Assessment of Risk Mitigation Strategies and Their Association with Construction Project Performance in Nigeria

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ABSTRACT

The study investigated the relationship between risk management practices and construction project performance and assessed the predictive relationship between risk mitigation strategies and project performance in Nigeria. The study employed a quantitative research design using a cross-sectional survey approach. The study was conducted in Lagos State, Nigeria, with an accessible population of 320 construction professionals involved in large-scale construction projects valued at 500 million naira and above. Using the Yamane sample size formula, a minimum sample size of 178 respondents was obtained, while 210 questionnaires were distributed. Of these, 120 usable responses were retained for analysis, representing a 57.1% usable response proportion. Data were analysed using Pearson Product-Moment Correlation and Multiple Regression Analysis. The findings revealed statistically significant positive relationships between overall risk management practices and cost, time, quality, and overall project performance. Risk Mitigation exhibited the strongest correlation with overall project performance ($r = 0.591$). The overall regression model explained 48.7% of the variance in overall project performance, with Risk Mitigation having the largest standardized coefficient ($\beta = 0.345$). For cost performance, Risk Mitigation was the strongest significant predictor ($\beta = 0.257$), while Risk Monitoring and Control was the strongest predictor of time performance ($\beta = 0.280$); Risk Mitigation was the strongest significant predictor of quality performance ($\beta = 0.316$). The five-item mitigation model was statistically significant ($R^2 = 0.356$), although none of the individual mitigation items was significant at the 0.05 level when entered simultaneously. The findings are interpreted as associations and predictive relationships rather than evidence of causation because of the cross-sectional design. It is recommended that construction firms strengthen structured risk identification, assessment, mitigation, and continuous monitoring practices throughout the project lifecycle, while recognising that the present evidence does not establish that these practices cause improvements in project performance.

Keywords: Risk Management Practices, Risk Mitigation Strategies, Construction Project Performance, Risk Identification, Risk Assessment, Risk Monitoring and Control, Construction Projects.

INTRODUCTION

The construction industry is a vital sector that makes a significant contribution to economic growth, infrastructure development, employment, and national progress in both developed and developing nations (Odediran et al., 2022). In Nigeria, it plays a strategic role in providing key infrastructure, including roads, bridges, housing, commercial buildings, and public facilities, supporting urbanization and enhancing living standards. Due to the complexity of construction projects involving multiple stakeholders, large financial investments, lengthy durations, technical challenges, and changing environmental conditions, the industry faces numerous risks that can affect project outcomes (Adekunle et al., 2023; Ezeokoli & Nwakoby, 2022). As a result, risk management has become a vital part of construction project management, with risk mitigation strategies such as contingency plans, risk transfer, stakeholder involvement, ongoing monitoring, and preventive controls aimed at reducing the likelihood and consequences of risks (ISO, 2018; PMI, 2021; Olanipekun, 2020).

Despite the significant contribution of the construction industry to Nigeria's economic growth and infrastructure development, the sector continues to experience persistent project performance challenges. Lawal et al. (2023) reported continuing performance challenges in Lagos State construction projects, while Olanipekun (2020)

identified fluctuating material prices, inflation, regulatory changes, technical complexities, and multiple stakeholder interests as important sources of uncertainty. These conditions make risk mitigation an important area of project management. However, many construction organizations in Nigeria still rely on reactive and informal approaches to mitigating project risks, thereby limiting the consistency of risk responses and monitoring (Soyingbe & Simeon, 2025; Ojo et al., 2022; Adeyemo & Alaghbari, 2023).

Although construction risk management has received considerable attention, existing literature has largely concentrated on identifying and ranking construction risks rather than evaluating the mitigation strategies used to address them. Ezeokoli and Nwakoby (2022) observed that many studies focus on the occurrence and classification of project risks. Hassan et al. (2020) reported that inadequate implementation of risk mitigation measures is associated with poorer project outcomes, while Olanipekun (2020) noted that empirical evidence linking specific mitigation strategies with cost, time, quality, and overall project performance remains limited. There is therefore a need for empirical evidence on the relationship between different risk mitigation strategies and construction project performance within the Nigerian construction industry.

