

# Investigating Project Portfolio Management Adoption in Iraqi Construction Projects: An Analysis of Perceived Benefits and Challenges

**Majid Hameed Yahya**

Civil Engineering Department, College of Engineering, University of Baghdad, Baghdad, Iraq  
majed.yahya2201d@coeng.uobaghdad.edu.iq (corresponding author)

**Kadhim R. Erzaij**

Civil Engineering Department, College of Engineering, University of Baghdad, Baghdad, Iraq  
kadhim69@coeng.uobaghdad.edu.iq

Received: 2 February 2026 | Revised: 24 February 2026 and 9 March 2026 | Accepted: 27 March 2026

Licensed under a CC-BY 4.0 license | Copyright (c) by the authors | DOI: <https://doi.org/10.48084/etasr.17923>

## ABSTRACT

Project Portfolio Management (PPM) is becoming increasingly relevant to Iraqi construction organizations that manage multiple typical and repetitive projects under budget, schedule, and governance constraints. This study investigates whether the perceived benefits and implementation challenges of PPM vary according to the organizations' current multi-project management level and whether standardized Typical Project Management (TPM) practices can serve as a practical foundation for portfolio governance. A structured 14-item questionnaire covering seven potential benefits and seven potential challenges was developed from the literature and refined through expert review for contextual suitability. Data collected from 102 Iraqi construction professionals were analyzed using descriptive statistics, weighted contingency tables, Pearson's chi-square tests, and Cramer's V. The results show statistically significant associations between management level and the dominant perceived benefit category ( $\chi^2 = 26.503$ ,  $df = 12$ ,  $p = 0.009$ ,  $V = 0.271$ ) and between management level and the dominant perceived challenge category ( $\chi^2 = 28.290$ ,  $df = 12$ ,  $p = 0.005$ ,  $V = 0.280$ ). Organizations operating at the portfolio-management level place stronger emphasis on alignment, prioritization, and governance-oriented value, whereas organizations with lower levels of maturity tend to emphasize commitment, coordination, and difficulties associated with prioritization methods. The study provides a compact context-sensitive instrument and practical insights into how adoption priorities shift across management levels in Iraqi construction organizations. Due to the cross-sectional nature of the study, the results indicate association rather than causation.

**Keywords-**Project Portfolio Management (PPM); Iraqi construction projects; Typical Project Management (TPM); portfolio governance; benefits; challenges

## I. INTRODUCTION

Construction companies in Iraq manage multiple projects simultaneously while operating under constrained budgets, schedule pressure, fragmented resource availability, and strong public expectations regarding accountability. In such an environment, managing each project in isolation may improve local control, but it does not necessarily ensure that scarce resources are allocated to the most valuable combination of projects for the organization or the wider development agenda [1-6].

Typical construction projects, such as schools, housing units, service buildings, and other repetitive public facilities, are especially relevant to this problem. Their technical repetition makes standardized planning, procurement, reporting, and performance tracking feasible; however, their simultaneous execution creates competition for labor,

equipment, funding, and managerial attention across projects [1, 2]. Typical Project Management (TPM) refers to the standardized use of common procedures, documentation, reporting routines, and control practices across similar projects. TPM is treated as an enabling operational base rather than as a substitute for higher-level portfolio governance.

Project Portfolio Management (PPM) addresses this higher-level governance need by supporting project selection, prioritization, balancing, monitoring, and value review at the portfolio level [3, 4]. In construction and other project-based sectors, formalized portfolio practices have been linked to better strategic alignment, more explicit prioritization criteria, improved resource deployment, and stronger financial stewardship, including better Return on Investment (ROI) visibility [5-9].

However, PPM adoption is rarely a purely technical matter. It is often affected by weak strategic clarity, limited senior-management sponsorship, organizational resistance, difficulty demonstrating non-financial value, and uncertainty regarding the development of prioritization criteria perceived as legitimate and workable [10-12]. These issues are particularly relevant in the construction industry, where organizations typically prioritize project-level standardization and governance routines. Authors in [13] addressed some portfolio-related issues, such as the evaluation of stalled construction projects; however, they failed to provide detailed insights into how organizations at different management levels perceive the main benefits and barriers of broader PPM adoption. Therefore, the present study examines perception patterns across three management aspects: individual project management, multi-project management, and portfolio management within the context of typical Iraqi construction projects.

