



Effect of Project Planning Approaches on Project Performance: A Case of Kigali Innovation City Project in Gasabo District, Rwanda

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Abstract: *The general objective of this study was to assess the effect of project planning approaches on the performance of the Kigali Innovation City Project in Rwanda. The specific objectives were to analyse the effect of the risk-based planning approach on the performance of the Kigali Innovation City Project in Gasabo District, examine the effect of the results-based planning approach on project performance, and assess the effect of the participatory planning approach on project performance. The study adopted a descriptive and correlational research design. The population comprised 389 project managers, engineers, planners, field officers, and stakeholders involved in the Kigali Innovation City Project. A sample size of 197 was determined using Slovin's formula. Stratified and simple random sampling techniques were applied to ensure representation of all stakeholder groups. Regression findings showed that the risk-based planning approach had a positive and significant effect on project performance ($B = 0.190$, $t = 3.065$, $p = 0.002$), the results-based planning approach had a positive and significant effect ($B = 0.511$, $t = 7.862$, $p = 0.000$), and the participatory planning approach had a positive and significant effect ($B = 0.204$, $t = 3.290$, $p = 0.001$). The study concluded that all three planning approaches significantly improved the performance of the Kigali Innovation City Project in terms of scope, quality, time, cost, and achievement of intended objectives. It recommended strengthening integrated planning practices by combining risk identification, results tracking, and stakeholder participation throughout project implementation.*

Keywords: *Project Planning Approaches; Risk-Based Planning Approach; Results-Based Planning Approach; Participatory Planning Approach; Project Performance*

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1. Introduction

Project planning approaches have evolved as central determinants of construction project performance, particularly in relation to cost control, time delivery, quality assurance, and risk mitigation. Formal project planning practices became standardized after the global adoption of structured project management frameworks in the late twentieth century, with notable consolidation following the release of the PMBOK Guide in 1996 and its continuous updates thereafter. By 2017, integrated planning approaches combining scope, schedule, risk, and resource planning had become dominant in construction governance structures. These developments positioned planning not merely as a preparatory phase but as a continuous performance-shaping mechanism throughout

the project life cycle. Contemporary construction research emphasizes that weak planning remains a leading cause of cost overruns and schedule slippage globally (Project Management Institute, 2021).

In the United Kingdom, construction planning approaches have undergone significant reform following persistent infrastructure delivery challenges. After the 2011 UK Government Construction Strategy, planning systems increasingly emphasized collaborative planning, early contractor involvement, and lifecycle scheduling. Despite these reforms, major projects such as HS2 continued to face delays and cost escalations linked to early planning inaccuracies and scope changes. Planning failures were often traced to fragmented design coordination and insufficient risk forecasting during pre-construction phases. These experiences demonstrate that planning

sophistication directly influences construction performance outcomes in the UK context (Davies et al., 2022).

Accelerated urban growth in India has placed unprecedented pressure on construction planning systems to deliver complex projects within constrained timelines and budgets. rapid urbanization since 2011 has pressured construction planning systems to deliver housing, transport, and industrial projects at scale. Government-led initiatives such as the Smart Cities Mission launched in 2015 emphasized integrated planning across procurement, scheduling, and resource allocation. However, planning effectiveness has been undermined by inconsistent feasibility analysis and limited coordination between contractors and public agencies. Empirical assessments reveal that inadequate planning maturity contributes to recurring time overruns exceeding 30 percent in public construction projects. These outcomes highlight how planning capability gaps translate directly into performance deficits (Kumar & Bansal, 2023).

Persistent performance setbacks in Nigeria's construction sector have exposed deep-rooted weaknesses in project planning approaches. Nigeria's construction sector continues to grapple with planning inefficiencies despite regulatory reforms introduced in 2014. Major road and housing projects frequently suffer from cost escalation due to weak scope definition and unrealistic scheduling during planning stages. Studies show that planning documents often lack alignment with available financial and material resources, leading to implementation breakdowns. The persistence of abandoned projects reflects systemic planning shortcomings rather than execution failures alone. These patterns confirm the central role of planning approaches in determining construction project performance in Nigeria (Olanrewaju et al., 2021).

