



Leadership Practices and Critical Success Factors in Construction Projects: A Quantitative Investigation

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Abstract

This study reassesses survey evidence on the conditions associated with perceived success in construction projects. The original dataset reports 120 usable responses and examines teamwork, competency, leadership, resource procurement, environmental conditions, and coordination for communication. A corrected reading of the supplied Pearson correlations shows that none of the six focal variables has a statistically significant bivariate association with project success (all $p > .05$). A multiple regression containing resource procurement, environmental aspects, and coordination for communication is also nonsignificant, $F(3, 116) = 0.504$, $p = .680$, $R^2 = .013$. Thus, the model explains only 1.3% of the variance in project success. The results do not demonstrate that leadership or the other measured conditions predict project success in this sample. They instead expose important measurement and model-specification concerns, including exact duplication among three pairs of constructs and the exclusion of variables after a zero-tolerance warning. The paper reframes the contribution accordingly: leadership remains theoretically and practically important, but stronger instruments, transparent construct validation, and context-sensitive success criteria are needed before causal or predictive conclusions can be made.

Keywords: construction projects; project success; leadership; teamwork; communication; procurement; quantitative reassessment



Introduction

Construction projects bring together temporary organizations, specialized firms, dispersed teams, regulatory demands, and interdependent technical tasks. In that setting, project leaders must align people and resources while responding to uncertainty. Earlier studies link leadership, team building, communication, and project-management capability with project outcomes (Aga et al., 2016; Mir & Pinnington, 2014; Yang et al., 2011). More recent evidence similarly emphasizes relationship management, leading by example, self-management, and effective communication in construction settings (Rehan et al., 2024).

The meaning of success has also broadened. Conventional measures emphasize time, cost, scope, and quality, whereas contemporary approaches incorporate stakeholder value, benefits realization, sustainability, learning, and long-term outcomes. The Project Management Institute (2024) describes project success as the combination of execution and value, while Mavi et al. (2025) organize construction success criteria across project, organizational, industry, and societal levels. This wider view matters because a technically completed project may still disappoint clients, communities, users, or sponsors.

Against this background, the present paper does not claim that a preferred leadership style automatically produces success. It re-examines the statistical outputs reported in an earlier survey and asks a narrower question: what support does this particular dataset provide for associations between six management conditions and perceived construction-project success? This formulation aligns the argument with the available evidence and separates theoretical relevance from empirical confirmation.

Research problem

The literature generally treats leadership and team processes as consequential, yet observed effects vary with project complexity, organizational arrangements, sector, culture, and the way success is measured. A further problem is methodological: overlapping questionnaire items can create multicollinearity, unstable estimates, and misleading hypothesis decisions. In the supplied outputs, three construct pairs have perfect correlations, and the regression reports a zero-tolerance limit. These features prevent a straightforward test of distinct leadership and project-delivery factors.

Aim and research questions

The study aims to reassess the reported relationships between management conditions and perceived project success in a construction-sector survey.



- RQ1. How are teamwork, competency, leadership, resource procurement, environmental aspects, and coordination for communication associated with project success?
- RQ2. Does the reported three-predictor regression explain meaningful variance in project success?
- RQ3. What measurement and model-design lessons follow from the results?

Contribution

The revised paper contributes through analytical correction rather than cosmetic rewording. It retains the reported sample and numerical outputs, distinguishes coefficients from significance probabilities, withdraws unsupported hypothesis claims, and translates the limitations into a practical agenda for a stronger replication.

Literature Review and Conceptual Basis

Leadership as a context-dependent project capability

Contingency perspectives propose that effective leadership depends on alignment among task demands, environment, team capability, and organizational conditions. Situational leadership likewise assumes that direction and support should change with follower readiness and task circumstances (Thompson & Glasø, 2015). For projects, this suggests that leadership is better treated as a portfolio of adaptive behaviors than as one universally superior style.

Transformational leadership may build shared purpose, motivation, and trust, while task-oriented behaviors clarify standards, schedules, and accountability. Shared and ambidextrous leadership can distribute expertise and balance exploration with execution. Evidence indicates that leadership can influence success indirectly through team building, knowledge sharing, cohesion, trust, and communication (Aga et al., 2016; Imam & Zaheer, 2021; Zacher & Rosing, 2015). Accordingly, leadership effects may disappear in a simple bivariate test when these mechanisms or contextual moderators are omitted.

Teamwork, competency, and communication

Project teamwork involves coordination, mutual support, shared goals, and the integration of specialized knowledge. Competency includes technical, managerial, interpersonal, and contextual capabilities. Communication connects these domains by enabling timely information exchange, conflict resolution, stakeholder alignment, and learning. In construction, formal communication supports traceability and governance, while informal interaction can accelerate problem solving. Rehan et al. (2024) identify effective communication and relationship management as key behavioral domains, supporting the view that leadership is enacted through interactions rather than titles alone.