This study makes three main contributions: the development of a compact 14-item instrument tailored to typical Iraqi construction environments, the comparison of perceived benefits and challenges across three management levels, and the translation of statistical findings into practical priorities for organizations seeking to move from TPM standardization toward more formal portfolio governance. In addition, the study also examines whether management level influences the dominant perceived benefit and challenge categories of PPM adoption.

## II. RESEARCH MODEL AND HYPOTHESES

The research model assumes that stronger TPM standardization improves the comparability and reliability of project information, and thereby supports the transition toward PPM practices such as portfolio selection, prioritization, balancing, and governance. In analytical terms, the organization's current multi-project management level is treated as the independent categorical variable, while the dominant perceived PPM benefit category and the dominant perceived PPM challenge category are treated as dependent categorical outcomes.

Accordingly, the study addresses the following research questions:

- RQ1: Is the dominant perceived PPM benefit category associated with the organization's current multi-project management level (individual project, multi-project, or portfolio management)?
- RQ2: Is the dominant perceived PPM challenge category associated with the organization's current multi-project management level (individual project, multi-project, or portfolio management)?

Based on the research model, the following directional hypotheses were formulated:

- H1: The organization's current multi-project management level significantly influences which PPM benefit category is perceived as the most salient; higher management levels are expected to place greater emphasis on governance-

oriented benefits such as alignment, prioritization, and financial oversight.

- H2: The organization's current multi-project management level influences which PPM challenge category is perceived as the most salient; lower-maturity levels are expected to emphasize commitment and coordination barriers, whereas higher-maturity levels are expected to emphasize prioritization-method, strategy-alignment, and value-demonstration barriers.

## III. METHODOLOGY

### A. Study Design and Questionnaire Development

This research employed a cross-sectional survey design implemented in a single survey. The questionnaire items were derived from established PPM and construction-management literature, and then refined by senior academics and experienced practitioners familiar with the Iraqi construction industry. The expert review focused on clarity, contextual relevance, and the extent to which the item wording adequately represented portfolio-governance issues in organizations executing multiple typical projects.

### B. Survey Instrument

The final instrument contained 14 substantive items: seven possible PPM benefit statements (B1-B7) and seven possible PPM challenge statements (C1-C7). Respondents were asked to identify the single most salient benefit and the single most salient challenge that best matched their organizational context. This forced-choice structure was used to reveal the dominant perceived value driver and barrier and to support categorical association testing across management levels. Table I presents the instrument items and their supporting sources.

TABLE I. SURVEY INSTRUMENT ITEMS: PERCEIVED PPM BENEFITS AND CHALLENGES (B1–B7, C1–C7)

Code	Benefits of PPM practices	References
B1	Improve alignment of projects with national development objectives	[14, 15]
B2	Improve project prioritization and allocation of resources	[8, 14]
B3	Reduce risks through portfolio-level risk evaluation	[12, 16]
B4	Increase efficiency in project implementation	[17]
B5	Reduce delays and cost overruns	[17]
B6	Improve financial management and investment administration	[18]
B7	Ensure repeatable success through PPM	[9, 19]
Code	Barriers to PPM application	References
C1	Lack of sufficient commitment from senior management and stakeholders	[13]
C2	Difficulty in establishing a project prioritization methodology	[5]
C3	Unclear organizational strategy causing misalignment	[7, 10]
C4	Resistance to change due to organizational and cultural factors	[10]
C5	Negative impact on existing systems and processes	[19]
C6	Absence of clear evidence demonstrating PPM benefits	[10]
C7	Inadequacy of projects to justify portfolio management	[11]

The questionnaire also recorded respondents' qualifications, role, years of experience, current approach to managing multiple projects, and familiarity with PPM concepts. These background variables were used to describe the respondent profile and to interpret the practical credibility of the survey evidence.

