

KOREAN CONSTRUCTION PROJECT MANAGER'S CAPABILITY CHANGE OVER THE LAST DECADE

Soun JO^{1*}, Hyunsang CHO¹, Seeun CHOI¹, Minji BAEK², Jimin KIM³, Hyounseung JANG⁴

¹ Graduate Student, Architectural Engineering Program, School of Architecture, Seoul National University of Science and Technology, 232 Gongneung-ro, Gongneung-dong, Nowon-gu, Seoul 01811, Korea, E-mail address: sown0513@seoultech.ac.kr

² Undergraduate Student, Architectural Engineering Program, School of Architecture, Seoul National University of Science and Technology, 232 Gongneung-ro, Gongneung-dong, Nowon-gu, Seoul 01811, Korea.

³ Associate professor, Architectural Engineering Program, School of Architecture, Seoul National University of Science and Technology, 232 Gongneung-ro, Gongneung-dong, Nowon-gu, Seoul 01811, Korea.

⁴ Professor, Architectural Engineering Program, School of Architecture, Seoul National University of Science and Technology, 232 Gongneung-ro, Gongneung-dong, Nowon-gu, Seoul 01811, Korea, E-mail address: jang@seoultech.ac.kr (Corresponding author)

Abstract: The South Korean construction industry has grown larger and more complex through collaboration with various fields. In the construction industry, faced with the era of the 4th Industrial Revolution, the importance of project managers is growing for successful construction projects. Amid these changes, it is necessary to grasp the capabilities and importance of project managers for the development of the South Korean construction industry and analyze how they affect it. This study aims to review the required capabilities of the project manager and suggest implications with a comparison of current capabilities and importance. To this end, a survey was conducted on the importance and Performance of the project manager. Using collected data, changes in capabilities are identified by comparing the Performance and importance of project managers respectively in 2010 and 2022 through the Importance – Performance Analysis (IPA) method. The analysis results show changes in the Performance and importance of project managers according to changes in the construction environment, and the insufficient capabilities of them. Based on this research, it is expected that efficient construction management will be possible amid changes in the construction environment by presenting the method to improve necessary capabilities to project managers in South Korea.

Key words: construction project manager; ipa(Importance & Performance Analysis); necessary capability

1. INTRODUCTION

In 2016, Klaus Schwab's "4th Industrial Revolution" emerged in the so-called Davos Forum, the World Economic Forum. It is defined as "a fusion of technologies such as bio, digital, and offline [1]. The 4th Industrial Revolution has been introduced to South Korea and established a firm position in all sectors of our society and economy, and the construction environment has been also changing in line with "4th Industrial Revolution" technologies. Following the change, it is believed that the construction market, construction companies, and the capabilities of project managers who carry out projects are also changing in the era of the 4th industrial revolution. In addition to having a positive impact on subordinates by working with them, the project manager plays an important role in various areas from managing the construction site, making decisions, and tackling challenges to eventually achieving a successful project [2]. Therefore, this study aims to identify changes in the project manager's capabilities according to the changing trends in the construction site. In so doing, it is believed that in response to changes in the construction environment, the findings from the study can enhance capabilities that

change with the times and are used for efficient construction management suitable for the capabilities of the project manager.

2. RESEARCH FRAMEWORK

This study conducted a survey to find the capabilities of the project manager. In order to obtain a wide range of opinions, it was limited to field project managers from small and large companies among Korea construction companies. In order to understand the capabilities of project managers before and after the 4th Industrial Revolution, the same questions were conducted as the project manager competency survey in 2010. In 2022, the capabilities of future suitable personnel necessary for the 4th Industrial Revolution were additionally investigated in the same question. The flow chart of this study is shown in <Figure 1>.

