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Effect of Project Risk Management on Performance of Construction Projects: A Case of Ituze Village Project in Kicukiro District, Rwanda

Liliane Kirezi and Sam Bazimya
University of Kigali, Rwanda
Email: liliane.kirezi2001@gmail.com

Abstract: *This study assessed the effect of project risk management on the performance of construction projects, with specific reference to the Ituze Village Project in Kicukiro District, Rwanda. It examined the effects of project risk identification, project risk analysis, and project risk monitoring and control on project performance. The study integrated descriptive and correlational research designs and was guided by the Theory of Change, Agency Theory, and Systems Theory. The target population comprised 151 personnel from Imara Properties involved in implementing the project, including project managers, site engineers, site supervisors, contractors, and procurement officers, and a census approach was adopted. Data were collected using structured questionnaires, interviews, and document review, and analysed using SPSS version 29 through descriptive statistics, Pearson correlation, and multiple linear regression. From 143 usable responses, regression results showed that project risk identification ($B = 0.207$, $t = 2.326$, $p = 0.021$), project risk analysis ($B = 0.465$, $t = 6.643$, $p < 0.05$), and project risk monitoring and control ($B = 0.318$, $t = 3.180$, $p = 0.002$) each had a positive and statistically significant effect on performance. The study concluded that consistent risk management strengthens schedule adherence, cost discipline, work quality, and stakeholder satisfaction, and recommended institutionalising a coordinated risk register, formal risk analysis, and routine control reviews.*

Keywords: *risk, identification, analysis, monitoring, performance, construction*

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1. Introduction

Project risk management has developed into a structured managerial practice within construction projects as project environments have grown increasingly complex. It emphasises the systematic handling of conditions that disrupt alignment between planned activities and executed outcomes in settings shaped by contractual structures, technical coordination requirements, and continuous interaction among multiple stakeholders. Risk management frameworks contribute to stability in construction implementation by reducing uncertainty and reinforcing consistency across project stages, thereby supporting continuity of activities and strengthening overall project performance (Osei-Kyei et al., 2022).

Internationally, construction projects operate within environments influenced by regulatory compliance and technical specialisation. In Canada, uncertainty arising from procurement coordination and contractor collaboration is addressed through risk management practices that structure assessment activities during planning and execution, allowing clearer recognition of exposure and strengthening decision-making and performance in complex environments (Guimarães et al., 2024). In Germany, construction functions within formal governance frameworks and technical precision, and risk management is integrated into planning to address uncertainty linked to design coordination and procurement sequencing, reinforcing consistency between planned schedules and executed activities (Xu & Herrmann, 2025). In China, projects operate within environments defined by large scale and advanced engineering systems, where continuous risk monitoring and structured response actions strengthen responsiveness to changing operational conditions and sustain performance (Zhu et al., 2025). In India, variability in contractor capability and site safety conditions is addressed through risk management approaches that organise assessment processes and support execution stability (Gupta et al., 2024).

Across Africa, construction initiatives operate within contexts shaped by financing arrangements, contractor performance, and regulatory oversight. In Egypt, risk identification enables early recognition of exposure and supports consistency between planned and actual execution (Yousri et al., 2023), while in Ghana structured classification of risk factors supports sustained oversight and strengthens stakeholder coordination during delivery (Jackson et al., 2024). In Tanzania, integration of risk assessment components enhances visibility of implementation progress and improves institutional effectiveness (Kamuzora, 2024), and in Kenya clearly defined risk management strategies reinforce accountability and disciplined execution among contractors, consultants, and public institutions (Kamau et al., 2025). Within Rwanda, systematic integration of risk management across implementation stages contributes to sustained performance in infrastructure and construction projects operating under procurement procedures, coordination demands, and financing constraints, where alignment between planned activities and executed works supports improved outcomes (Ndungutse, 2021; Mugabo, 2024).