Accordingly, the study aims to: (i) examine the relationship between overall risk-management practices and construction project performance; (ii) assess the predictive contributions of risk identification, risk assessment, risk mitigation, and risk monitoring and control to overall, cost, time, and quality performance; and (iii) examine the collective and individual predictive relationships of the five mitigation items with overall project performance.

LITERATURE REVIEW

Concept of Risk in Construction Projects

Construction risk arises from uncertainty affecting technical, financial, human, environmental, regulatory, and stakeholder conditions throughout the project lifecycle (Hwang et al., 2022; Serpella et al., 2023). In this study, risk is understood in line with ISO 31000:2018 as the effect of uncertainty on objectives, while the construction context is considered primarily in relation to potential effects on cost, time, quality, safety, and stakeholder outcomes (ISO, 2018; PMI, 2021).

In the Nigerian construction context, macroeconomic instability, regulatory uncertainty, resource constraints, and complex stakeholder relationships can intensify project risk (Olanipekun, 2020). These contextual conditions make systematic risk management particularly relevant to large-scale projects and provide the setting for examining how risk-management practices are associated with project performance.

Concept of Risk Management in Construction Projects

Risk management provides a structured process for identifying, assessing, responding to, and monitoring uncertainty. ISO 31000:2018 emphasises an integrated and continual approach, while the PMBOK Guide provides project-management guidance for identifying risks, assessing their implications, planning responses, and monitoring risk throughout project delivery (ISO, 2018; PMI, 2021).

Evidence from the Nigerian construction sector suggests that formal risk-management practices are not implemented consistently, with limitations in professional capacity, documentation, and quantitative risk-management capability reported in previous studies (Soyingbe & Simeon, 2025; Adekunle et al., 2023; Ojo et al., 2022; Akanni & Alonge, 2010). This provides a relevant context for examining the four dimensions used in the present study: risk identification, risk assessment, risk mitigation, and risk monitoring and control.

Risk Management Process in Construction Projects

The risk-management process is iterative rather than strictly linear. For the purposes of this study, it is represented by four related dimensions: risk identification, risk assessment, risk mitigation, and risk monitoring and control (ISO, 2018; PMI, 2021). These dimensions correspond directly with the predictor variables examined in the empirical analysis.

Risk Identification

Risk identification involves systematically recognising and documenting potential events or conditions that may affect project objectives. Common approaches include expert judgement, brainstorming, checklists, historical project information, and risk registers (Serpella et al., 2023; Hwang et al., 2022). In Lagos State, Soyingbe and Simeon (2025) reported continuing reliance on informal approaches in some firms, indicating a gap between recommended and observed practice.

Risk Assessment

Risk assessment evaluates the likelihood and potential consequences of identified risks and supports prioritisation. Qualitative approaches include probability-impact assessment and expert judgement, while quantitative approaches may use numerical or probabilistic techniques (ISO, 2018; PMI, 2021). Ojo et al. (2022) reported greater use of qualitative than quantitative approaches among Nigerian construction firms, highlighting the contextual importance of the capacity to assess risk systematically.

Risk Allocation

Risk Mitigation

Risk mitigation refers to actions intended to avoid, reduce, transfer, or otherwise manage the consequences of identified risks (PMI, 2021). In construction, these may include preventive controls, contingency planning, insurance, contractual risk transfer, quality controls, and other response measures. Adekunle et al. (2023) and Lawal et al. (2023) provide evidence that formal mitigation practices are associated with project-delivery outcomes in Nigerian settings.

