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Research Article

The Influence of Project Management Implementation on Construction Project Success: Evidence from the BRI Bank Branch Construction Project in Malang, Indonesia

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Abstract

Effective project management practices are critical determinants of construction project success, particularly in complex infrastructure environments characterized by uncertainty and multiple stakeholders. This study examines the influence of planning, organizing, leadership, and resource management on construction project success in the BRI Bank Branch development project in Indonesia. A quantitative research design was employed using survey data from 30 project stakeholders. Data were analyzed using validity and reliability testing, Pearson correlation, multiple linear regression, and hypothesis testing (t-test and F-test). The results indicate that project management functions simultaneously explain 31% of the variance in project success ($R^2 = 0.310$, $p < .05$). Organizing emerged as the most dominant variable (18.4%), followed by leadership, resource management, and planning. The findings confirm that structured coordination mechanisms and clear role allocation significantly enhance project outcomes. This research contributes to the growing body of literature emphasizing managerial capability as a strategic driver of construction performance in emerging economies.

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Introduction

Construction projects are increasingly characterized by high levels of uncertainty, stakeholder complexity, technological disruption, and growing sustainability demands. Rapid urbanization, regulatory pressures, supply chain volatility, and digital transformation have collectively intensified the managerial challenges faced by project-based organizations. In such environments, traditional linear models of project performance assessment primarily centered on the iron triangle of time, cost, and quality are no longer sufficient to capture the multidimensional nature of project success (Martens & Carvalho, 2020). Contemporary project environments require more integrative frameworks capable of explaining how managerial processes, governance mechanisms, and organizational capabilities interact to produce sustainable performance outcomes.

Recent literature emphasizes project management capability as a dynamic organizational competence rather than a static set of administrative tools (Joslin & Müller, 2021; Khan et al., 2023). From this perspective, project capability encompasses structured planning

routines, governance alignment, adaptive leadership, stakeholder coordination, and optimized resource orchestration (PMI, 2021). These capabilities function as strategic assets that enable organizations to navigate uncertainty, respond to complexity, and deliver value beyond short-term efficiency metrics. Rather than treating planning, organizing, leadership, and resource management as isolated managerial functions, contemporary scholarship views them as interdependent components of a broader capability system embedded within organizational structures and culture.

Despite these theoretical advancements, most empirical investigations into construction project performance continue to rely predominantly on multiple regression analysis. While regression techniques offer valuable insights into direct relationships between variables, they often lack the capacity to simultaneously assess measurement reliability, construct validity, and structural interrelationships among latent variables. In contrast, Structural Equation Modeling using Partial Least Squares (SEM-PLS) provides methodological advantages, particularly in exploratory contexts and studies with relatively small sample sizes (Hair et al., 2022). SEM-PLS allows for simultaneous evaluation of the measurement model and structural model, enabling a more robust examination of complex capability-based frameworks.

This study addresses two important gaps in the existing literature. First, there remains a limited number of SEM-based project management studies conducted in Southeast Asia, particularly within the construction sector of emerging economies. Second, there is a lack of empirical research that integrates multiple managerial dimensions into a unified capability-based structural model. By employing a PLS-SEM approach, this research seeks to provide a more comprehensive understanding of how project management capabilities collectively influence construction project success within a developing country context.

Materials and Methods

Project Management Capability Theory

Project management capability is conceptually grounded in the Resource-Based View (RBV) and Dynamic Capability Theory. The RBV posits that sustainable competitive advantage arises from valuable, rare, inimitable, and non-substitutable resources embedded within an organization. In project-based environments, managerial competencies such as planning systems, coordination mechanisms, leadership practices, and resource orchestration represent intangible strategic assets that shape performance outcomes. Rather than viewing project management as a purely administrative function, the capability perspective frames it as an organizational competence that enables firms to deploy resources efficiently and respond strategically to environmental demands.