Kenya's construction industry reflects a transition toward more formalized planning practices driven by infrastructure expansion after 2010. Projects under the Big Four Agenda required structured planning tools including work breakdown structures and critical path scheduling. Nevertheless, performance reviews reveal that inadequate stakeholder coordination during planning stages contributed to time overruns exceeding 25 percent in public projects. Planning weaknesses were particularly evident in risk allocation and resource forecasting. Kenya's experience shows that planning quality remains uneven despite institutional reforms (Mwangi & Thiong'o, 2022).

Donor-supported infrastructure development in Uganda has progressively reshaped how construction projects are planned and coordinated. Construction project planning has increasingly incorporated donor-driven planning standards since 2015, particularly in transport and energy projects. Despite improved documentation, project performance has remained inconsistent due to limited planning integration across agencies. Delays in Karuma Hydropower Project highlighted gaps in schedule realism and contractor coordination during early planning. Evaluations linked performance failures to inadequate contingency planning and interface management.

Uganda's case illustrates that planning formality does not automatically translate into performance efficiency (Kigozi & Kulemeka, 2021).

Construction planning approaches have evolved significantly following the establishment of Rwanda Housing Authority in 2010 and the National Construction Policy in 2015. Public and private construction projects increasingly adopt structured planning techniques including detailed scheduling, cost estimation, and risk assessment. Despite these advances, performance audits reveal recurring challenges in project completion timelines and cost adherence. These challenges are often attributed to limited planning capacity at contractor and consultant levels. Rwanda's construction context demonstrates a strong policy foundation but uneven planning execution (Office of the Auditor General, 2022).

Rwanda's emphasis on urban development under Vision 2050 has intensified the demand for effective construction planning approaches. Projects such as road upgrades and public buildings in Kigali require integrated planning across multiple stakeholders and regulatory agencies. However, sector reviews indicate that planning weaknesses persist in scope control and schedule coordination, affecting performance reliability. The gap between planning frameworks and on-site execution remains a critical concern. This study is therefore positioned to examine how specific planning approaches influence construction project performance within Rwanda's evolving construction landscape (MININFRA, 2024).

Despite Rwanda's sustained investment in infrastructure development, performance challenges continue to affect construction projects across public and private sectors. National audit reports consistently show that a significant proportion of construction projects experience delays, cost overruns, or scope changes during implementation. For example, the Office of the Auditor General reported that over 38% of audited infrastructure projects in 2022 were completed behind schedule, largely due to weaknesses in planning and coordination processes (Office of Auditor General, 2022).

Planning deficiencies have remained evident in schedule and scope management across Rwanda's construction sector. Project feasibility studies and work schedules are often prepared under tight timelines, leading to unrealistic activity sequencing and underestimated resource requirements. According to the Ministry of Infrastructure, several road and building projects initiated between 2020 and 2023 required multiple contract variations linked to planning omissions at the design stage (MININFRA, 2023).

Planning documents often failed to reflect realistic implementation conditions, particularly in urban construction projects where regulatory approvals and stakeholder coordination are complex. These planning weaknesses were shown to reduce the effectiveness of performance monitoring during execution phases (Mukamurenzi et al., 2022). It is reported that inaccurate cost forecasting and delayed material procurement contributed directly to time overruns and quality

compromises. These shortcomings were linked to limited use of systematic planning tools during the pre-construction phase (Ndayishimiye & Rwigema, 2023). The study argued that while planning frameworks exist at policy level, their operationalization remains inconsistent at project level. Weak alignment between planning outputs and on-site decision-making reduced the ability to respond to risks and implementation disruptions (Habimana & Uwizeyimana, 2024).

While several studies and institutional reports including Office of Auditor General (2022), MININFRA (2023), Mukamurenzi et al. (2022), Ndayishimiye & Rwigema (2023) and Habimana & Uwizeyimana (2024) have examined construction project performance in Rwanda broadly, no empirical study has specifically focused on the relationship between project planning approaches and performance outcomes within Kigali Innovation City Project. This study will therefore bridge this knowledge gap by systematically examining project planning approaches and their effect on the performance of the Kigali Innovation City Project in Rwanda.