Risk Monitoring and Control

Risk monitoring and control involves tracking identified risks, reviewing response effectiveness, updating risk information, and recognising emerging risks as project conditions change (ISO, 2018; Serpella et al., 2023). Hwang et al. (2022) reported an important association between monitoring practices and project performance, while Soyingbe and Simeon (2025) identified monitoring as an area in which implementation can remain reactive in Lagos State.

Relationship Between Risk Management Practices and Project Performance

Previous empirical studies generally report positive associations between structured risk-management practices and construction project performance, but the relative importance of individual dimensions varies by context and performance outcome (Hassan et al., 2020; Hwang et al., 2022; Adeyemo & Alaghbari, 2023).

Hwang et al. (2022) found that risk monitoring and control was strongly associated with project performance in Singapore, while Hassan et al. (2020) reported positive relationships between risk-management maturity and cost, time, and quality outcomes across Sub-Saharan African projects. In Nigeria, Adekunle et al. (2023) reported positive relationships between formal mitigation practices and project delivery, while Adeyemo and Alaghbari (2023) found that risk identification and monitoring had strong independent associations with performance.

These findings indicate that risk management is relevant to project performance but do not establish a uniform strongest dimension across contexts. They also leave a need for studies that examine the four dimensions jointly across multiple performance outcomes in large-scale Lagos projects and distinguish bivariate associations from unique predictive contributions.

Mitigation Strategies in Construction Projects

Risk mitigation strategies comprise specific responses used to avoid, reduce, transfer, or retain risk. Their relevance to the present study is twofold: risk mitigation is analysed as one of the four broader risk-management dimensions, and five individual mitigation items are separately examined to determine whether their

relationships with overall project performance remain statistically distinguishable when considered simultaneously.

Lawal et al. (2023) reported that insurance, contingency allowances, and established subcontractors are among the commonly used mitigation approaches in Lagos State. The literature therefore supports examining mitigation as a portfolio of practices while avoiding the assumption that any single strategy independently determines project performance.

Empirical Review of Previous Studies

The empirical literature provides evidence of positive risk-management–performance relationships but also shows differences in the relative importance of risk-management dimensions and mitigation practices across settings. The studies most directly relevant to the present analysis are summarised in Table 2.1. Ogunde et al. (2023) reported that risk management was among the important factors associated with construction project performance in Lagos State, with risk identification and monitoring showing strong associations. Adekunle et al. (2023) reported positive relationships between formal mitigation strategies and cost, time, and quality outcomes in Nigeria.

Ezeokoli and Nwakoby (2022) reported inconsistent implementation of formal risk-management practices across Nigeria, while Soyingbe and Simeon (2025) identified differences in risk-management formalisation among Lagos construction firms. Hwang et al. (2022) and Serpella et al. (2023) likewise found positive relationships between more structured risk-management practices and project outcomes in non-Nigerian contexts.

The studies summarised above are presented in Table 2.1 below for ease of reference.

Table 2.1: Summary of Empirical Studies on Risk Management and Construction Project Performance

Author(s) & Year	Context	Method/Sample	Key Finding
Ogunde et al. (2023)	Lagos, Nigeria	Survey (210)	Risk identification and monitoring are the strongest predictors of project performance (R^2 = 0.41).
Adekunle et al. (2023)	Lagos & Abuja, Nigeria	Survey (185)	Formal mitigation strategies linked to 18% cost and 22% schedule performance improvement.
Ezeokoli & Nwakoby (2022)	Nigeria (6 zones)	Survey (197)	Positive correlation between consistent RM implementation and project time and quality performance.
Soyingbe & Simeon (2025)	Lagos, Nigeria	Survey	Higher RM formalisation is associated with better performance, especially on large-scale projects.
Hwang et al. (2022)	Singapore	SEM (95 projects)	Risk monitoring has the strongest effect on performance; indirect effects of risk ID confirmed.
Serpella et al. (2023)	Latin America	Survey	RM maturity is positively associated with cost and schedule performance; effect stronger association with complex projects.
Hassan et al. (2020)	Sub-Saharan Africa	Regression (247)	RM explains 38% cost, 31% time, and 44% quality performance variance.
Lawal et al. (2023)	Lagos, Nigeria	Survey	Insurance, contingencies, and established subcontractors most common mitigation strategies.