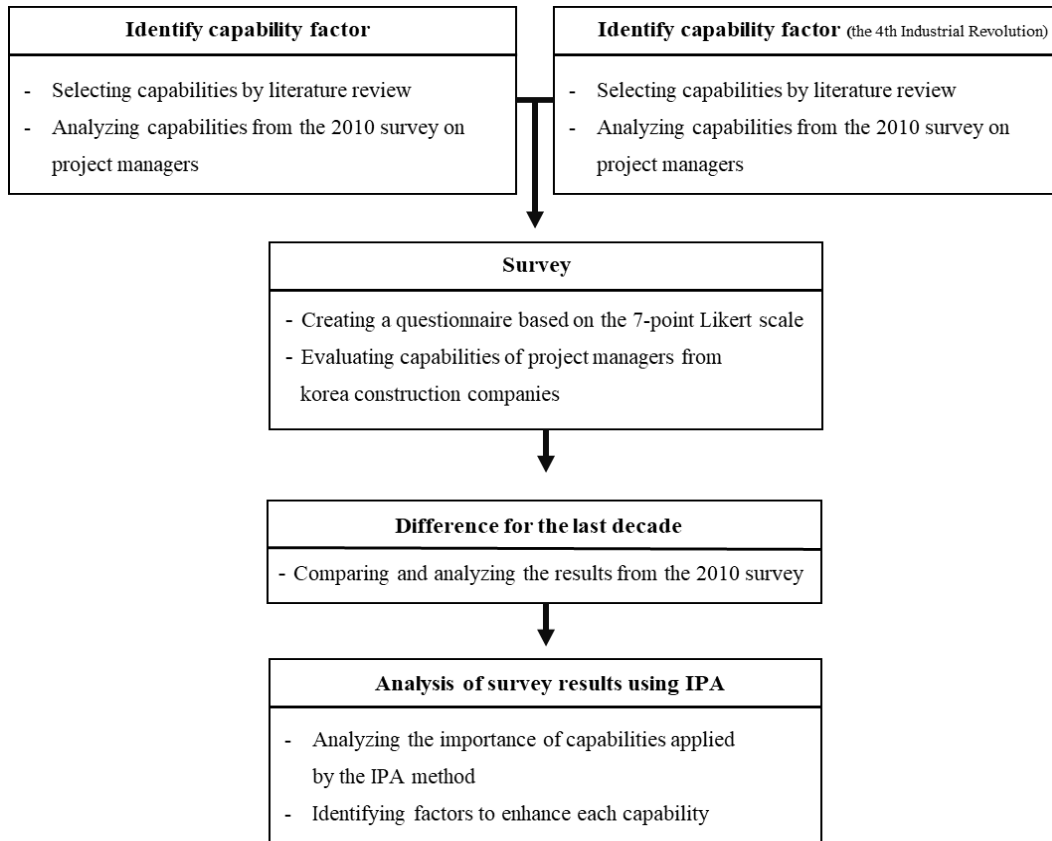


Figure 1. Research Flow Chart

Several steps are undertaken: initially, capabilities are chosen through literature review and analysis of a 2010 survey on project managers; subsequently, future capabilities are identified for the 4th Industrial Revolution via literature review; next, the performance of Korean project managers is assessed and importance is gauged using a 7-point Likert scale survey; then, results are compared with the 2010 survey and capability factors are analyzed using the Important Performance Analysis (IPA) method; finally, the survey results are verified.

3. LITERATURE REVIEW AND EXPLORING THE IPA METHOD

3.1. Literature review

It is intended to understand the main business capabilities of the project manager and the necessary capabilities for the right person after the era of the 4th Industrial Revolution. <Table 1> shows the main points of existing studies on the work and major capabilities of the project manager. Through the literature review on existing research, it can be seen that capabilities are largely divided into three management parts: external, project, and self-management, despite differences by each researcher regarding overall capability and desired capabilities for the right person. This study attempts to grasp

the change in the importance of the new capability of the project manager based on existing research and the survey on awareness of project managers on importance and performance in 2010.

Table 1. Literature Review

| Author | Main Points |
|-----------------------------|--|
| [3]Michael J. Bresen (1984) | It was focused on efficient project management to achieve successful project work and explained the leadership and various components of the project manager suitable for the field situation |
| [4]Tae-shik Lee (2001) | The analysis and classification of the actual work of the project manager were conducted, and a model that could systematically foster project managers was presented by developing the modeling of the project manager's work area. |
| [5]Low Sui Pheng (2005) | It defined the project factors that affected the performance of the project manager |
| [6]Alexander Styhre (2006) | It defines what the project manager is like at the construction site of the production stage and the main capabilities for various management problems that the project manager is required to do |
| [7]Kyoung-Hoon Park (2010) | The work of project managers is identified by each task to analyze the importance, workload, and difficulty of each task, and the factors that affect work performance level and performance ability by each task |
| [2]Inn-Han Youn (2015) | The effect of the authentic leadership of the construction project manager on the behavior and commitment of the site staff was analyzed. |
| [8]Jae-Yeob Kim (2017) | It defined the capabilities required for architectural engineers in the era of the 4th Industrial Revolution through the desired talent for Korea construction companies and research reports on the 4th Industrial Revolution |
| [9]Yong-Geun Cho (2020) | It analyzed prospects for Korea construction in the era of the 4th Industrial Revolution and suggested various methods of improving production systems in the construction market |
| [10]Yeon-Tae Kim (2020) | It analyzed the training of construction engineers needed in the future construction market and expected capabilities for them |

