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Effect of risk management practices on project performance: A case study of Nyabisindu and Nyagatovu informal settlements (RUDPII) in Gasabo district, Rwanda

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ABSTRACT

The purpose of this study was to determine the effect of risk management practices on the performance of the Nyabisindu and Nyagatovu informal settlement project. The analysis of the study included both descriptive and inferential statistics. The findings revealed that the unstandardized coefficient for Risk Identification was 0.183, indicating that a one-unit increase in Risk Identification results in a 0.183-unit increase in project performance ($\beta = 0.183$, $t = 3.284$, $p = 0.001$). The unstandardized coefficient for Risk Analysis was 0.354, showing that a one-unit increase in Risk Analysis leads to a 0.354-unit increase in project performance ($\beta = 0.354$, $t = 8.317$, $p = 0.000$). The unstandardized coefficient for Risk Response was 0.156, indicating that a one-unit increase in Risk Response results in a 0.156-unit increase in project performance ($\beta = 0.156$, $t = 2.936$, $p = 0.004$). Similarly, the unstandardized coefficient for Risk Monitoring and Evaluation was 0.268, indicating that a one-unit increase in Risk Monitoring and Evaluation leads to a 0.268-unit increase in project performance ($\beta = 0.268$, $t = 4.405$, $p = 0.000$). These results confirm that risk management components, namely risk identification, risk analysis, risk response, and risk monitoring and evaluation, have a positive and statistically significant effect on project performance. The study recommends active community engagement in identifying project needs, provision of structured training to support participatory implementation, establishment of open communication channels during project execution, and enhanced stakeholder involvement in monitoring activities under the RUDPII.

KEYWORDS: Risk Management Practices, Risk Identification, Risk Analysis, Risk Response and Risk Monitoring and Evaluation, Project Performance

INTRODUCTION

Risk management is a structured and continuous process that enables project teams to identify, analyze, and respond to uncertainties throughout the project life cycle in order to enhance decision-making and achieve project objectives. It involves systematic procedures for risk identification, assessment, response planning, and monitoring, all of which contribute to minimizing potential negative impacts on project outcomes (Project Management Institute, 2021). Project performance is commonly evaluated using the triple constraint model, which comprises scope, time, and cost, and these elements are interdependent such that a change in one dimension directly affects the others (Project Management Institute, 2021).

In the United States, organizations increasingly integrate formal risk management frameworks into project execution, recognizing that comprehensive risk practices significantly improve project delivery and performance outcomes (Hillson, 2020). Similarly, evidence from European contexts, including Finland, demonstrates that embedding risk management across all phases of a project enhances operational efficiency and supports systematic performance measurement, which involves assessing the effectiveness and efficiency of completed project activities (Neely, 2021). Widely adopted performance measurement tools in large infrastructure and construction projects include the Balanced Scorecard, Earned Value Management, and Key Performance Indicators, which provide structured approaches for monitoring and controlling project performance (Kaplan & Norton, 2020).

In developing countries, weak implementation of risk management practices has been associated with poor project outcomes. For example, studies indicate that inadequate risk management contributes to project delays, cost overruns, and inefficiencies in project execution (Kivilä, Martinsuo, & Vuorinen, 2017; updated

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application widely cited in recent project management literature). In Ghana, effective risk management has been shown to enhance coordination among project stakeholders and reduce negative impacts on cost, time, and quality, thereby improving overall project performance (Ofori, 2022).

In Rwanda, integrating risk management into project decision-making processes is essential for improving project viability and reducing uncertainty. Effective risk management practices enable project teams to evaluate potential risks, minimize losses, and enhance the likelihood of project success through proper planning and control mechanisms aligned with national development priorities (World Bank, 2021).

The Agatare Upgrading Project, initiated in 2018, targeted informal settlements in Biryogo, Agatare, Kiyovu, and Rwampara cells, aiming to improve housing conditions and reduce forced evictions while addressing increasing urban housing demand in Kigali (Ministry of Infrastructure Rwanda, 2021).