The empirical literature indicates three gaps addressed by the present study. First, previous studies generally report positive associations between risk management and project performance, but differ regarding which risk-management dimension is most strongly associated with particular outcomes. Second, relatively limited evidence examines risk identification, risk assessment, risk mitigation, and risk monitoring and control jointly across cost, time, quality, and overall performance in large-scale projects in Lagos State. Third, individual mitigation strategies are often discussed or correlated with performance, but fewer studies distinguish their bivariate

associations from their unique predictive contributions when entered simultaneously. Accordingly, this study (i) examines the relationship between overall risk-management practices and project performance; (ii) estimates the predictive contributions of the four risk-management dimensions to overall, cost, time, and quality performance; and (iii) examines the collective and individual predictive relationships of five mitigation items with overall project performance.

RESEARCH METHODOLOGY

The study is grounded in the positivist research philosophy, which posits that knowledge is derived from objective observation, measurement, and empirical analysis of relationships among variables (Saunders et al., 2019; Creswell & Creswell, 2018). Accordingly, the study employed a quantitative research design using a cross-sectional survey approach to investigate the relationships between risk management practices and construction project performance. The study was conducted in Lagos State, Nigeria, owing to its high concentration of large-scale construction projects and its complex construction environment. The accessible population comprised 320 construction professionals involved in large-scale construction projects valued at ₦500 million and above, including project managers, builders, quantity surveyors, architects, civil/structural engineers, construction site managers, and consultants. Using the Yamane (1967) sample size formula, a minimum sample size of 178 respondents was obtained, while 210 questionnaires were distributed to account for possible non-response. Of the 210 questionnaires distributed, 120 usable responses were retained for the final analysis, representing a 57.1% usable response proportion; the remaining 90 were not included in the final analytical dataset. The available field records do not support a reliable further breakdown of those 90 cases into non-returned and unusable questionnaires, so no such breakdown is claimed Akanni (2016). The 120 usable cases were used in the regression analyses, consistent with the reported residual degrees of freedom. A purposive sampling technique was employed to select respondents with at least three years of professional experience and direct involvement in large-scale construction projects in Lagos State.

Prior to the main survey, a pilot study involving 20 construction professionals was conducted to assess the clarity, comprehensibility, and reliability of the instrument. Internal consistency reliability was assessed using Cronbach's Alpha, with a minimum acceptable coefficient of 0.70. Cronbach's Alpha was treated as a measure of reliability, not validity. Data collection was conducted over an eight-week period through personal administration and electronic distribution of questionnaires via professional bodies, construction firms, and professional networks. Completed questionnaires were screened for completeness before coding and analysis. Inferential analyses comprised Pearson Product-Moment Correlation and Multiple Regression Analysis to examine associations and predictive relationships involving risk identification, risk assessment, risk mitigation, and risk monitoring and control and the project performance measures. The study hypotheses were tested at a 5% significance level. The cross-sectional design means that the findings are interpreted as relationships and predictive associations rather than definitive causal effects.

RESULTS AND DISCUSSION

Analysis and Results

Pearson product-moment correlation analysis was conducted to examine the bivariate relationships between the overall risk management practice score (RMPMean) and each project performance dimension. The results are presented in Table 4.1.