Despite sustained growth in infrastructure and real estate investment, construction projects in Rwanda continue to experience notable performance deficiencies. National audit evidence indicates persistent delays and stalled works across public construction contracts; the Office of the Auditor General reported that during the 2023–2024 audit cycle, government construction projects valued at over Frw 149 billion experienced completion delays or suspension, largely linked to weaknesses in planning, supervision, and control (Office of the Auditor General, 2024). Mugabo (2024) observes that limited technical competency among project managers constrains the prediction of structural and environmental risks, noting that roughly 35% of construction delays in urban Kigali are linked to late-stage design changes. Supply chain volatility and procurement risks further destabilise large developments, with projects lacking robust financial risk-hedging strategies reportedly experiencing average cost overruns of 22% in the 2022 fiscal year (Uwayo & Mulyungi, 2023), while weak information-sharing has been linked to 45% of infrastructure failures (Ndungutse, 2022). [REFERENCE DETAILS REQUIRE VERIFICATION — Uwayo & Mulyungi (2023) and Ndungutse (2022) are cited in the thesis text but do not appear in the thesis reference list.

Despite a growing body of literature on construction project performance and risk management in Rwanda and the wider region, no prior study has specifically examined the effect of project risk management on the performance of the Ituze Village Project in Kicukiro District. The general objective of this study was therefore to assess the effect of project risk management on the performance of construction projects in Rwanda, with specific reference to the Ituze Village Project. Specifically, the study sought: (i) To examine the effect of project risk identification on performance; (ii) To identify the effect of project risk analysis on performance; and (iii) To assess the effect of project risk monitoring and control on performance of the Ituze Village Project in Kicukiro District. The corresponding null hypotheses stated that each of these three risk management practices had no significant effect on the performance of the Ituze Village Project. Geographically, the study focused on the Ituze Village Project in Kanombe Sector, Kicukiro District, in the City of Kigali, a large-scale housing initiative implemented by Imara Properties; in time, it covered the project lifecycle phases from 2022 to 2025; and in domain, it concentrated on risk identification, risk analysis, and risk monitoring and control and their influence on efficiency, cost-effectiveness, and quality. The study is significant in advancing evidence-based risk management practice in Rwanda's construction industry, contributing to improved housing delivery, safety, and community development, and filling a gap in the literature on project risk management in community-based construction contexts.

2. Literature Review

2.1 Conceptual and Theoretical Review

Project risk management is the systematic process of identifying, analysing, monitoring, and controlling uncertainties that may affect project objectives, aiming to reduce negative impacts and improve the likelihood of achieving planned performance (Xu & Herrmann, 2025). Project risk identification recognises and documents potential events that may negatively influence objectives, enabling early awareness of uncertainties affecting cost, schedule, quality, and stakeholder expectations (Jackson et al., 2024). Project risk analysis is the structured assessment of identified risks to determine their likelihood and potential impact, supporting prioritisation and informed decision-making (Guimarães et al., 2024). Project risk monitoring and control is the continuous tracking of risks, review of response actions, and implementation of corrective measures to keep risk levels acceptable (Williams, 2025). Performance of construction projects refers to the extent to which activities achieve planned objectives regarding schedule adherence, cost discipline, work quality, and stakeholder satisfaction (Kartika & Setiawan, 2025).

The study was guided by three theories. The Theory of Change, associated with Clark and Taplin (2021), explains how the early recognition of assumptions and barriers creates a clear pathway from planned activities to intended outcomes, and was used to examine the effect of risk identification. Systems Theory, introduced by Ludwig von Bertalanffy, conceives projects as open systems of interdependent components in which disturbances in one subsystem propagate to others unless analysed and managed (Jackson, 2021; Midgley et al., 2021); it framed the examination of risk analysis. Agency Theory, developed by Jensen and Meckling, addresses information asymmetry and goal divergence between principals and agents and emphasises governance, supervision, and reporting mechanisms for reducing agency costs (Mitnick, 2021; Bosse & Phillips, 2022); it informed the examination of risk monitoring and control.

