	7
Risk Management	0.023	8
Decision Making	0.014	9
Change Management	0.013	10
Interaction Management	0.012	11
Planning	0.011	12

The results show that “Creating Positive Interactions” emerged as the most important behavioral competency overall with a final global weight of 0.366, followed by “Negotiation Ability” (0.208) and “Crisis Management” (0.116). Together, these three competencies accounted for approximately 70% of the total importance weights obtained through the FAHP analysis.

The relatively low ranking of “Planning” does not suggest that planning is unimportant in project management practice. Rather, it indicates that technical planning capabilities are considered baseline expectations for project managers, while behavioral competencies are viewed as the differentiating factors in managing complex metro construction projects.

Overall, the findings indicate that communication, stakeholder interaction, conflict resolution, and crisis response capabilities play a dominant role in the successful management of Mashhad metro projects. The results also suggest that behavioral competencies should receive greater attention in project manager selection, evaluation, and professional development processes within large-scale infrastructure organizations.

CONCLUSION

This study examined the behavioral competencies of project managers in Mashhad metro projects using the Fuzzy Analytical Hierarchy Process (FAHP). Behavioral competencies related to communication, interaction management, and crisis response are considered more important than traditional managerial and planning-oriented competencies in the context of large-scale urban infrastructure projects.

Among the analyzed competency categories, Communication Competencies achieved the highest overall importance, while “Creating Positive Interactions,” “Negotiation Ability,” and “Crisis Management” emerged as the most influential individual competencies. The results suggest that the ability to manage stakeholder relations, maintain effective collaboration, and respond to uncertain project situations plays a central role in complex metro construction environments.

A similar emphasis on interpersonal leadership practices has been reported in previous studies emphasizing the importance of interpersonal and people-oriented leadership practices in construction project management (Rehan et al., 2024; Varajao et al., 2023). At the same time, the strong emphasis on crisis management reflects the specific operational conditions of Mashhad metro projects, including technical uncertainty, coordination complexity, and high public visibility.

From a practical perspective, the results suggest that employer organizations should place greater emphasis on behavioral competencies during project manager selection, evaluation, and professional development processes. In addition to technical qualifications, greater attention should be given to communication abilities, conflict resolution, negotiation capabilities, and crisis response skills.

This study is limited by the relatively small expert sample and its focus on a specific project environment. Future research may expand the analysis to other infrastructure projects and compare competency priorities across different construction contexts. Further studies may also combine behavioral, technical, and contextual competencies within broader project manager evaluation models and apply alternative multi-criteria decision-making approaches such as Fuzzy DEMATEL or ANP.

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