Dynamic Capability Theory further extends this argument by emphasizing an organization's ability to sense, seize, and reconfigure resources under conditions of uncertainty and rapid change (Teece, 2020). In construction and infrastructure projects, uncertainty arises from regulatory shifts, stakeholder complexity, supply chain disruptions, and technological evolution. Managerial routines, therefore, function as adaptive mechanisms that allow organizations to realign resources and processes in response to emerging challenges (Khan et al., 2023). From this integrated theoretical lens, project management capability is not static; it is an evolving organizational capacity that enhances resilience, coordination, and long-term project value creation.

Project Success (PS)

The concept of project success has evolved considerably beyond the traditional "iron triangle" of time, cost, and quality. Contemporary literature recognizes project success as a multidimensional construct encompassing operational efficiency, stakeholder satisfaction, strategic alignment, and long-term organizational benefits. Modern frameworks integrate

sustainability considerations, value creation, and governance performance into success evaluation criteria (Martens & Carvalho, 2020; Ul Musawir et al., 2021).

In infrastructure and construction contexts, project success is increasingly measured not only by adherence to schedules and budgets but also by client satisfaction, community impact, environmental responsibility, and contribution to institutional reputation. This broader perspective reflects the growing complexity of projects and the increasing expectations placed upon project organizations. Accordingly, project success is conceptualized in this study as a latent construct reflecting both short-term efficiency outcomes and longer-term strategic and stakeholder-oriented achievements.

Hypotheses Development

H1: Planning Capability → Project Success

Planning capability refers to the organization's ability to establish structured schedules, define milestones, anticipate risks, and align project objectives with strategic goals. Effective planning enhances schedule control, improves forecasting accuracy, and mitigates potential disruptions before they escalate into performance failures (Marzagão & Carvalho, 2021). By systematically identifying resource requirements and risk contingencies, planning capability contributes to both efficiency and reliability. Therefore, it is hypothesized that stronger planning capability positively influences project success.

H2: Organizing Capability → Project Success

Organizing capability reflects the ability to structure tasks, define responsibilities, establish reporting hierarchies, and coordinate interdependent activities. In complex construction systems, where multiple actors and subcontractors operate simultaneously, clear task allocation reduces ambiguity and enhances communication efficiency (Olaniran et al., 2022). Effective organizing minimizes workflow bottlenecks and supports timely execution. Thus, organizing capability is expected to positively influence project success.

H3: Leadership Capability → Project Success

Leadership capability encompasses the ability to inspire, motivate, and guide project teams toward shared objectives. Transformational leadership, in particular, enhances team engagement, adaptability, and innovative problem-solving in uncertain environments (Khan et al., 2023). Leaders who effectively manage conflict, communicate vision, and foster collaboration strengthen both morale and performance. Consequently, leadership capability is hypothesized to have a positive effect on project success.

H4: Resource Management Capability → Project Success

Resource management capability involves the efficient allocation and utilization of labor, materials, financial resources, and equipment. Optimized resource deployment improves productivity, reduces waste, and enhances cost performance (Joslin & Müller, 2021). In construction projects, where margins are often tight and resource constraints common, effective resource management becomes a critical determinant of overall success. Accordingly, resource management capability is hypothesized to positively influence project success.

Conceptual Model (PLS-SEM Framework)

The conceptual model is developed within a PLSSEM framework to examine the structural relationships among managerial capability constructs and project success. The model includes four exogenous latent variablesPlanning Capability (PLN), Organizing Capability (ORG), Leadership Capability (LDR), and Resource Management Capability (RES)and one endogenous latent variable, Project Success (PS).

Each exogenous construct represents a distinct dimension of project management capability, measured reflectively through multiple indicators. Project Success functions as the dependent construct, capturing multidimensional performance outcomes. The

structural model posits direct relationships between each managerial capability and project success.

The structural equation is expressed as:

PS=β1PLN+β2ORG+β3LDR+β4RES+ζPS = \beta_1 PLN + \beta_2 ORG + \beta_3 LDR + \beta_4 RES + \zetaPS=β1PLN+β2ORG+β3 LDR+β4RES+ζ

where β_1–β_4 represent the standardized path coefficients and ζ denotes the residual error term. This model enables simultaneous assessment of the relative contribution of each managerial capability while accounting for measurement reliability and predictive relevance within a unified analytical framework.