Furthermore, the second phase of the Rwanda Urban Development Project (RUDP II), supported by the World Bank, focuses on improving urban infrastructure in secondary cities such as Muhanga, Huye, Rusizi, Rubavu, Musanze, and Nyagatare. The project includes road upgrading, drainage systems, flood mitigation infrastructure, and rehabilitation of wetlands such as Gikondo and Nyabugogo, with the aim of enhancing urban resilience and improving living conditions for populations residing in high-risk zones (World Bank, 2021).

LITERATURE REVIEW

Theoretical review emphasized on existing theories that were pertinent to the effect of risk management practices on project performance in Nyabisindu and Nyagatovu, in Gasabo District. The researcher has identified three theories which were relevant to the research topic. They were known as field theory by Kurt Lewin, participation theory, and sustainable development theory.

2.1 Field Theory

Field Theory, developed by Kurt Lewin in 1947, explains behavior as a function of the interaction between individuals and their environment. Lewin emphasized that change occurs through the interaction of driving and restraining forces within a social system. According to this perspective, driving forces initiate change, while restraining forces hinder it, and effective transformation requires strengthening the former while reducing the latter (Burnes, 2020).

Lewin further proposed a three-stage model of change consisting of unfreezing, movement, and refreezing. The unfreezing stage involves preparing individuals to accept change by challenging existing beliefs and reducing resistance. The movement stage represents the actual transition where new behaviors, practices, or systems are introduced. The refreezing stage ensures that these new behaviors are stabilized and integrated into routine practice to prevent regression to previous habits (Burnes, 2020).

Despite its widespread application, Field Theory has been criticized for its general nature and limited attention to cultural and contextual dynamics. Scholars argue that the theory does not sufficiently explain how change processes differ across diverse social and institutional settings (Kump, 2023).

In relation to this study, Field Theory provides a framework for understanding how residents of Nyabisindu and Nyagatovu cells can transition toward improved living conditions. The unfreezing stage would involve awareness creation on environmental risks, the movement stage would include adoption of improved waste management practices and durable housing materials, and the refreezing stage would ensure these practices become sustainable community norms.

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2.2 Participation Theory

Participation Theory emphasizes the active involvement of community members in decision-making processes and development initiatives that affect their lives. The theory is rooted in participatory development approaches advanced by scholars such as Robert Chambers, who argued that inclusive participation enhances empowerment, ownership, and sustainability of development outcomes (Chambers, 2020).

Participation is commonly understood through two key perspectives. The first is the social perspective, which views participation as a means of empowering marginalized groups and promoting equity in resource distribution and decision-making. The second is the institutional perspective, which focuses on incorporating community input into formal planning, implementation, and evaluation processes (Cornwall, 2021).

However, Participation Theory has faced criticism regarding power dynamics and the depth of engagement. Critics argue that participation may sometimes be superficial, serving as a procedural requirement rather than a genuine mechanism for empowerment. Additionally, unequal power relations may limit the influence of local communities in decision-making processes (Cornwall, 2021).

In the context of this study, Participation Theory is relevant in explaining how residents of Nyabisindu and Nyagatovu cells can actively engage in urban upgrading initiatives. Their involvement in planning meetings organized by the City of Kigali and participation in implementation processes enhances ownership, ensures that interventions reflect local needs, and contributes to the sustainability of development outcomes.

2.3 Sustainable Development Theory

Sustainable Development Theory focuses on balancing economic, social, and environmental dimensions to ensure long-term development without compromising future generations. The concept gained global recognition through the World Commission on Environment and Development report, which defined sustainable development as meeting present needs without undermining the ability of future generations to meet theirs (WCED, 1987; reiterated in Shi et al., 2019).

The evolution of Sustainable Development Theory can be categorized into three main phases. The early stage emphasized environmental conservation and responsible resource use. The second phase, marked by global conferences such as the 1972 United Nations Conference on the Human Environment and the 1987 Brundtland Report, formalized the concept and its global relevance. The modern phase expanded the framework to include integrated development approaches, culminating in the adoption of the Sustainable Development Goals (SDGs) in 2015 (Shi et al., 2019).