3.2. IPA Method

The import-performance analysis (IPA) is a method for marketing analysis known to the public through the publication of a paper titled "Importance Performance Analysis" by Martilla & James (1977) in the Journal of Marketing. It is a useful tool to determine which items need to be improved first on the IPA grid and which parts are to be focused on, using the values of the Relative Importance and Relative Performance. In addition, it has the advantage of being able to visually show the level of perception of the survey subjects. In this study, the project manager's capabilities classified using the 7-point Likert scale were divided into quadrants with the mean of the result values (X-axis: average of current performance, Y-axis: average of importance) for the importance and performance levels of the questionnaire. The contents of the quadrants of the IPA grid are shown in <Figure 2>.

In the case of Quadrant 1 (Keep up the Good Work), it is desirable to maintain this situation while the importance of evaluated capabilities and the level of actual evaluated performances are also relatively highly estimated. Quadrant 2 (Concentrate Here) has a high importance for evaluated capabilities, but its performances are relatively undervalued, which urgently needs to be improved in the future. Quadrant 3 (Low Priority) has sufficient properties in a state where both items are low in importance and level for evaluated performance, and no more effort is required. In the case of Quadrant 4 (Possible Overkill), it is necessary to put efforts into other evaluation items with a relatively high degree of performances that are not considered relatively important.

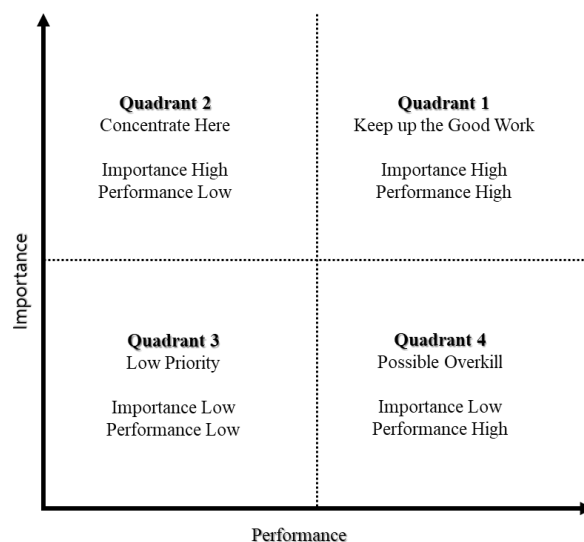


Figure 2. Importance-performance grid

4. IPA RESULTS ANALYSIS

4.1. selection of detailed capabilities

In the case of selecting detailed capabilities required for the study, the Focus Group Interview (FGI) method, which is a qualitative research method, was used. The questions were presented based on the 2010 survey, which was based on the finally derived items of capabilities, and in the case of future capabilities in the era of the 4th Industrial Revolution, they were selected using a literature review with reports from related research institutes and related papers [8]. The finally selected items for capabilities were divided into external management (profit/cost management: four items, External relations: five items), Project management (construction management: five items, Organization management: eight items), Self-management (Strategic thinking: five items, Self-discipline: five items), Capabilities for the 4th Industrial Revolution (future capabilities: five items) with four large categories and seven medium categories, which are 37 in total. The identified capabilities items are shown in <Table 2>.

Table 2. Literature Review

| Large category | Medium category | Code | Classification of capabilities |
|---------------------|-------------------------|---|--|
| external management | Profit/cost management | A-1 | Capability to win contracts Project implementation management capability |
| | | A-2 | Design modification capability for enhanced |
| | | A-3 | Capability to collect information for winning contracts |
| | | A-4 | Ideas for construction cost reduction |
| | External relations | B-1 | Gumption in the face of civil complaints |
| B-2 | | Capability to envision a win-win strategy with subcontractors | |
| B-3 | | Close rapport with clients | |
| B-4 | | Capability to hold persuasive negotiations with the ordering organization | |
| B-5 | | Understanding of local culture | |
| Project management | construction management | C-1 | Understanding of specifications and contracts |
| | | C-2 | Decision-making capability |
| | | C-3 | Flawless-construction- management capability |
| | | C-4 | Gumption |
| | | C-5 | Thorough understanding of construction |
| | Organization management | D-1 | Organizational-operation capability |
| | | D-2 | Sensitive leadership |
| | | D-3 | Capability to gain the trust of staff members |
| | | D-4 | Active involvement in enhancing the capabilities of one's subordinates |
| | | D-5 | Attentive listening |

