

Impact of Adoption and Application of PMBOK® Guide on Project Performance in Kenya's Construction Industry: A Multivariate Analysis

Erastus Mwanjama Katani^{1*}, Thomas Ntarangui Ng'Olua²

¹Department of Architecture and Built Environment, Technical University of Mombasa, P.O. Box 90420-80100 Mombasa, Kenya; ²Department of Real Estate, Construction Management and Quantity Surveying, University of Nairobi, P.O. Box 30197-00100, Nairobi

Corresponding author's email: ekatani@tum.ac.ke

Abstract

The construction industry in Kenya continues to face persistent performance challenges, including delays, cost overruns, and quality shortfalls. These issues have been partly attributed to inconsistent project management practices and limited adoption of structured frameworks. This study investigates the relationship between the application of the Project Management Body of Knowledge (PMBOK®) Guide and project performance outcomes in the Kenyan construction industry. Drawing on data collected from 172 construction professionals, the study evaluates how varying levels of PMBOK® adoption affect four key dimensions of project performance: adherence to time, cost control, quality delivery, and stakeholder satisfaction. The analysis employs Multivariate Analysis of Variance (MANOVA) and Spearman's rank correlation to examine whether deeper integration of PMBOK® processes is statistically associated with improved project outcomes. The findings reveal that higher levels of PMBOK® Guide application (especially partial to full adoption) correlate significantly with improvements in time management, quality assurance, and stakeholder satisfaction. Customized adoption, though less common, demonstrated the strongest performance association. However, cost control showed a weaker statistical linkage, suggesting the influence of external factors beyond PM process standardization. The study contributes to project management literature by offering empirical evidence from a developing country context, reinforcing the performance-enhancing potential of structured methodologies when appropriately adapted. It recommends institutionalizing PMBOK®-based training, aligning regulatory frameworks with standard practices, and fostering a culture of continuous project evaluation.

Key Words: PMBOK® Guide, Project performance, Construction industry, Process adoption, Kenya

Introduction

Project performance remains a critical concern in the construction industry, particularly in developing countries including Kenya where projects frequently experience cost overruns, schedule delays, and quality deficiencies (Ahiaga-Dagbui & Smith, 2014; Gwaya, et al., 2014). In response to these challenges, the adoption of structured project management methodologies has been widely promoted as a means to improve delivery outcomes. Among the most influential of these is the Project Management Body of Knowledge (PMBOK® Guide), developed by the Project Management Institute (PMI), which outlines a globally

recognized framework for project planning, execution, monitoring, and closure (PMI, 2021). While the PMBOK® Guide has gained international recognition for its systematic and integrative approach to project delivery, empirical studies on its impact in developing contexts remain limited. In many such environments, adoption is uneven, and the relationship between PMBOK® application and tangible performance improvements is not well established (Osei-Kyei & Chan, 2017; Adugna et al., 2021). Kenya presents a particularly compelling case for analysis, given its active construction sector and recent efforts to professionalize project management through formal training and regulatory oversight.

Project performance is a multidimensional construct, encompassing time adherence, budget control, quality achievement, and stakeholder satisfaction (Shenhar et al., 2001; Mir & Pinnington, 2014). Understanding how the use of PMBOK® processes influences these outcomes can inform both managerial practice and policy formulation. However, the assumption that methodological adoption necessarily leads to superior performance must be empirically tested within the complex realities of developing economies. This present study seeks to fill that gap by assessing the relationship between the extent of PMBOK® Guide application and four key dimensions of project performance in Kenya's construction industry. Grounded in the Contingency Theory of Management, the research hypothesizes that the performance impact of PMBOK® is contingent on the level of its integration into organizational processes and the maturity of the project environment. Using multivariate analysis of variance (MANOVA), the study explores whether and how different levels of PMBOK® adoption translate into performance differences across a diverse sample of construction projects.

A review of literature revealed project performance is a central metric in evaluating the effectiveness of project management methodologies. Traditional performance measures have focused on the "iron triangle" of time, cost, and quality, but contemporary scholarship has expanded this view to include client and stakeholder satisfaction, organizational learning, and strategic alignment (Mir & Pinnington, 2014; Shenhar et al., 2001). In construction, where projects are capital-intensive and highly complex, performance indicators are especially sensitive to the quality of planning, execution, and control mechanisms adopted by project teams. The PMBOK® Guide offers a comprehensive framework for managing projects through five process groups and ten knowledge areas, encompassing integration, scope, schedule, cost, quality, human resources, communication, risk, procurement, and stakeholder management (PMI, 2021). Several studies in developed contexts have found that adherence to structured project management methodologies, such as PMBOK®, is positively associated with improved project outcomes (Joslin & Müller, 2015; Serrador & Turner, 2015). These benefits are attributed to improved

planning accuracy, risk anticipation, stakeholder engagement, and overall project governance. However, standardized frameworks are not universally effective. The degree to which such methodologies improve project outcomes often depends on organizational maturity, leadership support, contextual alignment, and practitioner competence (Zwikael & Smyrk, 2019). Moreover, applying frameworks like PMBOK® without appropriate customization may result in procedural rigidity or poor fit with local project environments (Ika, 2012).