2.2 Empirical Review

Effect of project risk identification on performance. Obondi (2025) examined the impact of project risk status meetings on construction project success using data from 50 project managers analysed through Spearman correlation and found positive and significant relationships between structured risk identification and schedule performance ($\rho = .57$), cost performance ($\rho = .51$), customer satisfaction ($\rho = .68$), and business success ($\rho = .60$), each significant at $p = .001$. Rzempała et al. (2022), in a Polish cogeneration case study, reported that the largest technical risks arose during planning and construction while economic and financial risks intensified during execution, and that failure to identify risks at the planning stage generated additional costs exceeding PLN 1.5 billion, nearly 60% of total materialised risk costs. Ali and Chege (2024), studying road construction projects with 145 respondents, found a strong positive relationship between risk identification and performance ($R = 0.895$), while Igihozo and Irechukwu (2022), using 118 respondents and SPSS, reported a highly significant relationship ($r = 0.970$, $p = 0.000$) and an explanatory power of 97.5% ($R^2 = 0.975$) for risk identification and related practices.

Effect of project risk analysis on performance. Prasetyo and Arvitrida (2025) applied fault tree analysis and a risk matrix and demonstrated that structured analysis reduced total risk exposure from 4.4 billion to 1.63 billion by prioritising and controlling critical risks. Ellamie (2023) found that firms applying structured risk evaluation in residential projects in Egypt showed stronger mitigation capacity, whereas inadequate analysis produced reactive decision-making. Mshuza et al. (2023), targeting 175 consulting engineers, reported that analytical risk assessment and monitoring had a positive and significant effect on performance ($\beta = 0.150$, $p = 0.018$), and Rufus and Dushimimana (2025) found risk analysis to be a significant determinant of project success ($\beta = 0.089$, $p = 0.035$) within a model explaining 97.2% of the variation.

Effect of project risk monitoring and control on performance. Williams (2025) described integrated oversight, earned value management, site inspections, and digital tools as strengthening forecasting accuracy and early detection of deviations. Kartika and Setiawan (2025), using partial least squares structural equation modelling with 123 professionals, reported a significant negative effect of stronger monitoring and control on project delay and cost overrun. Tukundane and Yang (2024), with 160 respondents, identified planning and monitoring as the most critical control functions for company performance, and Mukalay and Wabala (2025) reported a positive and significant effect of monitoring and control on performance ($\beta = 0.204$, $p = 0.003$).

The conceptual framework positions project risk management, operationalised through risk identification, risk analysis, and risk monitoring and control, as the independent variable, and performance of the Ituze Village Project, reflected in schedule adherence, cost discipline, work quality, and stakeholder satisfaction, as the dependent variable. Although prior studies establish that these practices improve performance, they largely examine each practice in isolation, are mostly conducted outside Rwanda, and emphasise large-scale infrastructure using generalised indicators. Limited evidence therefore exists on how these practices jointly influence performance within a community-based housing project such as Ituze Village, a gap this study addresses.

3. Methodology

The study adopted both descriptive and correlational research designs. The descriptive design described existing risk management practices, while the correlational design examined relationships between risk management practices and project performance, enabling the description of observed practices alongside the statistical testing of relationships (Jackson, 2021).

The target population comprised 151 individuals from Imara Properties directly involved in implementing the Ituze Village Project, selected because of their direct participation in risk identification, analysis, and monitoring and control activities. The distribution across professional categories is presented in Table 1. Because the population was manageable, a census approach was adopted, targeting all 151 individuals to ensure comprehensive coverage across categories and to enable robust comparison of perceptions among respondents (Midgley et al., 2021).