Despite its global acceptance, the theory faces challenges related to implementation, measurement, and balancing competing priorities. Scholars highlight the distinction between strong sustainability, which prioritizes environmental preservation, and weak sustainability, which allows substitution between natural and human-made capital (Shi et al., 2019).

In this study, Sustainable Development Theory explains the importance of environmentally responsible urban upgrading in Nyabisindu and Nyagatovu cells. Residents are expected to relocate from high-risk zones such as wetlands and adopt practices that minimize environmental degradation. This approach contributes to improved living conditions while ensuring long-term environmental sustainability.

METHODOLOGY

For this study, the researcher would consider a total population of 200 individuals living or working in Nyabisindu and Nyagatovu informal settlements.

The sample size was determined by using Yamane formula and was 133 respondents. For this study, the researcher would use probability sampling method for the beneficiaries. Therefore, the beneficiaries would be

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represented by 120 respondents, while the implementers and the stakeholders would be represented by 13 respondents.

The questionnaire would be designed and would be distributed to respondents who were connected to Nyabisindu and Nyagatovu informal settlements in Gasabo District, with the aim of obtaining pertinent information. Prior to the distribution of questionnaires, the researcher would give some clarifications on how respondents should answer. Afterward, the researcher would collect questionnaires for analysis and interpretation. This tool would also help the researcher to gain understanding and valuable insights on the phenomenon of urbanization of Nyabisindu and Nyagatovu informal settlements in Gasabo District.

Table 1: Reliability Results

Variables	Cronbach's Alpha	N of Items
Risk Identification	.825	6
Risk Analysis	.829	6
Risk Response	.851	6
Risk Monitoring and Evaluation	.828	6
Project performance	.837	6

Table 1 presents the reliability results for the study variables, with all Cronbach's alpha values ranging from 0.825 to 0.851 across the five constructs, each containing six items. According to reliability standards, these scores fall within the acceptable range (greater than 0.7), indicating that the items under each variable are internally consistent and reliably measure their respective constructs, namely risk identification, risk analysis, risk response, risk monitoring and evaluation, and project performance.

Data analysis is defined as the process of converting collected data into meaningful information. The researcher first screened the data obtained for omissions. Subsequently, the questionnaire data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS), version 27.

RESEARCH FINDINGS

This section presents a comprehensive analysis of the data collected for the study on the effect of risk management practices on project performance in Nyabisindu and Nyagatovu villages, Gasabo District.

4.1 Correlation analysis

This section presents a correlation analysis to determine the strength and direction of the relationship between risk management variables and project performance. The variables studied include Risk Identification, Risk Analysis, Risk Response, Risk Monitoring and Evaluation, and Project Performance.

Table 2: Correelation Matrix

		Risk Identification	Risk Analysis	Risk Response	Risk Monitoring and Evaluation	Project Performance
Risk Identification	Pearson Correlation	1	.421**	.650**	.737**	.698**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	130	130	130	130	130
Risk Analysis	Pearson Correlation	.421**	1	.577**	.613**	.782**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	130	130	130	130	130

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Risk Response	Pearson Correlation	.650**	.577**	1	.620**	.718**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	130	130	130	130	130
Risk Monitoring and Evaluation	Pearson Correlation	.737**	.613**	.620**	1	.797**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	130	130	130	130	130
Project Performance	Pearson Correlation	.698**	.782**	.718**	.797**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	130	130	130	130	130

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Field Data, 2025

Table 2 presents the Pearson correlation values between the independent variables (Risk Identification, Risk Analysis, Risk Response, Risk Monitoring and Evaluation) and the dependent variable, Project Performance. The results indicated significant positive relationships between all independent variables and project performance, as the p-values for all correlations are less than 0.05. Specifically, Risk Identification shows a moderate positive relationship with project performance ($r = 0.698$, $p < 0.05$). This correlation study on the Nyabisindu and Nyagatovu project in Gasabo District indicates that robust risk identification practices significantly enhance project performance, leading to positive outcomes.