Table 4.1: Pearson Correlation Between Risk Management Practices and Project Performance

Performance Dimension	Pearson r	p-value	Decision	Effect Size
Cost Performance	0.484	< 0.001	Reject H_{01}	Moderate
Time Performance	0.588	< 0.001	Reject H_{01}	Moderate
Quality Performance	0.500	< 0.001	Reject H_{01}	Moderate
Overall Project Performance	0.693	< 0.001	Reject H_{01}	Moderate

The correlation analysis reveals statistically significant positive relationships between overall risk management practices and all project performance dimensions at $p < 0.001$. The correlation coefficients range from 0.484 (Cost Performance) to 0.693 (Overall Project Performance), all indicating moderate positive relationships according to Cohen's (1988) conventions. The strongest relationship was observed between overall risk management practices and overall project performance ($r = 0.693$, $p < 0.001$), suggesting that construction projects with higher levels of risk management practice adoption tend to achieve better overall performance outcomes. The correlation with time performance ($r = 0.588$) was notably stronger than with cost performance ($r = 0.484$), indicating that risk management practices may have a relatively greater impact on schedule adherence than on cost control. Additionally, correlation analysis was conducted between individual risk management practice dimensions and overall project performance:

Table 4.2: Correlation of Individual RMP Dimensions with Overall Project Performance

RMP Dimension	Pearson r	p-value	Decision
Risk Identification	0.420	< 0.001	Reject H_{01}
Risk Assessment	0.475	< 0.001	Reject H_{01}
Risk Mitigation	0.591	< 0.001	Reject H_{01}
Risk Monitoring & Control	0.414	< 0.001	Reject H_{01}

All four individual dimensions demonstrated statistically significant positive correlations with overall project performance. Risk Mitigation exhibited the strongest correlation ($r = 0.591$), followed by Risk Assessment ($r = 0.475$), Risk Identification ($r = 0.420$), and Risk Monitoring & Control ($r = 0.414$).

Decision on Hypothesis 1

Based on the correlation analysis, the null hypothesis H_{01} is rejected. There is a statistically significant positive relationship between risk management practices and construction project performance in Lagos State, Nigeria.

DISCUSSION

The significant positive correlations between risk management practices and project performance dimensions provide empirical evidence of association between systematic risk management and project outcomes. The moderate correlation coefficients ($r = 0.484$ to 0.693) indicate that risk management practices are related to project performance while other factors also account for variation in outcomes. Risk Mitigation demonstrated the strongest correlation with overall project performance ($r = 0.591$). This is consistent with the findings of Dikmen et al. (2007) and Zou et al. (2010), who highlighted the importance of risk response and mitigation in construction project risk management. The relatively weaker correlation for Risk Monitoring & Control ($r = 0.414$) may reflect the extent to which continuous monitoring mechanisms are implemented in Lagos State construction projects. The correlation matrix (Figure 4.2) also reveals intercorrelations among the risk management practice dimensions, with values ranging from 0.053 (RI-RMC) to 0.783 (RM-Overall RMP).

Hypothesis 2: Predictive Relationship Between Risk Management Practices and Project Performance

Null Hypothesis 2 (H_{02}): Risk management practices do not significantly predict construction project performance in Lagos State, Nigeria.

Analysis and Results

Multiple linear regression analysis was employed to examine the predictive relationships between the four risk management practice dimensions and project performance outcomes. Four regression models were estimated: Model 1 predicting Overall Project Performance, and Models 2–4 predicting Cost, Time, and Quality Performance, respectively.

Model 1: Risk Management Practices Predicting Overall Project Performance

Table 4.3 presents the regression results for Model 1.

Table 4.3: Multiple Regression Results — Overall Project Performance

Variable	B	Std. Error	β	t	p-value	95% CI
(Constant)	0.581	0.251	—	2.312	0.023	[0.083, 1.078]
Risk Identification	0.185	0.062	0.222	2.973	**0.004**	[0.062, 0.309]
Risk Assessment	0.159	0.062	0.202	2.574	**0.011**	[0.037, 0.281]
Risk Mitigation	0.276	0.065	0.345	4.228	**0.000**	[0.146, 0.405]
Risk Monitoring & Control	0.187	0.061	0.227	3.076	**0.003**	[0.067, 0.308]