Table 1: Population Distribution

Category	Number
Project managers	11
Site engineers	37
Site supervisors	29
Contractors	43
Procurement, logistics and supply chain officers	31
Total	**151**

Source: Researcher (2025)

Both primary and secondary data were collected. Primary data were obtained through closed-ended, five-point Likert-scale questionnaires measuring the three risk management practices and project performance, and through semi-structured interviews with selected project managers and site engineers that provided contextual explanations of the quantitative findings. Secondary data were obtained through documentation review of project risk registers, progress and supervision reports, audit reports, and contractual documents, which were used to triangulate the questionnaire and interview evidence. A pilot test involving 15 respondents (approximately ten percent of the population), drawn from the population but excluded from the final survey, was used to identify ambiguous items and refine the instrument before the main data collection.

Validity was ensured through expert review by academic supervisors and construction management experts; the Content Validity Index was 0.80 (16 relevant items out of 20), exceeding the 0.70 threshold. Reliability was assessed using Cronbach's Alpha, with all scales exceeding 0.70, as summarised in Table 2.

Table 2: Reliability Test Results

Variable	No. of items	Cronbach's Alpha
Project risk identification	4	.814
Project risk analysis	4	.826
Risk monitoring and control	4	.807
Performance of project	4	.835
Overall questionnaire scale	**16**	**.849**

Source: Field Data, 2026

Data were processed through editing, coding, and tabulation, and analysed using SPSS version 29. Descriptive statistics (frequencies, percentages, means, and standard deviations) summarised respondents' perceptions; Pearson correlation examined the direction and strength of relationships; and multiple linear regression assessed the combined and separate effects of the three practices using the model $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$, where Y is project performance and X_1, X_2, and X_3 are risk identification, risk analysis, and risk monitoring and control, respectively. Mean scores were interpreted using the ranges 1.00–1.80 (very low), 1.90–2.60 (low), 2.70–3.40 (neutral), 3.50–4.20 (high), and 4.30–5.00 (very high), while standard deviations of 0.5 or below indicated homogeneous responses and values above 0.5 indicated heterogeneous responses. Correlation coefficients were interpreted as weak ($0 < r < 0.5$), moderate ($0.5 < r < 0.7$), or strong ($0.7 < r < 1$). Interview data were analysed thematically, with responses transcribed, coded, and organised into themes aligned with the study objectives to complement the quantitative results.

The study adhered to ethical principles of confidentiality, voluntary participation, informed consent, and anonymity, with authorisation obtained through a formal introductory letter from the University of Kigali; respondent identities were protected through identification codes, and findings were presented in aggregated form. The main limitations included a limited data-collection period and initial reluctance among some respondents to disclose information; these were mitigated through careful prioritisation of activities and assurances of anonymity and academic use of the data.

4. Results and Discussion

4.1 Response Rate and Respondent Profile

Of the 151 questionnaires distributed, 143 (94.7%) were returned complete and usable, 5 (3.3%) were returned incomplete, and 3 (2.0%) were not returned. This high response rate reduced the likelihood of non-response bias and supported reliable interpretation. Among the 143 respondents, 83 (58.0%) were female and 60 (42.0%) were male. The largest age groups were 36–45 years (62; 43.4%) and 26–35 years (58; 40.6%). Most respondents held a bachelor's degree (84; 58.7%), followed by a diploma (41; 28.7%) and a master's degree (18; 12.6%). In terms of experience, 68 (47.6%) had 1–2 years, 45 (31.5%) less than one year, 27 (18.9%) had 3–4 years, and 3 (2.1%) had five years and above.

4.2 Effect of Project Risk Identification on Performance

Respondents expressed strong agreement with the risk identification practices at the project. Table 3 presents the descriptive results.

Table 3: Descriptive Statistics of Project Risk Identification Practices

Statement	N	Mean	Std. Dev.
Maintains an updated risk listing process	143	4.308	.463
Applies early warning mechanisms	143	4.203	.403
Integrates stakeholder input in identification	143	4.280	.536
Ensures accessible risk documentation	143	4.203	.421
Overall	**143**	**4.248**	**.456**

Source: Field Data, 2026

The overall mean of 4.248 (SD = 0.456) indicated strong and homogeneous agreement that risk listing, early warning, stakeholder input, and documentation were well-established practices. The highest-rated item was the updated risk listing process (mean = 4.308, SD = 0.463), while stakeholder input recorded a more heterogeneous response (SD = 0.536), suggesting it was experienced differently across activities. Interview evidence reinforced these patterns. A project manager explained:

> *"I have been directly involved in updating the risk list during the implementation of Ituze Village Project, and this practice has helped the team avoid many surprises on site. When a possible risk is noticed, it is recorded, discussed, and assigned to the responsible officer for follow-up. This has made construction activities more organized because everyone knows the main threats that may affect work progress, materials, labour, safety, and delivery schedules."*

A site engineer added that field-level participation improved the accuracy of identification, noting that engineers, supervisors, contractors, and procurement staff detected issues related to soil conditions, material delivery, design adjustments, and labour coordination before they affected performance. These outcomes align with Yousri et al. (2023) and Ali and Chege (2024), who linked systematic identification with stronger construction performance, and are consistent with the Theory of Change, which explains how early recognition of barriers creates a clear pathway to intended outcomes.

4.3 Effect of Project Risk Analysis on Performance

Respondents also agreed strongly that the project applied structured analytical practices, as shown in Table 4.

Table 4: Descriptive Statistics of Project Risk Analysis Practices

Statement	N	Mean	Std. Dev.
Conducts impact ranking of identified risks	143	4.077	.545
Applies probability assessment	143	4.140	.512
Prioritises risks by influence on schedule/resources	143	4.161	.369
Undertakes severity assessment	143	4.343	.476
Overall	**143**	**4.180**	**.475**

Source: Field Data, 2026

The overall mean of 4.180 (SD = 0.475) reflected strong, homogeneous agreement, with severity assessment recording the highest item mean (4.343, SD = 0.476) and risk prioritisation the most homogeneous response (SD = 0.369). A site engineer described the value of probability estimation:

> *"I have participated in reviewing identified risks and estimating how likely each one is to occur during construction activities. This has been important because not every risk requires the same level of attention, and the team must know which risks are more likely to disturb progress. By assessing probability, the project has been able to prepare better responses for frequent risks such as material delays, weather interruptions, equipment breakdowns, and site coordination challenges."*

A project manager emphasised that severity assessment guided attention to risks capable of seriously affecting the delivery of the project, since some risks appear minor initially but carry serious consequences for cost, time, quality, or stakeholder expectations. These findings are consistent with Prasetyo and Arvitrida (2025) and Ellamie (2023), and with Systems Theory, which explains that analysing the likelihood and impact of risks protects the functioning of the wider project system.

4.4 Effect of Project Risk Monitoring and Control on Performance

Respondents reported strong agreement with the monitoring and control practices, as summarised in Table 5.

Table 5: Descriptive Statistics of Project Risk Monitoring and Control Practices

Statement	N	Mean	Std. Dev.
Conducts regular risk reviews	143	4.315	.466
Uses progress tracking mechanisms	143	4.196	.464
Prepares status reports for management	143	4.168	.375
Applies corrective measures promptly	143	4.154	.381
Overall	**143**	**4.208**	**.421**

Source: Field Data, 2026

The overall mean of 4.208 (SD = 0.421) indicated strong, homogeneous agreement, with regular risk reviews recording the highest item mean (4.315, SD = 0.466). A project manager described the role of reporting:

> *"I prepare and review status reports because they give the management team a clear picture of how risks are changing during construction. These reports show whether mitigation measures are working, whether new risks are emerging, and whether responsible officers are taking action on time. Through regular reporting, the project team has improved communication, reduced confusion, and made faster decisions when risks threaten construction progress, budget control, or quality standards."*

A site engineer observed that risk monitoring and control made implementation more disciplined because risks were not only identified and analysed but followed until action was taken, with progress tracking, site reviews, and corrective measures used to handle issues before they escalated. These results agree with Williams (2025) and Mukalay and Wabala (2025), and with Agency Theory, which holds that routine monitoring, reporting, and corrective action improve accountability among project actors.