| | | | | |
|--|-----------------------|-----------------|--|-------------------------------|
| Self-management | Strategic thinking | D-6 | Considerate attitude towards others | |
| | | D-7 | Gerentocratic management mindset | |
| | | D-8 | Understanding of subordinates | |
| | | E-1 | Perceptive skills for competitors | |
| | | E-2 | Capability to develop new business models | |
| | | E-3 | Beyond-specifications judgment | |
| | | E-4 | Design review capability | |
| | | E-5 | Balanced work experience between construction and government affairs | |
| | | Self-discipline | F-1 | Wider perspective of projects |
| | | | F-2 | Self-development |
| F-3 | Reliability | | | |
| F-4 | Emphasis on principle | | | |
| F-5 | Responsibility | | | |
| capabilities for the 4th Industrial Revolution | future capabilities | G-1 | Critical thinking | |
| | | G-2 | Creative thinking | |
| | | G-3 | Systems thinking | |
| | | G-4 | Business agility | |
| | | G-5 | Transformativeness | |

4.2. Analysis of the Survey

4.2.1. Overview of the survey

In March 2022, the survey was conducted on project managers from Korea construction companies of various sizes. It sought to find the importance of each capability and the current capability level using 37 selected questions. A total of 71 responses were collected, and the basic information for survey respondents are as shown in <Table 3>.

Table 3. Composition of the respondents

| Category | Classification | Person(number) | Portion(%) |
|---------------------------------------|---|----------------|------------|
| Experience as a project manager | less than 3 years | 43 | 60.6% |
| | (more than) 3 years ~ (less than) 5 years | 6 | 8.5% |
| | 5 years ~ 10 years | 7 | 9.9% |
| | 10 years ~ 20 years | 9 | 12.7% |
| | more than 20 years | 6 | 8.5% |
| Size of their companies (Asset basis) | small business | 3 | 4.2% |
| | small and mid-sized company | 9 | 12.7% |
| | middle-market company | 8 | 11.3% |
| | middle and large-sized company | 23 | 32.4% |
| | large company | 28 | 39.4% |

4.2.2. Reliability Analysis

The Cronbach's Alpha value was used to test the consistency of the survey values. For the reliability criterion of Cronbach's Alpha value, the value of 0.700 or higher is appropriate regardless of the nature of the study such as initial research, basic research, applied research, and scale development research [10]. As a result of the collected survey, the Cronbach's Alpha values of both Importance and Performance are 0.700 or higher, so the results of this survey are found to be reliable. <Table 4>

Table 4. Cronbach's Alpha of Survey Results

| number of questions | Importance | Performance |
|---------------------|------------|-------------|
| 37 | 0.74 | 0.87 |

4.3. Difference for the last decade

The Importance and Performance in 2010 and 2022 were compared to examine the importance of the required capabilities of the project manager and the change in the performance according to the change in the era of the 4th Industrial Revolution. The compared items for capabilities are shown in <Figure 3> below.