Model Fit: $R^2 = 0.487$, Adjusted $R^2 = 0.469$, $F(4,115) = 27.30$, $p < 0.001$; $n = 120$

The regression model is statistically significant, $F(4, 115) = 27.30$, $p < 0.001$, explaining 48.7% of the variance in overall project performance ($R^2 = 0.487$; $n = 120$). All four risk management practice dimensions were significant positive predictors in the overall performance model. Risk Mitigation had the largest standardized coefficient ($\beta = 0.345$, $p < 0.001$), followed by Risk Monitoring & Control ($\beta = 0.227$, $p = 0.003$), Risk Identification ($\beta = 0.222$, $p = 0.004$), and Risk Assessment ($\beta = 0.202$, $p = 0.011$).

Model 2: Risk Management Practices Predicting Cost Performance

Table 4.4 presents the regression results for cost performance.

Table 4.4: Multiple Regression Results — Cost Performance

Variable	B	Std. Error	β	t	p-value	95% CI
(Constant)	0.747	0.405	—	1.842	0.068	[-0.056, 1.549]
Risk Identification	0.122	0.100	0.110	1.211	0.228	[-0.077, 0.321]
Risk Assessment	0.131	0.099	0.125	1.313	0.192	[-0.066, 0.328]
Risk Mitigation	0.273	0.105	0.257	2.594	**0.011**	[0.064, 0.481]
Risk Monitoring & Control	0.226	0.098	0.206	2.306	**0.023**	[0.032, 0.421]

Model Fit: $R^2 = 0.246$, Adjusted $R^2 = 0.220$, $F(4,115) = 9.38$, $p < 0.001$; $n = 120$

The model is significant, $F(4, 115) = 9.38$, $p < 0.001$, explaining 24.6% of the variance in cost performance. Only Risk Mitigation ($\beta = 0.257$, $p = 0.011$) and Risk Monitoring & Control ($\beta = 0.206$, $p = 0.023$) were significant predictors. Risk Identification and Risk Assessment did not significantly predict cost performance.

Model 3: Risk Management Practices Predicting Time Performance

Table 4.5 presents the regression results for time performance.

Table 4.5: Multiple Regression Results — Time Performance

Variable	B	Std. Error	β	t	p-value	95% CI
(Constant)	0.195	0.374	—	0.521	0.603	[-0.546, 0.936]
Risk Identification	0.220	0.093	0.199	2.373	**0.019**	[0.036, 0.404]
Risk Assessment	0.199	0.092	0.192	2.163	**0.033**	[0.017, 0.381]
Risk Mitigation	0.211	0.097	0.200	2.177	**0.032**	[0.019, 0.404]
Risk Monitoring & Control	0.305	0.091	0.280	3.363	**0.001**	[0.125, 0.484]

Model Fit: $R^2 = 0.351$, Adjusted $R^2 = 0.328$, $F(4,115) = 15.52$, $p < 0.001$; $n = 120$

The model is significant, F (4, 115) = 15.52, $p < 0.001$, explaining 35.1% of the variance in time performance (n = 120). All four risk management dimensions were significant predictors, with Risk Monitoring & Control showing the largest standardized coefficient (β = 0.280, p = 0.001).

Model 4: Risk Management Practices Predicting Quality Performance

Table 4.6 presents the regression results for quality performance.

Table 4.6: Multiple Regression Results — Quality Performance

Variable	B	Std. Error	β	t	p-value	95% CI
(Constant)	0.801	0.393	—	2.035	0.044	[0.021, 1.580]
Risk Identification	0.214	0.098	0.198	2.189	**0.031**	[0.020, 0.407]
Risk Assessment	0.147	0.097	0.146	1.520	0.131	[-0.044, 0.338]
Risk Mitigation	0.343	0.102	0.316	3.356	**0.001**	[0.140, 0.545]
Risk Monitoring & Control	0.030	0.095	0.027	0.318	0.751	[-0.158, 0.219]

Model Fit: $R^2 = 0.274$, Adjusted $R^2 = 0.248$, F (4,115) = 10.84, $p < 0.001$; n = 120

The model is significant, F (4, 115) = 10.84, $p < 0.001$, explaining 27.4% of the variance in quality performance. Risk Identification (β = 0.198, p = 0.031) and Risk Mitigation (β = 0.316, p = 0.001) were significant predictors, while Risk Assessment and Risk Monitoring & Control were not.