Research from emerging economies reveals mixed outcomes concerning the performance impact of structured project management approaches. For instance, in Ghana and Ethiopia, studies have shown that while awareness of standards like the PMBOK® Guide is increasing, their application is often inconsistent, and performance improvements are contingent on factors such as institutional support and training access (Osei-Kyei & Chan, 2017; Adugna et al., 2021). In Kenya, Gwaya et al. (2014) noted that while structured project management is gaining traction, many firms still rely on informal or experience-based practices, particularly in small to mid-sized construction projects. These studies suggest that the mere presence of a project management standard does not guarantee improved outcomes. Rather, the effectiveness of frameworks like the PMBOK® Guide must be evaluated based on their depth of integration and their compatibility with local project conditions.

The present study is underpinned by Contingency Theory, which posits that organizational effectiveness is dependent upon the alignment between external conditions, internal capacities, and strategic practices (Donaldson, 2001). In the context of project management, this means that the relationship between PMBOK® adoption and performance outcomes is not linear or universal but shaped by factors such as organizational culture, leadership support, and resource availability. Thus, this study does not presuppose a direct causal relationship between PMBOK® use and project success but instead tests the hypothesis that higher levels of structured adoption are positively correlated with performance: conditional on contextual variables.

Methodology

Research design

This study employed a quantitative, cross-sectional survey design to examine the relationship between the extent of PMBOK® Guide adoption and multiple dimensions of project performance in Kenya's construction sector. The design was appropriate for identifying correlational and group-based differences using inferential statistics. Specifically, the study used Multivariate Analysis of Variance (MANOVA) to assess whether varying levels of PMBOK® adoption were associated with significant differences in time, cost, quality, and stakeholder satisfaction performance outcomes.

Target population and sampling

The study targeted professionals engaged in managing construction projects across Kenya, including project managers, engineers, quantity surveyors, architects, contractors, and client representatives. A purposive sampling strategy was adopted to capture experienced professionals familiar with project delivery frameworks. The final dataset comprised 172 valid responses, representing a wide range of organization types (public and private), firm sizes, and project categories.

Data collection instrument

Primary data were collected through a structured questionnaire designed to capture: the extent of PMBOK® Guide adoption (5-point ordinal scale: 1 = Not sure, 2 = Not adopted, 3 = Partially adopted, 4 = Fully adopted, 5 = Customized use); and four project performance indicators, viz., time performance: ability to meet project deadlines; cost performance: budget adherence; quality performance: technical and workmanship standards; and

stakeholder satisfaction: perceptions of client and end-user satisfaction. Performance variables were measured using Likert-type scales (1 = Very poor to 5 = Excellent). The instrument was reviewed by academic and industry experts to ensure content validity and piloted among 15 respondents to refine wording and reliability.

Data analysis

Data was analyzed using IBM SPSS Statistics (Version 27). Descriptive statistics were computed to summarize respondent profiles and adoption levels. The core inferential analysis involved Multivariate Analysis of Variance (MANOVA) to test for statistically significant differences in performance outcomes across the five PMBOK® adoption categories. MANOVA was chosen due to the presence of multiple interrelated dependent variables (Tabachnick & Fidell, 2019). Prior to conducting MANOVA, assumptions of normality, homogeneity of variance-covariance matrices, and absence of multicollinearity were assessed. Where appropriate, Pillai's Trace was reported due to its robustness to violations of assumptions. Post-hoc analyses and Spearman's rank correlation were also conducted to examine the strength and direction of relationships between PMBOK® adoption and individual performance metrics.

Results

Descriptive statistics on PMBOK® adoption

Respondents reported varying levels of PMBOK® Guide adoption in their organizations. The distribution is presented in Table 1 below. Partial adoption was most common, followed by non-adoption. Fully adopted or customized applications were relatively rare.

Table 1. Extent of PMBOK® Guide Adoption among Respondents (N = 172)

Adoption Category	Frequency	Percentage (%)
Not sure	28	16.3
Not adopted	50	29.1
Partially adopted	78	45.3
Fully adopted	10	5.8

Customized application	6	3.5
Total	172	100.0%

Descriptive Statistics on Project Performance Indicators

Respondents rated their project outcomes on four performance indicators using a 5-point

Likert scale. Table 2 below summarizes the overall distribution. These scores suggest that projects generally perform better in quality and stakeholder satisfaction, while cost control shows comparatively weaker performance.