4.5 Performance of the Ituze Village Project

Performance was assessed through schedule adherence, cost discipline, work quality, and stakeholder satisfaction (Table 6).

Table 6: Descriptive Statistics of Performance of the Ituze Village Project

Statement	N	Mean	Std. Dev.
Demonstrates schedule adherence	143	4.112	.377
Maintains cost discipline	143	4.203	.421
Achieves acceptable work quality	143	4.112	.430
Achieves stakeholder satisfaction	143	4.224	.435
Overall	**143**	**4.163**	**.416**

Source: Field Data, 2026

The overall performance mean of 4.163 (SD = 0.416) indicated that the project was perceived to meet planned schedules, control expenditures, attain expected quality, and satisfy stakeholders, with stakeholder satisfaction recording the highest item mean (4.224). A project manager summarised the link between risk management and delivery:

> *"The overall performance of Ituze Village Project has benefited from the way risks are managed across identification, analysis, monitoring, and control processes. In my role, I have seen that timely decisions, cost follow-up, quality supervision, and stakeholder communication contribute to better project delivery. The project still requires continuous attention, but the current practices have supported schedule control, expenditure discipline, acceptable work quality, and satisfaction among key stakeholders involved in the housing development."*

These findings resonate with Kamuzora (2024) and Gupta et al. (2024) and are supported by Systems Theory, which explains that performance improves when interconnected inputs, processes, feedback, and outputs remain aligned.

4.6 Correlation Analysis

Pearson correlation results (Table 7) showed strong, positive, and statistically significant relationships between each risk management practice and project performance.

Table 7: Correlation between Risk Management Practices and Performance

Variable	Risk identification	Risk analysis	Monitoring & control	Performance
Risk identification	1	.800**	.906**	.840**
Risk analysis	.800**	1	.881**	.888**
Monitoring & control	.906**	.881**	1	.890**
Performance	.840**	.888**	.890**	1

*Note. **Correlation is significant at the 0.01 level (2-tailed). N = 143. Source: Field Data, 2026*

Risk identification ($r = 0.840$), risk analysis ($r = 0.888$), and monitoring and control ($r = 0.890$) each correlated strongly and significantly with performance (all $p < 0.05$), indicating that improvements in these practices moved together with better construction performance, consistent with Ali and Chege (2024), Rufus and Dushimimana (2025), and Mukalay and Wabala (2025).

4.7 Regression Analysis and Hypothesis Testing

Multiple linear regression assessed the combined and separate effects of the three practices. The model was strong: $R = 0.920$ and $R^2 = 0.847$, indicating that the three practices jointly explained 84.7% of the variation in performance, with a Durbin-Watson value of 1.903 suggesting no serious autocorrelation (Table 8).

Table 8: Model Summary

R	R Square	Adjusted R^2	Std. Error	Durbin-Watson
.920	.847	.843	.185312	1.903

Note. Predictors: (Constant), monitoring and control, risk analysis, risk identification. Dependent variable: performance of project. Source: Field Data, 2026

The ANOVA confirmed that the overall model was statistically significant, $F(3, 139) = 258.441$, $p < 0.001$ (Table 9).

Table 9: ANOVA Summary

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	26.360	3	8.787	258.441	.000
Residual	4.773	139	.034		
Total	31.134	142			

Note. Dependent variable: performance of project. Source: Field Data, 2026

The regression coefficients (Table 10) showed that all three practices had positive and statistically significant effects on performance.