Data Analysis using PLS-SEM

The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with the assistance of SmartPLS 4 software. PLS-SEM was selected due to its suitability for exploratory research, predictive modeling, and small-to-medium sample sizes. Compared to covariance-based SEM, PLS-SEM is more appropriate when the research objective emphasizes variance explanation and prediction rather than strict model fit confirmation. Furthermore, PLS-SEM is robust against non-normal data distribution and is particularly advantageous for complex models involving multiple latent constructs and indicators.

The analysis followed a two-step approach: evaluation of the measurement (outer) model and assessment of the structural (inner) model. This procedure ensures that the constructs are both statistically reliable and theoretically meaningful before interpreting the hypothesized relationships.

Outer Model Evaluation

The outer model assessment focused on establishing reliability and validity of the reflective measurement constructs. Indicator reliability was examined by analyzing outer loadings, with a recommended threshold of greater than 0.70. Indicators below this threshold were carefully evaluated to determine whether their removal would improve construct validity without compromising theoretical integrity.

Internal consistency reliability was assessed using Composite Reliability (CR), which is considered more appropriate than Cronbach's alpha in PLS-SEM because it does not assume equal indicator loadings. A CR value exceeding 0.70 was considered acceptable, indicating adequate internal consistency among the measurement items.

Convergent validity was evaluated through the Average Variance Extracted (AVE). An AVE value above 0.50 suggests that a construct explains more than half of the variance of its indicators, thereby confirming adequate convergence between the construct and its measures.

Discriminant validity was examined using the Heterotrait–Monotrait ratio of correlations (HTMT). A threshold below 0.90 was applied to ensure that constructs are empirically distinct from one another. Establishing discriminant validity is critical to avoid conceptual overlap among planning, organizing, leadership, resource management, and project success constructs.

Inner Model Evaluation

After confirming measurement model adequacy, the structural (inner) model was evaluated to assess the hypothesized relationships among constructs. The coefficient of determination (R^2) was used to measure the explanatory power of the model, indicating the proportion of variance in the endogenous variable explained by the exogenous variables.

Effect size (f^2) was calculated to determine the individual contribution of each predictor construct to the R^2 value. This metric provides insight into whether each independent variable has a small, medium, or large impact on project success.

Predictive relevance was assessed using the Stone–Geisser Q^2 value obtained through blindfolding procedures. A Q^2 value greater than zero indicates that the model possesses predictive capability beyond mere explanatory power.

Bootstrapping with 5,000 subsamples was conducted to test the statistical significance of path coefficients. This resampling technique generates robust standard errors and t-values, enabling reliable hypothesis testing without relying on normal distribution assumptions.

Results

Measurement Model

The assessment of the measurement model demonstrates that all latent constructs meet the recommended thresholds for reliability and validity within the PLS-SEM framework. Composite Reliability (CR) values range from 0.86 to 0.91, exceeding the commonly accepted minimum threshold of 0.70. This indicates strong internal consistency among the indicators measuring each construct. Specifically, Planning (CR = 0.87), Organizing (CR = 0.90), Leadership (CR = 0.88), Resource Management (CR = 0.86), and Project Success (CR = 0.91) all exhibit robust reliability, confirming that their respective indicators consistently represent the underlying latent variables.

Convergent validity is supported by the Average Variance Extracted (AVE) values, which range from 0.61 to 0.71, all above the recommended threshold of 0.50. This suggests that each construct explains more than half of the variance of its indicators, thereby demonstrating adequate convergent validity. Among the constructs, Project Success (AVE = 0.71) and Organizing (AVE = 0.69) show particularly strong convergent properties, indicating that their measurement items capture the core conceptual dimensions with high precision.

Table 1 Measurement Model

Construct	CR	AVE	Conclusion
Planning	0.87	0.63	Valid
Organizing	0.90	0.69	Valid
Leadership	0.88	0.65	Valid
Resource Mgmt	0.86	0.61	Valid
Project Success	0.91	0.71	Valid

HTMT values < 0.85 indicating discriminant validity.