Procurement and environmental conditions

Procurement establishes contractual relationships, incentives, risk allocation, supplier interfaces, and resource availability. Its effect on performance may depend on planning quality, market capacity, collaborative behavior, and the fit between the delivery system and project complexity. Environmental conditions—including economic volatility, regulation, technology, sustainability requirements, and political conditions—can further shape cost, schedule, and stakeholder expectations (Liu et al., 2015; Naoum & Egbu, 2015). These factors are conceptually distinct, even when practitioners perceive them as interconnected.

Project success as a multidimensional outcome

Project-management success concerns efficient execution, whereas project success also includes usefulness, benefits, strategic alignment, and stakeholder value (Mir & Pinnington, 2014; Pinto et al., 2022). Recent construction research underscores risk and knowledge management, contractor and procurement management, digitization, sustainability, safety, and stakeholder satisfaction (Mavi et al., 2025). A single undifferentiated survey score may therefore conceal distinct pathways: leadership might improve team learning or safety without immediately improving cost performance.

Table 1

Conceptual domains retained in the reassessment

Domain	Expected role	Key caution
Teamwork	Integrates effort and knowledge	May overlap with communication
Competency	Supports decisions and execution	Requires role-specific measurement
Leadership	Provides direction, support, and adaptation	Effects may be indirect or contextual
Resource procurement	Secures inputs and allocates contractual risk	Depends on delivery system and market
Environmental aspects	Represent external constraints and opportunities	Broad constructs can lack precision
Coordination for communication	Aligns actors and resolves interface problems	Potential redundancy with leadership/teamwork
Project success	Captures execution and value	Should be multidimensional



Research Method

Design and sample

The underlying study used a cross-sectional, quantitative survey design and a deductive orientation. The reported regression degrees of freedom and demographic totals indicate 120 usable cases (80 men and 40 women). The earlier methods section mentioned a planned sample of 100; because this conflicts with the analysis, the achieved sample of 120 is used here. The source does not provide sufficiently reliable age-category totals, organizational locations, response rate, sampling frame, or fieldwork dates; these details should be recovered from the original data record before journal submission.

Measures

The reported constructs were teamwork, competency, leadership, resource procurement, environmental aspects, coordination for communication, and project success. The supplied manuscript does not identify item wording, response anchors, number of items per construct, scale sources, reliability estimates, or scoring procedures. Consequently, construct validity and internal consistency cannot be verified from the document alone.

Analytical strategy

The reassessment uses only the numerical outputs contained in the source document: Pearson correlations and a multiple linear regression. Statistical significance is evaluated using two-tailed p values with $\alpha = .05$. Correlation coefficients (r) indicate direction and magnitude; they are not p values. For the regression, model fit is assessed using R^2 , adjusted R^2 , F , and the model p value. Individual predictors are interpreted using B , standardized β , t , and p .

Ethics

The source states that participants received information about the study, provided consent, and were protected through coded identifiers. However, it gives no ethics committee name, approval number, data-retention protocol, or consent documentation. These items should be verified and reported before publication.

Results

Data-integrity observations

The correlation matrix reports exact identity between teamwork and resource procurement ($r = 1.000$), competency and environmental aspects ($r = 1.000$), and leadership and coordination for communication ($r = 1.000$). These perfect correlations are not plausible evidence that distinct



theoretical constructs are merely strongly related; they indicate duplicate variables, duplicated scoring, or a data-export error. The regression note that tolerance reached .000 is consistent with perfect multicollinearity. Teamwork, competency, and leadership were therefore excluded while their exact duplicates remained in the model.

Regression model

Table 2

Multiple regression predicting project success (N = 120)

Predictor	B	SE B	β	t	p
Constant	2.768	.464	—	5.958	< .001
Resource procurement	.026	.087	.028	.300	.764
Environmental aspects	.079	.089	.083	.896	.372
Coordination communication	for -.076	.094	-.074	-.806	.422

The three-predictor model was not statistically significant, $F(3, 116) = 0.504$, $p = .680$. Model fit was weak: $R = .113$, $R^2 = .013$, adjusted $R^2 = -.013$, and the standard error of estimate was 1.408. Collectively, the predictors explained 1.3% of the observed variance. None of the individual predictors reached statistical significance. The negative adjusted R^2 indicates that, after accounting for model complexity, the model performs no better than an intercept-only baseline for this sample.