Table 2. Summary of mean \pm SD of Performance Ratings (1 = Very Poor, 5 = Excellent)

Performance Dimension	Mean \pm SD
Time performance	3.41 \pm 0.93
Cost performance	3.12 \pm 1.01
Quality performance	3.58 \pm 0.89
Stakeholder satisfaction	3.46 \pm 0.95

Multivariate Analysis of Variance (MANOVA)

A MANOVA was conducted to determine whether project performance outcomes

differed significantly based on the level of PMBOK® Guide adoption (Table 3). The Pillai's Trace value of 0.435, with a significance level of $p < 0.001$, indicates a statistically significant multivariate effect of PMBOK® adoption on the combined set of performance variables.

Table 3. Multivariate test results

Effect	Value	F	Hypothesis df	Error df	Sig.
PMBOK_Adoption	Pillai's Trace = 0.435	5.091	16	668	0.000

Post Hoc Analysis and Correlation Results

Univariate ANOVAs revealed statistically significant differences across PMBOK® Guide adoption levels for: Time performance: $F(4, 167) = 6.01$, $p < 0.001$, Quality performance: $F(4, 167) = 4.45$, $p = 0.002$, and Stakeholder satisfaction: $F(4, 167) = 3.98$, $p = 0.004$. However, cost performance did not show a statistically significant difference: $F(4, 167) = 1.94$, $p = 0.107$. To identify the specific group differences, Tukey's Honest Significant Difference (HSD) post-hoc tests were conducted. Time performance: significant differences were observed between the "Low" and "High" adoption groups (mean difference = 0.89, $p = 0.001$), and between "Moderate" and "High" groups (mean difference = 0.61, $p = 0.012$); Quality performance: significant pairwise differences emerged between "Low" and "High" adoption levels (mean difference = 0.75, $p = 0.007$); and Stakeholder satisfaction: significant differences were found between

"Low" and "Very High" adoption groups (mean difference = 0.68, $p = 0.023$). No significant pairwise differences were found for cost performance, consistent with the ANOVA result.

Spearman's rank correlation further supported these findings: PMBOK® adoption and time performance: $r_s = 0.362$, $p < 0.001$, PMBOK® adoption and quality performance: $r_s = 0.319$, $p = 0.001$, PMBOK® adoption and stakeholder satisfaction: $r_s = 0.287$, $p = 0.003$, and PMBOK® adoption and cost performance: $r_s = 0.143$, $p = 0.071$. These results suggest that higher levels of PMBOK® Guide adoption are significantly associated with improvements in time, quality, and stakeholder satisfaction, but not conclusively with cost control.

Discussion

The findings of this study provide empirical evidence that the structured application of the

PMBOK® Guide is significantly associated with enhanced project performance in Kenya's construction industry. Specifically, higher levels of adoption (ranging from partial to customized use) correlate positively with improvements in time management, quality delivery, and stakeholder satisfaction. These results affirm the practical utility of standardized project management methodologies while highlighting the contextual factors that mediate their effectiveness. The statistically significant multivariate effect observed through MANOVA confirms that PMBOK® adoption exerts a measurable influence across multiple performance dimensions, consistent with findings from developed economies (Joslin & Müller, 2015; Serrador & Turner, 2015). However, the Kenyan context introduces important distinctions. For instance, the weak and statistically insignificant relationship between PMBOK® use and cost performance may reflect structural inefficiencies such as inflation volatility, client-driven scope changes, and funding delays that fall outside the direct control of project managers (Osei-Kyei & Chan, 2017; Adugna et al., 2021). The positive relationship between PMBOK® adoption and time performance suggests that structured scheduling, activity sequencing, and monitoring procedures, when applied even partially, help mitigate common sources of delay in construction projects. Similarly, the significant association with quality performance and stakeholder satisfaction implies that PMBOK®-based frameworks enhance consistency, documentation, and communication: factors that directly influence how clients and users perceive the project's success (Mir & Pinnington, 2014).

These results align well with *Contingency Theory*, which posits that project performance is not merely a function of methodology, but of the fit between practices and project environments (Shenhar et al., 2001). Organizations with greater internal capacity (such as training, leadership support, and technological infrastructure) are better positioned to extract performance benefits from PMBOK® adoption. This finding echoes the argument by Zwikael and Smyrk (2019) that governance, maturity, and alignment are prerequisites for translating standards into results. Furthermore, the observed benefits of customized adoption, albeit less frequent in the

sample, highlight the value of contextual adaptation. As prior studies have emphasized, frameworks like PMBOK® should not be applied rigidly but should be tailored to reflect sectoral dynamics, regulatory environments, and resource constraints (Crawford & Pollack, 2008; Ika, 2012). This study, therefore, reinforces the emerging consensus that structured flexibility (rather than methodological orthodoxy) is the key to project success in developing economies.