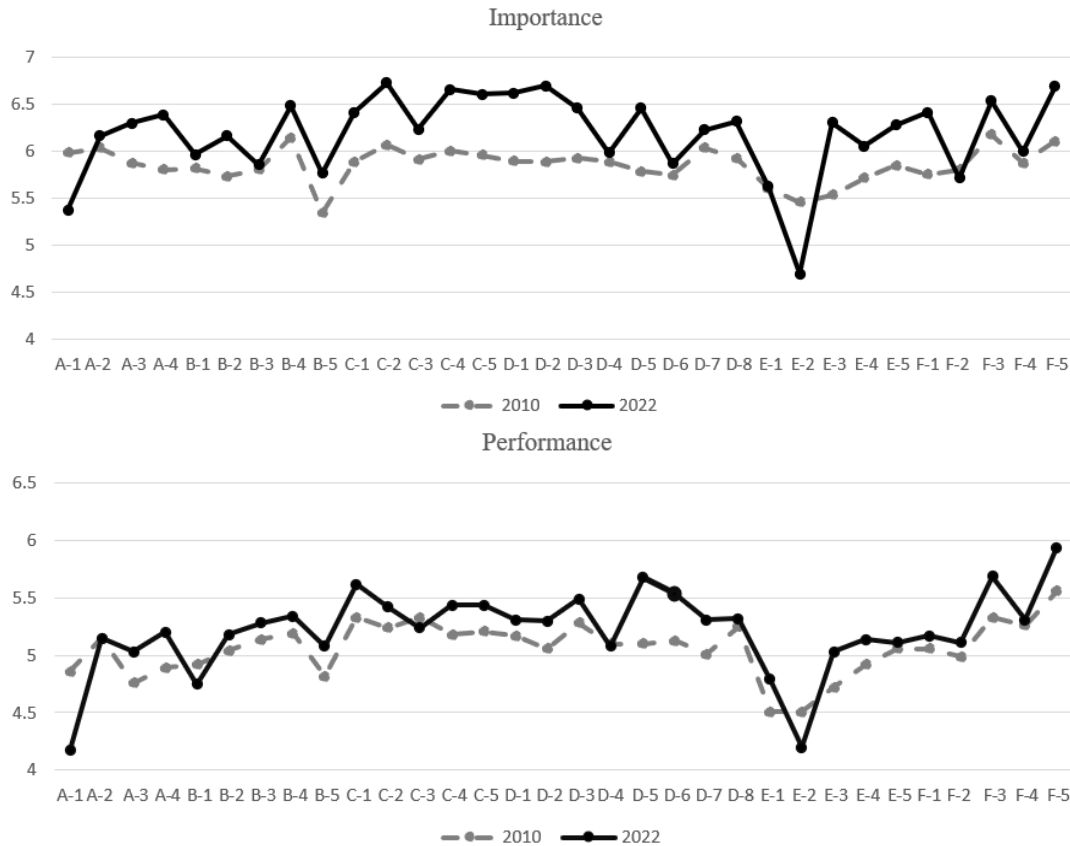


Figure 3. Comparison of Importance and performance in 2010 and 2022

In the Importance graph of <Figure 3>, it was confirmed that all items other than three out of 37 items increased in importance overall compared to that of the 2010. The items show the high importance in the past are ‘A-1 Capability to win contracts Project implementation management capability’, ‘E-2 Capability to develop new business models’, and ‘F-2 Self-development.’ In the Performance graph, a total of five items appeared to have lower performances than in the past. These five items are ‘A-1 Capability to win contracts Project implementation management capability’, ‘B-1 Gumption in the face of civil complaints’, ‘C-3 Flawless-construction- management capability’, ‘D-4 Active involvement in enhancing the capabilities of one’s subordinates’, and ‘E-2 Capability to develop new business models,’ which can be understood that some of the items fell short of the expectations, compared to the current performance.

4.4. IPA Analysis

The importance and performances results obtained through the survey are shown in <Figure 4>. The one common result of the survey was to show the low level of current performances by comparing the importance. In addition, the capability that shows the average or higher value in terms of importance and current performances is the construction management capability (importance: 6.53, performance: 5.43) among the project management capabilities. Next, the capability showing high importance and current performances is the organizational management capability (importance: 6.33, performance: 5.38) among project management capabilities.