### C. Participants and Sampling

The target population comprised professionals working in Iraqi public and private construction organizations and involved in delivering, supervising, or managing multiple projects. As a complete sampling frame for all eligible professionals was not available, purposive sampling was used to reach respondents with relevant experience, including owners' representatives, contractors' representatives, consultants, and supervising engineers. Participation was voluntary and anonymous.

The sample-size adequacy was assessed retrospectively using Cochran's formula for an exploratory proportions-based survey [21]. The sample size is assessed using:

$$n_o = Z^2 p \frac{(1-p)}{e^2} \quad (1)$$

where  $n_o$  is the minimum required sample size,  $Z$  is the standard normal value associated with the selected confidence level,  $p$  is the assumed population proportion, and  $e$  is the tolerated margin of error.

Using a 95% confidence level ( $Z = 1.96$ ), the maximum variability ( $p = 0.50$ ), and a 10% margin of error ( $e = 0.10$ ), the minimum target sample was approximately 96 respondents. The final dataset contained 102 valid questionnaires, which exceeded this threshold. Because the questionnaire was disseminated purposively through professional networks rather than to a closed roster, a conventional response-rate denominator could not be estimated reliably; therefore, the study reports the number of valid responses instead of an imprecise response rate.

### D. Data Analysis and Weighting

The data were coded and analyzed in IBM SPSS Statistics [20]. Respondent characteristics were reported using unweighted frequencies and percentages. To test H1 and H2, cross-tabulations were prepared between management level (three categories) and the dominant selected benefit or challenge category (seven categories). Moreover, Pearson's chi-square tests of independence were conducted at  $\alpha = 0.05$ . Assumptions were checked by confirming one response per participant and by reviewing the contingency structure before interpreting the results. As sparse cells can occur in exploratory multi-category tables, the results were interpreted based on both statistical significance and effect size measures rather than p-values alone.

Because the three management-level groups were unequal in size (28 individual-project, 40 multi-project, and 34 portfolio-management respondents), post-stratification weights were applied to the association tests in order to balance group influence. The target weighted group size was set to 34 for each category. These weights were used only for association testing; demographic summaries remained unweighted.

The weighting rule is applied to each management-level group as:

$$w_g = \frac{N_{target}}{n_g} \quad (2)$$

where  $w_g$  is the weight for group  $g$ ,  $N_{target}$  is the target weighted group size, and  $n_g$  is the observed size of group  $g$ . Using (2), the weighting factors were calculated as:  $w_{individual} = 34/28 = 1.214$ ,  $w_{multi-project} = 34/40 = 0.850$ , and  $w_{portfolio} = 34/34 = 1.000$ .

Pearson's chi-square statistic is calculated as:

$$\chi^2 = \sum \left( \frac{(O_i - E_i)^2}{E_i} \right) \quad (3)$$

where  $\chi^2$  is the chi-square statistic,  $O_i$  is the observed frequency in cell  $i$ , and  $E_i$  is the expected frequency in cell  $i$  under the null hypothesis of independence.

Similarly, the Cramer's V is defined as:

$$V = \sqrt{\left( \frac{\chi^2}{(N \times \min(r-1, c-1))} \right)} \quad (4)$$

where  $V$  is Cramer's V,  $N$  is the sample size used in the test, and  $r$  and  $c$  are the numbers of rows and columns in the contingency table, respectively.

### E. Ethics and Confidentiality

At the beginning of the questionnaire, participants were informed about the study purpose, the voluntary nature of participation, the anonymous handling of responses, and the confidentiality of the reported data. No personal identifiers were collected, and completion of the questionnaire was treated as informed consent to participate.

## IV. RESULTS

### A. Respondent Profile and Background

Table II presents that respondents were predominantly Bachelor's degree holders (56.86%), followed by MSc holders (24.51%). This indicates that the sample is technically grounded while still including a meaningful postgraduate segment capable of judging organizational governance practices.