Risk Analysis demonstrates a strong positive relationship ($r = 0.782$, $p < 0.05$). This correlation study on the Nyabisindu and Nyagatovu project in Gasabo District indicates that effective risk analysis contributes to improved project performance and better decision-making processes.

Risk Response exhibits a moderate positive relationship ($r = 0.718$, $p < 0.05$). The findings are consistent with the Project Management Institute (2021), which explains that structured risk response strategies, including risk avoidance, mitigation, transfer, and acceptance, are critical in reducing the negative effects of risks on project outcomes. This correlation study on the Nyabisindu and Nyagatovu project in Gasabo District indicates that effective risk response strategies are essential for enhancing project performance and mitigating challenges.

Risk Monitoring and Evaluation shows a strong positive relationship ($r = 0.797$, $p < 0.05$). These findings highlight that higher levels of risk management practices are associated with improved project performance of Nyabisindu and Nyagatovu (RUDPII) in Gasabo District. The findings are supported by Zwikael and Smyrk (2019), who emphasize that continuous monitoring and evaluation of project risks enhance accountability, control, and overall project success. This correlation study on the Nyabisindu and Nyagatovu project in Gasabo District indicates that continuous risk monitoring and evaluation significantly improve project accountability and performance.

4.2 Regression Analysis

This section presents the results of regression analysis to examine the effect of risk management practices on project performance. The variables analyzed include Risk Identification, Risk Analysis, Risk Response, and Risk Monitoring and Evaluation, with Project Performance as the dependent variable.

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Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.906[a]	.821	.815	.04277	2.290

a. Predictors: (Constant), Risk Monitoring and Evaluation, Risk Analysis, Risk Response, Risk Identification

b. Dependent Variable : Project Performance

Source : Field Data, 2025

Table 3 presents the model summary for the regression analysis. The R-value of 0.906 indicated a very strong positive relationship between the predictors (Risk Identification, Risk Analysis, Risk Response, Risk Monitoring and Evaluation) and Nyabisindu and Nyagatovu RUDPII project performance. The R-squared value of 0.821 indicated that 82.1% of the variance in project performance can be explained by the independent variables. The adjusted R-squared value of 0.815 shows that the model fits the data well, taking into account the number of predictors. The Durbin–Watson statistic of 2.290 highlights that there is no significant autocorrelation in the residuals, indicating that the model is appropriately specified.

The findings are consistent with the observations made by the Project Management Institute (2021), which emphasizes that systematic implementation of risk management practices significantly enhances project performance by improving control over uncertainties and supporting informed decision-making. The PMBOK framework highlights that integrated risk management processes contribute substantially to project success by reducing delays and cost overruns. Similarly, Hillson (2020) explains that effective risk management strengthens project predictability and performance outcomes through structured identification, analysis, response, and monitoring of risks. The model summary results for the Nyabisindu and Nyagatovu project in Gasabo District indicate that effective risk management explains 82.1% of the variance in project performance, reinforcing the importance of structured risk practices. Both perspectives confirm that well-implemented risk management is critical for achieving successful project outcomes.

Table 4: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.046	4	.261	142.903	.000[b]
	Residual	.229	125	.002		
	Total	1.274	129			

a. Dependent Variable : Project Performance

b. Predictors: (Constant), Risk Monitoring and Evaluation, Risk Analysis, Risk Response, Risk Identification

Source: Field Data, 2025

Table 4 presents the ANOVA results for the regression analysis. The F-statistic of 142.903 with a p-value of 0.000 indicated that the regression model is statistically significant at the 0.05 level. This indicates that the combined effect of Risk Identification, Risk Analysis, Risk Response, and Risk Monitoring and Evaluation significantly influenced the performance of the Nyabisindu and Nyagatovu RUDPII project. The findings are supported by empirical evidence from Kivilä, Jussi, Martinsuo, and Vuorinen (2017), who demonstrated that integrated project control systems, including risk management practices, significantly influence project performance outcomes, with their model showing strong statistical significance in explaining performance variability. Their study confirmed that combining multiple risk management processes enhances overall project efficiency and effectiveness.