Bivariate relationships with project success

Table 3

Pearson correlations with project success (N = 120)

Predictor	r	p (two-tailed)	Decision at $\alpha = .05$
Teamwork	.020	.832	Not significant
Competency	.081	.379	Not significant
Leadership	-.075	.415	Not significant
Resource procurement	.020	.832	Not significant
Environmental aspects	.081	.379	Not significant
Coordination communication	for -.075	.415	Not significant



All six correlations were small in absolute magnitude ($|r| \leq .081$), and none was significant. The repeated coefficients and p values mirror the exact construct duplication described above. Therefore, the dataset provides no empirical basis for accepting a positive-association hypothesis for any focal predictor.

Corrected hypothesis decisions

Table 4

Corrected decisions for the directional hypotheses

Hypothesis	Reported relationship	Corrected decision
H1	Teamwork → project success	Not supported
H2	Competency → project success	Not supported
H3	Leadership → project success	Not supported
H4	Resource procurement → project success	Not supported
H5	Environmental aspects → project success	Not supported
H6	Communication coordination → project success	Not supported

Discussion and Conclusion

Discussion

The corrected results do not show that the measured leadership or delivery conditions are associated with perceived project success. This conclusion is narrower than saying that leadership does not matter. It means that the available measures and model, in this sample, failed to detect the relationships proposed by the theory. The distinction is essential because prior research offers plausible mechanisms connecting leadership with team building, trust, knowledge sharing, communication, and success (Aga et al., 2016; Imam & Zaheer, 2021; Rehan et al., 2024).

Measurement problems are the most immediate explanation. Perfect correlations between theoretically different constructs suggest that identical variables were used more than once. If the source dataset contains separate questionnaire items, the scoring or export process should be reconstructed. If the questionnaire itself reused the same items under different labels, the constructs cannot be tested as distinct predictors. Reliability analysis alone would not solve this



problem; exploratory and confirmatory factor analysis are needed to examine dimensionality and discriminant validity.

A second explanation concerns outcome specification. Contemporary definitions view project success as execution plus stakeholder value (Project Management Institute, 2024). Leadership may relate differently to schedule adherence, safety, quality, client satisfaction, team learning, and long-term benefits. Aggregating these outcomes into a single score may suppress meaningful associations. Future models should therefore distinguish immediate project-management performance from strategic and societal outcomes.

A third issue is causal inference. A one-time survey cannot establish that leadership behaviors caused success. Common-source data may also inflate or obscure relationships, depending on response patterns. A stronger design would combine survey measures with objective performance records and stakeholder assessments collected at multiple project stages.

Practical implications

Managers should not interpret the null findings as a reason to neglect leadership. Instead, organizations should monitor observable leadership practices and connect them to defined outcomes. The most defensible actions are those supported by both theory and recent construction evidence:

- Define success at project authorization using execution, stakeholder-value, safety, sustainability, and benefits criteria.
- Translate leadership into observable behaviors such as information sharing, conflict resolution, inclusive decisions, feedback, and leading by example.
- Design communication routines around project interfaces, decision rights, escalation paths, and traceable commitments.
- Align procurement strategy with project complexity, risk allocation, supplier capacity, and collaboration requirements.
- Use periodic pulse measures and objective indicators rather than a single end-of-project perception score.

Limitations

The reassessment is limited to outputs embedded in the source document; the raw dataset and survey instrument were unavailable. The sampling frame and location are unreported, age totals are inconsistent, and the planned sample conflicts with the achieved sample. Reliability and validity cannot be evaluated, perfect collinearity prevents a valid test of distinct effects, and the cross-sectional self-report design precludes causal conclusions.



Conclusion and Research Agenda

In the reported sample of 120 construction-sector respondents, none of the six management conditions was significantly correlated with project success. The three-predictor regression was also nonsignificant and explained only 1.3% of the variance. None of the proposed positive relationships was supported.

The central finding is methodological: duplicated construct pairs make the original model uninterpretable as a test of separate factors. A replication should correct scoring, document sampling and ethics, validate the measurement model, and test direct and indirect relationships against multidimensional outcomes. This would support a credible explanation of when and how leadership practices matter.

Table 5
Recommended replication design

Stage	Recommended action	Purpose
1. Audit	Recover questionnaire, codebook, raw data, and consent record	Resolve inconsistencies and duplicates
2. Validate	Assess missing data, distributions, reliability, EFA/CFA, and discriminant validity	Establish credible constructs
3. Specify	Separate execution, stakeholder value, safety, sustainability, and benefits	Model multidimensional success
4. Test	Use preregistered regression or SEM with justified controls and diagnostics	Estimate effects transparently
5. Triangulate	Combine multiple stakeholder surveys with schedule, cost, quality, and safety records	Reduce common-source bias
6. Replicate	Compare project types, delivery systems, regions, and complexity levels	Examine contextual boundaries

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