TABLE II. DISTRIBUTION OF RESPONDENTS BY QUALIFICATION

Qualification	Frequency	Percentage (%)
Bachelor	58	56.86
MSc	25	24.51
PhD	12	11.76
Other	7	6.86

Table III shows that contractors or their representatives formed the largest respondent group (41.18%), followed by owners' representatives (28.43%) and consultants (17.65%). The distribution suggests that the study captures PPM perceptions from multiple positions in the project-delivery chain rather than from a single stakeholder group. Similarly, Table IV illustrates a highly experienced sample, with 51.0% of respondents reporting more than 10 years of experience, and the largest single category being professionals with more than

20 years of experience (28.43%). This distribution strengthens the credibility of the reported benefit and challenge perceptions.

TABLE III. DISTRIBUTION OF RESPONDENTS BY ROLE

Role	Frequency	Percentage (%)
Contractor or representative	42	41.18
Owner or representative	29	28.43
Consultant	18	17.65
Supervising engineer	13	12.75

TABLE IV. DISTRIBUTION OF RESPONDENTS BY EXPERIENCE

Experience	Frequency	Percentage (%)
More than 20 years	29	28.43
1–5 years	26	25.49
6–10 years	24	23.53
11–20 years	23	22.55

Table V indicates that multi-project management was the most frequently reported organizational approach (39.22%), followed by portfolio management (33.33%) and individual project management (27.45%). This spread is useful analytically because it provides representation from all three maturity levels examined in the hypotheses.

TABLE V. CURRENT ORGANIZATIONAL APPROACH TO MANAGING MULTIPLE PROJECTS

PPM approach	Frequency	Percentage (%)
Multi-project management	40	39.22
Project portfolio management	34	33.33
Individual project management	28	27.45

Table VI exhibits that 62.75% of the respondents were already familiar with PPM concepts. This indicates that most participants were able to evaluate the questionnaire items with at least basic conceptual awareness of portfolio-management practices.

TABLE VI. KNOWLEDGE OF PPM

PPM knowledge	Frequency	Percentage (%)
Yes	64	62.75
No	38	37.25

B. Hypothesis Testing and Association Results

Table VII shows statistically significant associations for both hypotheses. The chi-square analysis demonstrated that both the dominant perceived benefit category and the dominant perceived challenge category varied significantly across management levels (benefit:  $\chi^2 = 26.503$ ,  $df = 12$ ,  $p = 0.009$ ,  $V = 0.271$ ; challenge:  $\chi^2 = 28.290$ ,  $df = 12$ ,  $p = 0.005$ ,  $V = 0.280$ ). The effect sizes indicate small-to-moderate but substantively meaningful differences across management levels.

TABLE VII. CHI-SQUARE TESTS FOR BENEFITS AND CHALLENGES

Dimension	$\chi^2$	$df$	$p$	$V$
Benefits	26.503	12	0.009	0.271
Challenges	28.290	12	0.005	0.280

C. Cross-Tabulation Interpretation by Management Level

Figure 1 shows that benefit priorities shift by management levels. Individual-project environments emphasize operational outcomes, such as reducing delays and cost overruns (B5) and reducing risk (B3), multi-project environments place stronger emphasis on implementation efficiency (B4) and resource prioritization (B2), and portfolio-management environments give greater weight to strategic alignment (B1), prioritization and allocation discipline (B2), and governance-oriented value categories such as financial management (B6).

Overall, the perceived value of PPM becomes less operational and more governance-oriented as organizations move toward portfolio-level management. This pattern is consistent with the idea that TPM standardization first improves execution discipline, after which formal PPM creates additional value through prioritization and alignment.