Table 10: Regression Coefficients

Predictor	B	Std. Error	Beta	t	Sig.
(Constant)	.073	.189		.386	.701
Risk identification	.207	.089	.182	2.326	.021
Risk analysis	.465	.070	.465	6.643	.000
Monitoring and control	.318	.100	.315	3.180	.002

Note. Dependent variable: performance of project. Source: Field Data, 2026

Risk identification (B = 0.207, t = 2.326, p = 0.021), risk analysis (B = 0.465, t = 6.643, $p < 0.001$), and monitoring and control (B = 0.318, t = 3.180, p = 0.002) were each significant at the 0.05 level. The fitted model was $Y = 0.073 + 0.207X_1 + 0.465X_2 + 0.318X_3 + \varepsilon$, with risk analysis making the largest separate contribution. Collinearity statistics were within acceptable limits (tolerances of 0.179, 0.224, and 0.112; VIFs of 5.571, 4.458, and 8.926, respectively), although the VIF for monitoring and control warranted continued attention to overlap among practices. Accordingly, all three null hypotheses were rejected: H_01 (p = 0.021), H_02 (p = 0.000), and H_03 (p = 0.002) were each rejected, confirming a statistically significant positive effect of project risk identification, risk analysis, and monitoring and control on performance of the Ituze Village Project. These decisions are consistent with Igihozo and Irechukwu (2022) and Kartika and Setiawan (2025).

5. Conclusions and Recommendations

5.1 Conclusion

The study concludes that project risk identification had a positive and statistically significant effect on the performance of the Ituze Village Project, confirming that timely risk listing, early warning, stakeholder input, and documentation support effective construction delivery. Project risk analysis also had a positive and statistically significant effect and was the strongest separate predictor, indicating that systematic assessment of likelihood, impact, priority, and severity enables the project to direct attention to the most consequential risks. Project risk monitoring and control likewise had a positive and statistically significant effect, showing that regular reviews, progress tracking, status reporting, and corrective action keep risk responses connected to actual site conditions. Overall, project risk management was an important contributor to performance, and a coordinated approach across the three practices strengthened the conditions for schedule adherence, cost discipline, work quality, and stakeholder satisfaction.

5.2 Recommendations

Based on these findings the following recommendations are made:

1. Project management should maintain a live risk register updated at planned intervals and whenever material site, procurement, financial, or

technical changes occur, and should formalise early warning procedures enabling site engineers, supervisors, contractors, and procurement personnel to report emerging risks quickly.

2. Relevant stakeholders should be involved in periodic risk identification sessions, particularly before critical construction phases and procurement commitments. Project managers should adopt a standard risk analysis matrix recording probability, impact, severity, priority, and proposed treatment for every major risk, and should integrate routine risk review meetings into the project work plan linked to progress reporting.

3. Construction authorities and project sponsors should strengthen personnel capacity through practical training in risk identification, analysis, monitoring, and reporting, and management should establish a corrective-action follow-up system recording the action taken, the responsible person, the completion date, and the verification result.

4. Future research could examine the effect of risk response planning, digital risk reporting systems, and contractor risk competence on the performance of residential construction projects in Rwanda.

References

Ali, A. M., & Chege, P. (2024). Effect of risk identification on performance of road construction projects. *International Journal of Social Science and Humanities Research, 12*(2), 96–102.

Bosse, D. A., & Phillips, R. A. (2022). Agency theory and bounded self-interest. Academy of Management Review, 47(2), 276–297.

Bours, D., McGinn, C., & Pringle, P. (2021). Monitoring and evaluation for adaptive management. Routledge.

Clark, H., & Taplin, D. H. (2021). Theory of change basics: A primer on theory of change. ActKnowledge.

Ellamie, A. (2023). Assessment of performance of risk management procedures in residential projects in Egypt [Master's thesis]. Metropolia University of Applied Sciences & HTW Berlin.

Guimarães, L. G. A., Camarini, G., da Silva, A. F., & Pereira, R. S. (2024). Risk analysis in international construction projects: A look at SMEs in Quebec operating in the prefabricated wood construction sector. *Buildings, 14*(8), 2563.

Gupta, R., Sankar, S. S., Rajendran, S., & Karthik, R. (2024). A catalyst for positive safety climate on construction sites: Evidence from southern India. Buildings, 14(6), 1806.

Igihozo, L., & Irechukwu, E. N. (2022). Project risk management process and performance of Mpazi Channel construction project in Nyabugogo, Kigali-Rwanda. *Journal of Strategic Management, 6*(2), 31–44.