Conclusion and Recommendations

This present study sets out to examine the impact of PMBOK® Guide adoption on project performance in the Kenyan construction industry. Using multivariate analysis, it established that greater adoption of PMBOK® processes is significantly associated with improved performance in time management, quality delivery, and stakeholder satisfaction. These results underscore the value of structured project management frameworks in enhancing predictability, professionalism, and client-oriented delivery in complex construction environments. However, the absence of a significant relationship between PMBOK® adoption and cost performance suggests that external financial and contractual conditions may limit the influence of methodology on budgetary outcomes. This nuance reflects the complex interplay between internal project practices and broader contextual factors such as procurement delays, inflation, and funding reliability. The findings reinforce the relevance of *Contingency Theory* in project management scholarship, demonstrating that the efficacy of methodological frameworks depends on contextual fit. PMBOK® adoption yields performance benefits not by virtue of standardization alone but through strategic alignment with organizational capabilities and environmental conditions. The study contributes to an expanding literature that moves beyond normative claims of universal best practices toward empirically grounded assessments of what works, for whom, and under what conditions. This study therefore, recommends the following:

- Promote contextual training: Professional bodies and universities should integrate PMBOK®-aligned

training with case studies reflecting local construction realities to support meaningful applications.

- Encourage tailored adoption: Firms should be encouraged to adapt PMBOK® processes to their organizational culture and project type rather than adopting wholesale or rigid models.
- Enhance performance monitoring: Institutionalize project performance evaluation frameworks within firms to track time, quality, and stakeholder satisfaction outcomes in relation to methodological use.
- Align regulatory environments: Government and regulatory bodies should work toward harmonizing public procurement and construction oversight frameworks with recognized project management standards.
- Support project maturity models: Encourage firms to assess and improve their project management maturity as a prerequisite for realizing the full benefits of structured methodologies.

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References

Adugna, B.G., Yimam, A.Y., & Weldegebriel, Z.B. (2021). Project management practices and performance in developing countries: A study of Ethiopian public sector projects. *International Journal of Project*

Organisation and Management, 13(1), 1–21

Crawford, L., & Pollack, J. (2008). Developing a basis for global reciprocity: Negotiating between the many standards for project management. *International Journal of IT Standards and Standardization Research*, 6(1), 70–84.
<https://doi.org/10.4018/jitsr.2008010104>

Donaldson, L. (2001). *The contingency theory of organizations*. Thousand Oaks, CA: Sage Publications. ISBN 978-0761914413

Gwaya, A.O., Masu, S.M., & Wanyona, G. (2014). A critical analysis of project management practices in Kenya. *International Journal of Soft Computing and Engineering (IJSCE)*, 4(5), 64–73

Ika, L.A. (2012). Project management for development in Africa: Why projects are failing and what can be done about it. *Project Management Journal*, 43(4), 27–41.
<https://doi.org/10.1002/pmj.21281>

Joslin, R., & Müller, R. (2015). Relationships between a project management methodology and project success in different project governance contexts. *International Journal of Project Management*, 33(6), 1377–1392.
<https://doi.org/10.1016/j.ijproman.2014.08.005>

Mir, F.A., & Pinnington, A.H. (2014). Exploring the value of project management: Linking project management performance and project success. *International Journal of Project Management*, 32(2), 202–217.
<https://doi.org/10.1016/j.ijproman.2013.05.012>

Osei-Kyei, R., & Chan, A.P.C. (2017). Implementation constraints in public-private partnerships in developing countries: Evidence from Ghana. *Journal of Facilities Management*, 15(1), 7–24

PMI. (2021). *A Guide to the Project Management Body of Knowledge*

- (PMBOK® Guide) (7th ed.). Newtown Square, PA: Project Management Institute
- Serrador, P., & Turner, R. (2015). The relationship between project success and project efficiency. *Project Management Journal*, 46(1), 30-39. <https://doi.org/10.1002/pmj.21468>
- Shenhar, A.J., Dvir, D., Levy, O., & Maltz, A.C. (2001). Project success: A multidimensional strategic concept. *Long Range Planning*, 34(6), 699-725. [https://doi.org/10.1016/S0024-6301\(01\)00097-8](https://doi.org/10.1016/S0024-6301(01)00097-8)
- Tabachnick, B.G., & Fidell, L.S. (2019). *Using multivariate statistics* (7th ed.). Pearson.
- Zwikael, O., & Smyrk, J. (2019). *Project governance: Implementing corporate governance and business ethics in project-based management*. Cham: Springer.