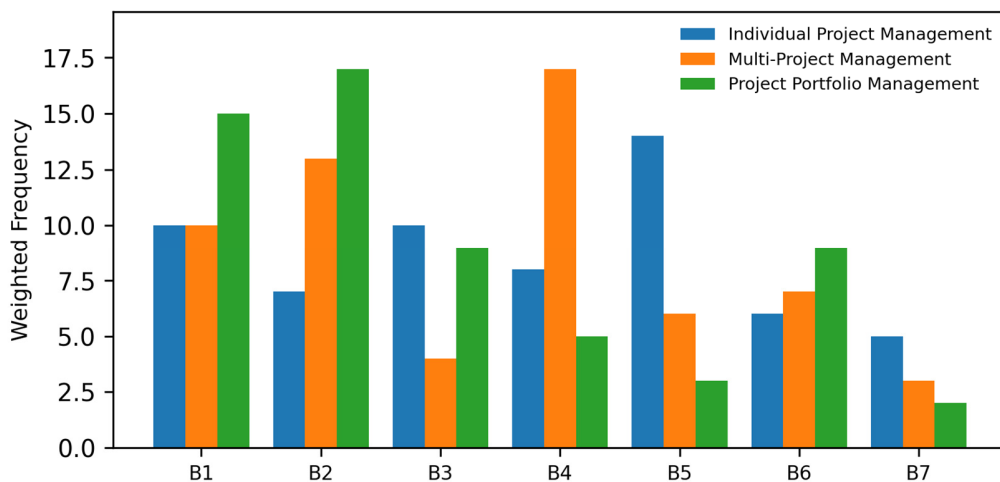


Fig. 1. Distribution of perceived PPM benefits by project management level.

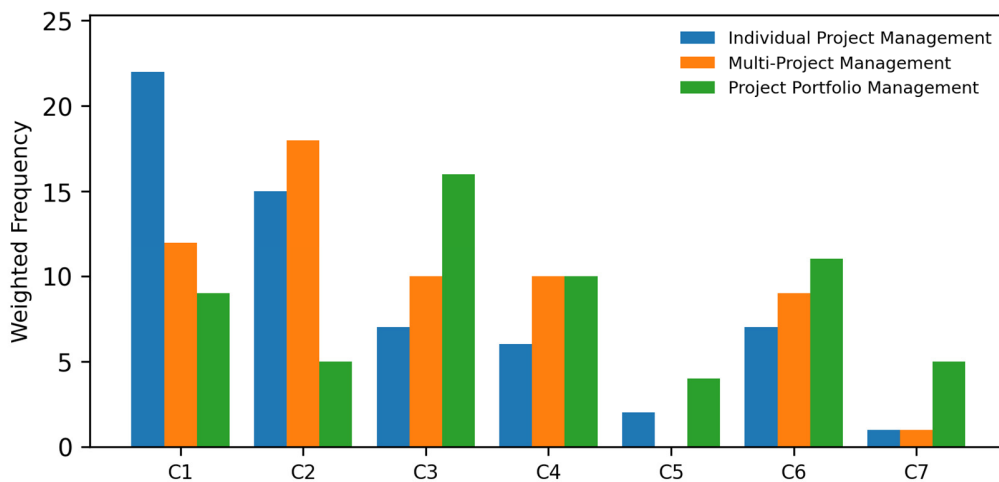


Fig. 2. Distribution of perceived PPM implementation challenges by project management level.

Figure 2 indicates that challenge priorities also evolve with management maturity. Individual-project environments most frequently report insufficient senior-management and stakeholder commitment (C1), multi-project environments most frequently report difficulty in establishing a prioritization methodology (C2), while portfolio-management environments more frequently emphasize strategy-related ambiguity (C3) and the need to demonstrate credible portfolio value (C6). The findings therefore support the interpretation that adoption barriers do not disappear with maturity; rather, they become more governance- and evidence-oriented.

## V. DISCUSSION

The results provide empirical evidence that perceived PPM value drivers and adoption barriers vary according to the organization's current management level in the Iraqi construction industry. In other words, management maturity does not merely change how projects are administered; it also changes what organizations expect PPM to deliver and what they perceive as the main difficulty in adopting it.

The respondent profile enhances the practical relevance of this interpretation because the sample includes owners, contractors, consultants, and supervising engineers with substantial professional experience. This multi-stakeholder structure is important in construction environments where governance problems are distributed across procurement, execution, supervision, and financial control.