Decision on Hypothesis 2

Based on the regression analysis, the null hypothesis H_{02} is rejected for the overall project performance model. Risk management practices significantly predict overall construction project performance in Lagos State, Nigeria, with the model explaining 48.7% of the variance. The dimension-specific models show different patterns across cost, time, and quality performance; therefore, the significance of the overall model should not be interpreted as evidence that every risk-management dimension is significant for every performance outcome.

DISCUSSION

The regression results indicate a statistically significant predictive relationship between risk management practices and construction project performance in Lagos State. The R^2 value of 0.487 for the overall performance model indicates that the four predictors jointly explain 48.7% of the observed variance in overall project performance. Risk Mitigation had the largest standardized coefficient in the overall model (β = 0.345), but it was not the strongest predictor in every performance model. For cost performance, Risk Mitigation had the largest significant coefficient (β = 0.257), while Risk Monitoring & Control also contributed significantly (β = 0.206). Risk Identification and Risk Assessment were not significant predictors of cost performance. For time performance, all four dimensions were significant, with Risk Monitoring & Control having the largest coefficient (β = 0.280). For quality performance, Risk Mitigation had the largest significant coefficient (β = 0.316), followed by Risk Identification (β = 0.198), while Risk Assessment and Risk Monitoring & Control were not significant. These dimension-specific patterns indicate that the relative predictive contribution of risk-management practices varies across performance outcomes. The standardized coefficients in Figure 4.3 therefore provide a comparison of predictive contributions rather than evidence of causal influence. The time-performance result is consistent with the importance of continuous attention to changing schedule risks, although the cross-sectional design does not establish that monitoring and control causes better schedule performance. Similarly, the quality-performance result identifies Risk Mitigation as the largest significant predictor, while Risk Monitoring & Control was not significant in that model. These findings should therefore be interpreted as differences in predictive association across performance dimensions.

Hypothesis 3: Mitigation Strategies and Project Performance

Null Hypothesis 3 (H_{03}): The mitigation strategies, considered as a composite set, do not significantly predict

overall construction project performance in Lagos State, Nigeria.

Analysis and Results

The analysis of mitigation strategies focused on the five items measuring Risk Mitigation (RM1–RM5). Table 4.7 presents the correlation between individual mitigation items and the four performance dimensions.

Table 4.7: Correlation of Individual Mitigation Items with Project Performance

Mitigation Item	Cost Perf.	Time Perf.	Quality Perf.	Overall Perf.
RM1	0.317***	0.358***	0.379***	0.465***
RM2	0.405***	0.397***	0.374***	0.519***
RM3	0.351***	0.447***	0.401***	0.529***
RM4	0.422***	0.356***	0.390***	0.515***
RM5	0.300***	0.355***	0.358***	0.447***

Note: *** $p < 0.001$

All individual mitigation items demonstrated statistically significant positive correlations with all performance dimensions ($p < 0.001$). RM3 (avoidance/transfer strategies) showed the strongest correlation with overall project performance ($r = 0.529$), while RM1 (acceptance/retention) showed the weakest but still significant correlation ($r = 0.465$).