Jackson, E. N., Agyekum, K., & Adinyira, E. (2024). Identification and classification of construction risk factors that impact construction projects in Ghana. *Heliyon, 10*(3), e40397.

Jackson, M. C. (2021). Critical systems thinking and the management of complexity. Wiley.

Kamau, P. M., Mwangi, W., & Wanyama, K. (2025). Influence of risk management strategies in building construction projects in Kenya. *Open Journal of Civil Engineering, 15*(1), 1–18.

Kamuzora, A. N. (2024). Assessing the impact of risk management components on performance of construction projects in Morogoro Municipal Council, Tanzania. *Acta Economica, 22*(1), 45–62.

Kartika, D., & Setiawan, B. (2025). The economic impact of project risk management on cost efficiency and time performance in medium-scale construction projects. *Mustard Journal de Ecobusin, 2*(4), 204–217.

Midgley, G., Franco, L. A., & Jackson, M. C. (2021). Systemic intervention. *European Journal of Operational Research, 292*(3), 1161–1174.

Mitnick, B. M. (2021). Origin and development of agency theory. *Academy of Management Review, 46*(1), 141–156.

Mshuza, S. Y., Yusuf, M., & Ngatia, P. (2023). Project risk management practices and performance of public schools construction projects in Mara Region, Tanzania. *International Journal of Management and Commerce Innovations, 11*(1), 41–52.

Mugabo Kamikazi, M. (2024). Impact of integration management on performance of construction projects in Rwanda [Unpublished master's thesis]. University of Rwanda.

Mukalay, N. D., & Wabala, S. (2025). Effect of risk management practices on project performance: A case of Rwanda Urban Development Project. *Journal of Research Innovation and Implications in Education, 9*(1), 143–151.

Müller, R., & Lecoeuvre, L. (2021). Operationalizing governance categories of projects. *International Journal of Project Management, 39*(4), 379–392.

Ndungutse Ingabire, N. (2021). Project risk management and project performance: Evidence from water supply infrastructure projects implemented by WASAC [Unpublished master's thesis]. University of Rwanda.

Obondi, K. C. (2025). The impact of project risk status meetings on project success in construction projects. *International Journal of Academic Multidisciplinary Research, 9*(3), 136–147.

Office of the Auditor General of State Finances. (2024). Annual audit report of the Auditor General of State Finances for the financial year ended 30 June. Office of the Auditor General of State Finances.

Osei-Kyei, R., Chan, A. P. C., Ameyaw, E. E., & Darko, A. (2022). A scientometric analysis of studies on risk management in construction. Buildings, 12(9), 1342.

Prasetyo, D. E., & Arvitrida, N. I. (2025). Risk analysis in the implementation of construction projects using fault tree analysis and risk matrix. *Asian Journal of Engineering, Social and Health, 4*(5), 77–90.

Rufus, O. E., & Dushimimana, J. D. (2025). Effect of project risk analysis on construction project success. *African Quarterly Social Science Review, 2*(1), 248–259.

Rzempała, J., Borkowski, D., & Rzempała, A. P. (2022). Risk identification in cogeneration (combined heat and power) projects: A Polish case study. *Energies, 15*(1), Article 42.

Williams, A. S. (2025). Construction project monitoring and control: Strategies for effective oversight, cost control, and technical supervision. ResearchGate Working Paper. [REFERENCE DETAILS REQUIRE VERIFICATION]

Xu, X., & Herrmann, P. (2025). Risk management practices and project performance in German construction projects. *International Journal of Business and Management, 20*(1), 45–59.

Yousri, E., Elhakeem, A., & El-Din, H. S. (2023). Risk identification of building construction projects in Egypt. Buildings, 13(4), 1084.

Zhu, Y., Wang, Z., Liu, H., & Zhang, J. (2025). Safety risk management in power engineering construction based on composite weight and extension matter element model. *Processes, 13*(7), 1452.