Discriminant validity was evaluated using the Heterotrait–Monotrait (HTMT) ratio of correlations. All HTMT values are below the conservative threshold of 0.85, confirming that the constructs are empirically distinct from one another. This finding is critical because it ensures that Planning, Organizing, Leadership, and Resource Management are not redundantly measuring the same conceptual domain. Instead, each represents a theoretically and statistically independent dimension of project management capability. Collectively, these results confirm that the measurement model is both reliable and valid, thereby providing a solid foundation for evaluating the structural relationships among constructs.

Structural Model

The structural model analysis reveals meaningful and statistically significant relationships between project management capabilities and project success. The model explains 47% of the variance in Project Success ($R^2 = 0.47$), which indicates moderate explanatory power according to established PLS-SEM guidelines. This level of explained variance suggests that managerial capabilities constitute a substantial determinant of

construction project performance, while acknowledging that additional contextual or external factors may also contribute.

All hypothesized paths are statistically significant at the 5% level. Planning capability demonstrates a positive effect on project success ($\beta = 0.21$, $t = 2.04$, $p = 0.041$), indicating that systematic scheduling, risk assessment, and goal alignment contribute to improved outcomes. Although significant, its effect size is moderate relative to other constructs, suggesting that planning alone is insufficient without effective execution mechanisms.

Organizing capability exhibits the strongest structural effect ($\beta = 0.34$, $t = 3.61$, $p < 0.001$), making it the most influential predictor of project success in the model. This finding underscores the importance of coordination structures, role clarity, and workflow integration in complex construction environments. The relatively high t-value indicates strong statistical robustness, reinforcing the strategic importance of organizational alignment in achieving performance targets.

Leadership capability also shows a substantial and statistically significant effect ($\beta = 0.27$, $t = 2.88$, $p = 0.004$). This suggests that effective leadership enhances motivation, adaptability, and decision-making quality within project teams. Meanwhile, Resource Management capability contributes positively ($\beta = 0.19$, $t = 2.11$, $p = 0.035$), confirming that efficient allocation of labor and materials supports cost and productivity performance.

Table 2 Efficient Allocation of Labor and Materials

Path	β	t-value	p-value	Result
PLN → PS	0.21	2.04	0.041	Supported
ORG → PS	0.34	3.61	0.000	Supported
LDR → PS	0.27	2.88	0.004	Supported
RES → PS	0.19	2.11	0.035	Supported

$R^2 = 0.47$

$Q^2 = 0.29$ (predictive relevance confirmed)

Organizing shows the strongest structural effect.

Predictive relevance is supported by a Q^2 value of 0.29, indicating that the model has satisfactory out-of-sample predictive capability. Overall, the structural results validate the theoretical proposition that integrated managerial capabilities significantly enhance construction project success, with organizing capability emerging as the dominant driver within the tested framework.

Discussion

The findings derived from the SEM-PLS analysis demonstrate substantially stronger explanatory power ($R^2 = 47\%$) compared to the earlier multiple regression model ($R^2 = 31\%$), indicating that the structural equation modeling approach provides a more comprehensive representation of the relationships among latent constructs. This improvement suggests that modeling managerial dimensions as reflective constructs within a multivariate structural framework captures the complexity of capability interactions more effectively than traditional linear regression techniques. The higher explanatory value reinforces the argument that project success is not influenced by isolated managerial factors, but rather by an integrated system of capabilities that operate simultaneously and interactively. These results lend empirical support to the capability-based view of project governance, which posits that structured managerial routines and organizational competencies function as strategic enablers of performance outcomes (Joslin & Müller, 2021).

Among the examined constructs, organizing capability exhibits the strongest path coefficient, indicating that coordination structures and role clarity play a dominant role in driving construction project success. This finding aligns with coordination theory, which emphasizes the necessity of structured task interdependencies and communication channels in complex project-based systems (Olaniran et al., 2022). Construction projects, particularly infrastructure developments, involve multiple subcontractors, technical specialists, regulatory stakeholders, and supply chain actors. In such environments, ambiguity in responsibilities or weak coordination mechanisms can lead to schedule slippage, cost escalation, and quality deviations. The prominence of organizing capability in this study highlights the importance of formalized workflows, integrated reporting systems, and clearly defined authority structures. It suggests that even well-designed plans may fail if execution mechanisms lack organizational coherence.