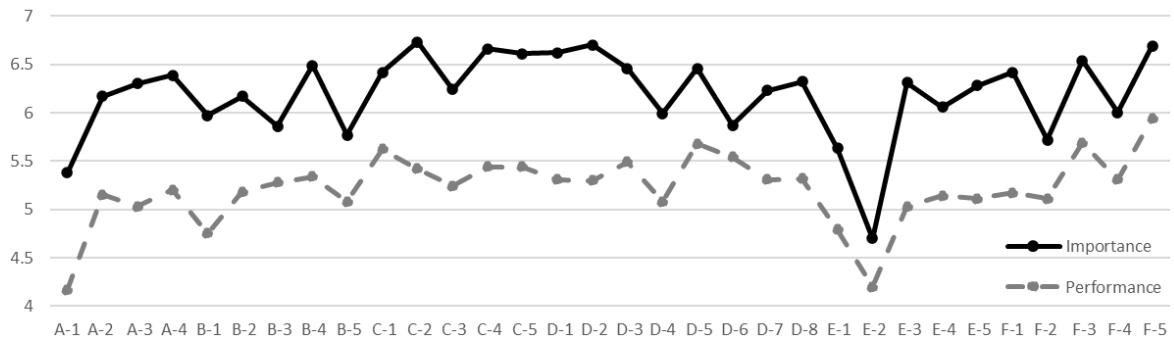


Figure 4. Results by Survey

The IPA model for the 37 capabilities factor items applied to the survey is as shown in <Figure 5>. As a result of the analysis, the five capabilities items located in the area of Quadrant 2 with high priority are two external management capabilities (Profit/cost management: two items) and two self-management capabilities (Self-discipline: one item, Strategic thinking: two items). Detailed factor items are shown in <Table 5>. Items for capabilities located in Quadrant 2 area have a relatively low performance level compared to importance. It is judged that the priority of enhancing capability in this area is higher than other areas. This study was prepared by considering only Quadrant 2, where capability enhancement is prioritized due to its relatively low level of project performance capabilities in terms of importance.

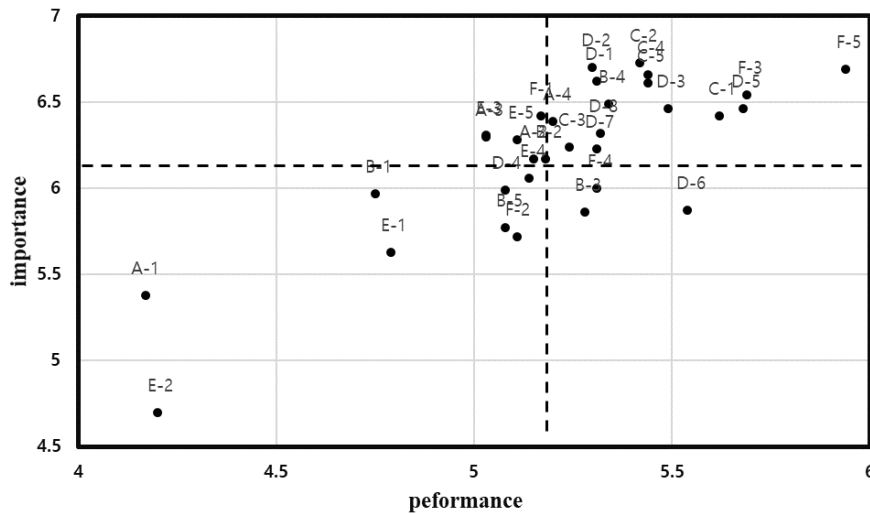


Figure 5. Total Importance-performance grid

Table 5. Analysis Results of Quadrant 2

| code | Competitiveness Factors | Importance | Performance | GAP |
|------|--|------------|-------------|------|
| A-2 | Design modification capability for enhanced | 5.81 | 4.89 | 0.92 |
| A-3 | Capability to collect information for winning contracts | 5.82 | 4.92 | 0.90 |
| E-3 | Beyond-specifications judgment | 5.74 | 5.04 | 0.70 |
| E-5 | Balanced work experience between construction and government affairs | 5.82 | 4.99 | 0.83 |
| F-1 | Wider perspective of projects | 5.53 | 4.82 | 0.71 |

Among the items in the Quadrant 2 area, the capability factor with a relatively large difference between the importance and the performance level is [A-2: Design modification capability (0.92)]. It is judged that the five items corresponding to the area need to be intensively improved in the future.

5. CONCLUSIONS

This study analyzed the importance of the required capabilities and the change in the performance of the project manager due to changes in the construction environment promoted by the 4th Industrial Revolution. To carry it out, a survey, including the future capabilities of the 4th Industrial Revolution, was conducted with reference to the survey items on the same topic twelve years ago.

As a result, the importance of the required capabilities for project managers increased compared to that of 2010 in almost all capabilities. Nevertheless, given the decrease in the value of the importance of a few capabilities, it is found that changes in the construction environment affect the capabilities of the project manager. The limitation of this study is that the past and current survey subjects are not identical, which may affect the survey results.

If the effect of changes in the construction environment on the capabilities of project managers is identified with the results of this study, it leads to the successful performance of the construction site and helps smooth external relations, project management, and organizational management. In future studies, it is intended to analyze the difference in performance for project managers and construction companies by size.

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