A multiple regression model was estimated with the five mitigation items as predictors of overall project performance:

Table 4.8: Regression of Mitigation Items on Overall Project Performance

Variable	B	Std. Error	β	t	p-value
(Constant)	1.589	0.194	—	8.192	< 0.001
RM1	0.058	0.074	0.087	0.780	0.437
RM2	0.103	0.081	0.154	1.263	0.209
RM3	0.146	0.076	0.219	1.912	0.058
RM4	0.112	0.077	0.168	1.449	0.150
RM5	0.053	0.070	0.079	0.751	0.454

Model Fit: $R^2 = 0.356$, Adjusted $R^2 = 0.328$, $F(5,114) = 12.62$, $p < 0.001$; $n = 120$

The overall mitigation-item model is statistically significant, $F(5, 114) = 12.62$, $p < 0.001$, explaining 35.6% of the variance in project performance ($R^2 = 0.356$; $n = 120$). However, when the five mitigation items were entered simultaneously, none reached statistical significance at the 0.05 level, although RM3 approached significance ($p = 0.058$). The significant overall model should therefore be distinguished from the non-significant individual coefficients. Because VIF and tolerance statistics were not retained in the available analysis output, the present study does not diagnose multicollinearity as the cause of the individual non-significant coefficients. The results instead indicate that the mitigation items collectively explain a significant proportion of variation while their unique contributions are not statistically distinguishable at the 0.05 level in the simultaneous model.

Decision on Hypothesis 3

Based on the regression analysis, the null hypothesis H_{03} is rejected for the composite mitigation-item model because the overall regression model is statistically significant. However, none of the individual mitigation items demonstrates a statistically significant unique predictive contribution when the five items are entered simultaneously. Thus, the result supports a significant collective predictive relationship for the mitigation-item set, not a claim that each individual strategy independently predicts project performance.

DISCUSSION

The significant bivariate correlations between all mitigation items and performance dimensions indicate positive associations between the individual mitigation items and project outcomes. RM3 showed the strongest correlation with overall project performance (r = 0.529). The contrast between the significant bivariate correlations and the non-significant individual coefficients in the simultaneous regression indicates that the mitigation items capture overlapping aspects of the broader mitigation construct. However, because collinearity diagnostics were not retained, the analysis cannot establish that multicollinearity caused the loss of individual significance. The results are therefore best interpreted as evidence that the mitigation items collectively provide significant predictive information, while no individual item demonstrated a statistically significant unique contribution at the 0.05 level in the simultaneous model.

CONCLUSION AND RECOMMENDATIONS

The study found a statistically significant positive relationship between risk management practices and construction project performance. All four risk-management dimensions were positively correlated with overall project performance, with Risk Mitigation showing the strongest correlation. The null hypothesis for the relationship between risk management practices and project performance was therefore rejected.

The regression analysis showed that the four risk-management dimensions jointly predicted 48.7% of the variance in overall project performance. Risk Mitigation had the largest standardized coefficient in the overall model. However, the relative predictive contribution differed by performance dimension: Risk Mitigation had the largest significant coefficient for cost and quality performance, whereas Risk Monitoring & Control had the largest standardized coefficient for time performance. These findings are interpreted as predictive relationships rather than causal effects because the study used a cross-sectional design.

The five mitigation items, considered together, formed a statistically significant regression model explaining 35.6% of the variance in overall project performance. However, none of the individual mitigation items was independently significant at the 0.05 level when entered simultaneously. The result therefore supports a significant collective predictive relationship for the mitigation-item set, but does not demonstrate that each individual mitigation strategy has an independent predictive contribution.

It is recommended that construction firms strengthen structured risk-management frameworks integrating risk identification, risk assessment, risk mitigation, and continuous risk monitoring throughout the project lifecycle. Construction organizations should also give attention to mitigation planning, risk transfer, contingency planning, contractual risk allocation, and preventive controls as components of an integrated risk-management process. Because the present study identifies associations and predictive relationships rather than causal effects, these recommendations should be treated as practice-oriented implications rather than evidence that any single intervention will necessarily produce a specific performance improvement. Professional bodies, regulatory agencies, and construction firms should organise regular training and capacity-building programmes on contemporary risk-management standards and practices, such as ISO 31000:2018 and the PMBOK Guide.

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