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Table 5: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.181	.185		.976	.331
	Risk Identification	.183	.056	.202	3.284	.001
	Risk Analysis	.354	.043	.429	8.317	.000
	Risk Response	.156	.053	.163	2.936	.004
	Risk Monitoring and Evaluation	.268	.061	.285	4.405	.000

Source : Field Data, 2025

$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \epsilon$

Hence,

Performance of Nyabisindu and Nyagatovu project in Gasabo District = 0.181 + 0.183 (Risk Identification) + 0.354 (Risk Analysis) + 0.156 (Risk Response) + 0.268 (Risk Monitoring and Evaluation) + ϵ

Table 5 presents the coefficients for the regression model analyzing the effect of Risk Identification, Risk Analysis, Risk Response, and Risk Monitoring and Evaluation on the performance of the Nyabisindu and Nyagatovu RUDPII project. The unstandardized coefficient for the constant is 0.181, indicating the baseline value of project performance when all predictor variables are zero. This baseline establishes a framework for assessing the contributions of each risk management component to overall project performance.

The unstandardized coefficient for Risk Identification is 0.183, indicating that a one-unit increase in Risk Identification results in a 0.183-unit increase in project performance ($\beta = 0.183$, $t = 3.284$, $p = 0.001$). This significant finding aligns with empirical evidence reported by Tamošaitienė, Jolanta and *et al.* (2021), who found that early-stage risk identification significantly improves project planning accuracy and reduces the likelihood of cost overruns and schedule delays in infrastructure projects. Their study demonstrated that structured identification processes enhance proactive decision-making, thereby strengthening project performance outcomes.

The unstandardized coefficient for Risk Analysis is 0.354, indicating that a one-unit increase in Risk Analysis results in a 0.354-unit increase in project performance ($\beta = 0.354$, $t = 8.317$, $p = 0.000$). This significant finding is supported by Taroun (2022), who established that rigorous risk analysis techniques, including qualitative and quantitative assessment models, significantly improve project performance by enabling prioritization of critical risks and enhancing resource allocation efficiency.

The unstandardized coefficient for Risk Response is 0.156, indicating that a one-unit increase in Risk Response results in a 0.156-unit increase in project performance ($\beta = 0.156$, $t = 2.936$, $p = 0.004$). This significant finding is consistent with findings by Ofori and Daniel (2022), who demonstrated that effective risk response strategies such as mitigation, transfer, and avoidance significantly contribute to improved project delivery outcomes by reducing the adverse effects of uncertainties in construction projects.

The unstandardized coefficient for Risk Monitoring and Evaluation is 0.268, indicating that a one-unit increase in Risk Monitoring and Evaluation results in a 0.268-unit increase in project performance ($\beta = 0.268$, $t = 4.405$, $p = 0.000$). This significant finding aligns with empirical evidence from Zwikael, Ofer and Smyrk (2019), who emphasized that continuous monitoring and evaluation systems enhance project control, accountability, and performance by ensuring that risks are tracked and managed throughout the project life cycle.

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CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The purpose of this study was to examine the effect of risk management practices on project performance of the RUDPII in Nyabisindu and Nyagatovu villages, Gasabo District. The findings indicate that all hypotheses tested regarding the effects of risk management on the performance of the Nyabisindu and Nyagatovu RUDPII yielded p-values that were less than the significance threshold of 0.05. As a result, the null hypotheses stating that there was no significant effect of risk management, risk identification, risk analysis, risk response, and risk monitoring and evaluation on project performance were rejected.

5.2 Recommendations

Beneficiaries are recommended to actively engage community members, particularly women, in identifying project needs to ensure that project objectives align with local expectations. Furthermore, they should establish effective feedback mechanisms to continuously refine engagement strategies and respond to evolving community needs.

Project staff should facilitate open communication channels with stakeholders during the implementation phase to support collaborative execution of project activities, thereby enhancing overall project efficiency. They should also conduct regular consultations with stakeholders to address emerging concerns and maintain transparency in project operations and progress.

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