For H1, the findings generally confirm prior PPM literature showing that portfolio governance is valued for alignment, prioritization, and resource-allocation discipline [3-9]. At the same time, the study contributes to the existing literature by demonstrating a maturity gradient within Iraqi construction organizations, where lower-maturity levels emphasize operational gains, while portfolio-management levels place greater emphasis on strategic and governance-oriented benefits. This finding is important as it suggests that the perceived benefits of PPM are not static; they depend on how far the organization has progressed beyond project-by-project control.

For H2, the results are also consistent with the broader literature on PPM barriers, especially the recurring roles of strategic ambiguity, limited sponsorship, resistance, and difficulty demonstrating value [10-12, 16]. In the Iraqi construction context, this pattern complements [22], showing that management weakness, coordination problems, and governance gaps remain central to project performance problems in areas such as delays, cost management, and project-management-board capability. The present study does not contradict those findings; instead, it extends them upward from project execution concerns to the portfolio-governance level.

Practically, the transition from TPM to PPM should be treated as a staged organizational-change process. The first stage is standardization of project information and reporting through TPM. The second stage is the creation of explicit prioritization rules and portfolio review routines. The third stage is the development of stronger strategy linkage, benefit tracking, and evidence of portfolio value. Future research can strengthen this model through follow-up case mapping, expert interviews, and mixed-method validation using objective performance indicators.

## VI. CONCLUSION

This study investigated whether the dominant perceived Project Portfolio Management (PPM) benefit and challenge categories vary across three management aspects in Iraqi construction organizations. Both hypotheses validate that management level was significantly associated with the dominant perceived benefit category and with the dominant perceived challenge category. Portfolio-management environments emphasized alignment, prioritization, and governance-oriented value more strongly, while lower-maturity levels placed greater emphasis on commitment, coordination, and operational concerns.

The key contributions of the present study include a compact 14-item instrument and an interpretable maturity-based understanding of PPM adoption priorities in typical Iraqi construction projects. The findings suggest that the

organizations should not expect the same adoption agenda at every maturity stage. Furthermore, the findings contribute context-sensitive empirical evidence from a context that remains underrepresented in portfolio governance research.

The principal limitations are the perception-based nature of the evidence and the cross-sectional design, which do not support causal inference. Future work should combine survey evidence with case mapping, expert interviews, and objective cost, schedule, and governance indicators.

#### DECLARATION OF COMPETING INTERESTS

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### ACKNOWLEDGMENT

The authors received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors for this research.

#### DATA AVAILABILITY

The anonymized data supporting the findings of this study are available from the corresponding author upon reasonable request.