Leadership capability also demonstrates a statistically significant and meaningful contribution to project success. In dynamic and uncertain construction contexts, leadership extends beyond supervisory oversight to encompass vision articulation, adaptive decision-making, conflict resolution, and motivational engagement. The positive structural relationship confirms prior evidence that agile and transformational leadership styles enhance team cohesion, innovation, and resilience under uncertainty (Khan et al., 2023). Effective leaders facilitate alignment between strategic objectives and operational activities, ensuring that teams remain focused despite environmental volatility. Moreover, leadership capability acts as a behavioral catalyst that activates other managerial dimensions, strengthening planning execution and resource optimization.

Resource management capability further validates its importance through its significant path coefficient. Efficient allocation of labor, materials, and financial resources remains central to construction performance, particularly in emerging markets where resource constraints are common. The findings underscore that productivity enhancement and material efficiency are not merely operational concerns but strategic determinants of project success. Proper scheduling of workforce deployment, minimization of idle time, and optimization of material procurement contribute directly to cost control and schedule adherence. In addition, effective resource management supports sustainability objectives by reducing waste and improving utilization rates.

Taken together, the discussion highlights that project success is shaped by an integrated managerial ecosystem. Organizing capability provides structural stability, leadership injects adaptive energy, planning offers strategic direction, and resource management ensures operational efficiency. The stronger SEM results confirm that these capabilities collectively form a coherent explanatory model with moderate predictive relevance. This integrated interpretation strengthens the theoretical positioning of project management capability as a multidimensional construct embedded within governance and strategic management frameworks, while also offering practical insights for improving performance in construction projects characterized by complexity and uncertainty.

Conclusion

This study provides robust empirical evidence that project management capabilities play a decisive and statistically significant role in determining construction project success. By conceptualizing planning, organizing, leadership, and resource management as distinct yet interrelated managerial capabilities, the research demonstrates that structured managerial processes are not merely administrative routines but strategic assets that shape project outcomes. The application of Partial Least Squares Structural Equation Modeling (PLS-SEM)

enabled a comprehensive assessment of both the measurement and structural components of the model. The findings indicate moderate predictive power, suggesting that the proposed framework explains a substantial proportion of variance in project success while maintaining strong construct reliability and convergent and discriminant validity. These results affirm that managerial capability constructs are empirically sound and theoretically meaningful within the context of infrastructure development projects.

Beyond its empirical contribution, this research advances theoretical discourse by integrating the Resource-Based View (RBV) and project governance perspectives into a unified explanatory framework. From an RBV standpoint, project management capabilities function as intangible organizational resources that enhance competitive advantage by enabling efficient coordination, adaptive leadership, and effective resource orchestration. Simultaneously, the governance lens underscores the importance of structured oversight, accountability mechanisms, and role clarity in complex project environments. The integration of these perspectives provides a more holistic understanding of how managerial competence translates into measurable project performance outcomes.

Practically, the research underscores the importance of strengthening coordination systems, clarifying organizational roles, and cultivating leadership agility within infrastructure projects. In construction environments characterized by uncertainty, stakeholder multiplicity, and resource constraints, effective organizing capability emerges as a central mechanism for aligning tasks, minimizing communication breakdowns, and enhancing workflow integration. Moreover, leadership capability supports adaptive decision-making and team engagement, while resource management ensures productivity and cost efficiency. Collectively, these capabilities form a coherent managerial architecture that improves the likelihood of achieving project objectives across time, cost, quality, and stakeholder satisfaction dimensions.

Although the model demonstrates moderate explanatory power, future research may extend this framework by incorporating contextual moderators such as project complexity, digital integration (e.g., BIM adoption), sustainability orientation, or organizational culture. Expanding the sample size and applying longitudinal designs could further strengthen causal inference and predictive robustness. Overall, this study reinforces the strategic importance of project management capabilities and offers both theoretical and managerial insights for enhancing construction project performance in emerging market contexts.

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