#### REFERENCES

- [1] A. Simonaitis, M. Daukšys, and J. Mockienė, "A Comparison of the Project Management Methodologies PRINCE2 and PMBOK in Managing Repetitive Construction Projects," *Buildings*, vol. 13, no. 7, Jul. 2023, Art. no. 1796, <https://doi.org/10.3390/buildings13071796>.
- [2] H. Kerzner, *Project Management: A Systems Approach to Planning, Scheduling, and Controlling*, 20th ed. Hoboken, NJ, USA: Wiley, 2017.
- [3] *The Standard for Portfolio Management*, 4th ed. Newtown Square, PA, USA: Project Management Institute, 2017.
- [4] *Project, Programme and Portfolio Management — Guidance on Portfolio Management*, ISO 21504:2022, International Organization for Standardization, Geneva, Switzerland, Feb. 2022.
- [5] L. Crawford, B. Hobbs, and J. R. Turner, "Aligning Capability with Strategy: Categorizing Projects to Do the Right Projects and to Do Them Right," *Project Management Journal*, vol. 37, no. 2, pp. 38–50, Jun. 2006, <https://doi.org/10.1177/875697280603700205>.
- [6] M. Martinsuo and C. P. Killen, "Value Management in Project Portfolios: Identifying and Assessing Strategic Value," *Project Management Journal*, vol. 45, no. 5, pp. 56–70, Oct. 2014, <https://doi.org/10.1002/pmj.21452>.
- [7] A. Bakar and N. M. Yusof, "Project Portfolio Management and Portfolio Performance in Construction Industry: A Conceptual Framework," *Research Journal of Fisheries and Hydrobiology*, vol. 11, pp. 131–136, 2018.
- [8] J. Teller, B. N. Unger, A. Kock, and H. G. Gemünden, "Formalization of Project Portfolio Management: The Moderating Role of Project Portfolio Complexity," *International Journal of Project Management*, vol. 30, no. 5, pp. 596–607, Jul. 2012, <https://doi.org/10.1016/j.ijproman.2012.01.020>.
- [9] B. N. Unger, H. G. Gemünden, and M. Aubry, "The Three Roles of a Project Portfolio Management Office: Their Impact on Portfolio Management Execution and Success," *International Journal of Project Management*, vol. 30, no. 5, pp. 608–620, Jul. 2012, <https://doi.org/10.1016/j.ijproman.2012.01.015>.
- [10] M. J. Butler, "Project Portfolio Management Practices: A Theoretical Base and Practitioner Guidelines," *International Journal of Project Organisation and Management*, vol. 14, no. 1, p. 65, 2022, <https://doi.org/10.1504/IJPOM.2022.121548>.
- [11] N. Hadjicolaou and J. Dumrak, "Investigating Association of Benefits and Barriers in Project Portfolio Management to Project Success," *Procedia Engineering*, vol. 182, pp. 274–281, 2017, <https://doi.org/10.1016/j.proeng.2017.03.191>.
- [12] S. Rajegopal, *Portfolio Management*. London, UK: Palgrave Macmillan UK, 2013.
- [13] K. R. Erzaij, W. A. Hatem, and B. H. Maula, "Applying Intelligent Portfolio Management to the Evaluation of Stalled Construction Projects," *Open Engineering*, vol. 10, no. 1, pp. 552–562, Jun. 2020, <https://doi.org/10.1515/eng-2020-0064>.
- [14] Z. Laslo, "Project Portfolio Management: An Integrated Method for Resource Planning and Scheduling to Minimize Planning/Scheduling-Dependent Expenses," *International Journal of Project Management*, vol. 28, no. 6, pp. 609–618, Aug. 2010, <https://doi.org/10.1016/j.ijproman.2009.10.001>.
- [15] J. Detemple, "Portfolio Selection: A Review," *Journal of Optimization Theory and Applications*, vol. 161, no. 1, pp. 1–21, Apr. 2014, <https://doi.org/10.1007/s10957-012-0208-1>.
- [16] Y. Petit, "Project Portfolios in Dynamic Environments: Organizing for Uncertainty," *International Journal of Project Management*, vol. 30, no. 5, pp. 539–553, Jul. 2012, <https://doi.org/10.1016/j.ijproman.2011.11.007>.
- [17] A. Kozlov and E. Shnyrenkov, "Portfolio Management for Investment Projects in the Construction Industry," *MATEC Web of Conferences*, vol. 106, 2017, Art. no. 08006, <https://doi.org/10.1051/mateconf/201710608006>.
- [18] R. D. Archibald and D. Prado, "The Importance of Knowing Your Project, Program, and Portfolio Management Maturity: PPPMM," *Project Management*, Jun. 2020. <https://projectmanagement.com.br/the-importance-of-knowing-your-project-program-and-portfolio-management-maturity/>.
- [19] F. Costantino, G. Di Gravio, and F. Nonino, "Project Selection in Project Portfolio Management: An Artificial Neural Network Model Based on Critical Success Factors," *International Journal of Project Management*, vol. 33, no. 8, pp. 1744–1754, Nov. 2015, <https://doi.org/10.1016/j.ijproman.2015.07.003>.
- [20] A. Field, *Discovering Statistics Using IBM SPSS Statistics*, 4th ed. Los Angeles, CA, USA: Sage, 2013.
- [21] W. G. Cochran, *Sampling Techniques*, 3rd ed. Hoboken, NJ, USA: Wiley, 2007.
- [22] S. H. N. Alani and A. H. Mahmoud, "Factors Affecting the Cost Management of Iraqi Construction Firms," *Engineering, Technology & Applied Science Research*, vol. 13, no. 6, pp. 12001–12005, Dec. 2023, <https://doi.org/10.48084/etasr.5212>.