1.1 General Objective

The general objective of this study was to assess the effect of project planning approaches on the performance of the Kigali Innovation City Project in Rwanda.

1.2 Specific Objectives

The specific objectives that guided the study were as follows:

1. To analyse the effect of the risk-based planning approach on the performance of the Kigali Innovation City Project in Gasabo District.
2. To examine the effect of the results-based planning approach on the performance of the Kigali Innovation City Project in Gasabo District.
3. To assess the effect of the participatory planning approach on the performance of the Kigali Innovation City Project in Gasabo District.

2. Literature Review

This section presents the theoretical and empirical literature relevant to project planning approaches and project performance.

2.1 Theoretical Review

The theoretical review explains the theories that underpin the study variables and their relationship with project performance.

2.1.1 Risk Management Theory

Risk Management Theory emerged from decision science and systems engineering, with foundational contributions by Frank H. Knight in 1921 through his work *Risk, Uncertainty and Profit*. Knight distinguished measurable risks from unmeasurable uncertainty, laying the

groundwork for structured risk assessment. The theory was later formalized within project management practice through standards such as ISO 31000, first published in 2009 and revised in 2018. Risk Management Theory focuses on identifying, analyzing, and responding to uncertainties that may affect objectives (Ochieng & Kiarie, 2022).

Risk Management Theory informed the analysis of how risk-based planning approaches affected the performance of the Kigali Innovation City Project. The theory helped assess how early identification and mitigation of risks during planning contributed to improved project outcomes in Gasabo District.

2.1.2 Results-Based Management Theory

Results-Based Management Theory guided the examination of how results-based planning approaches influenced the performance of the Kigali Innovation City Project. The theory supported analysis of how outcome-oriented planning enhanced accountability, efficiency, and achievement of project objectives in Gasabo District.

2.1.3 Participatory Development Theory

Participatory Development Theory was advanced by Robert Chambers in 1983 through his influential work *Rural Development: Putting the Last First*. Chambers argued that development interventions are more sustainable when beneficiaries actively participate in planning and decision-making. The theory challenged top-down planning models by promoting bottom-up approaches that value local knowledge. Participation, empowerment, and dialogue are central pillars of the theory (Shrestha & Shrestha, 2022).

Participatory Development Theory was used to examine how participatory planning approaches influenced the performance of the Kigali Innovation City Project. The theory helped assess how inclusive planning practices improved coordination, acceptance, and effectiveness of project implementation in Gasabo District.

2.2 Empirical Review

The empirical review presents previous studies related to each planning approach and project performance in different contexts.

2.2.1 Risk-Based Planning Approach and Project Performance

In Kenya, Ochieng and Kiarie (2022) analyzed the relationship between risk-based planning and performance of road construction projects funded by the national government. The study adopted a cross-sectional survey design involving 267 project supervisors and engineers. Pearson correlation analysis revealed a significant positive relationship between risk-based planning practices and project performance ($r = 0.67$, $p < .01$). Regression analysis confirmed that risk-based planning accounted for 45 percent of the variation in performance outcomes ($R^2 = 0.45$). Projects that conducted systematic risk assessments during planning

reported 28 percent fewer cost overruns. The study concluded that risk-based planning improves both efficiency and delivery reliability in infrastructure projects.

A Rwandan study by Niyigena and Uwizeyimana (2023) examined risk-based planning practices and performance of donor-funded construction projects in Kigali City. Using a quantitative approach, data were collected from 174 project managers and consultants. Regression results showed that risk-based planning had a statistically significant effect on project performance ($\beta = 0.48$, $p < .01$), with the model explaining 39 percent of performance variance ($R^2 = 0.39$). Projects that integrated risk mitigation measures at the planning stage achieved higher mean performance scores ($M = 4.01$) than those that did not ($M = 3.21$). The authors concluded that risk planning practices in Rwanda were improving but remained inconsistently applied. They recommended formal enforcement of risk-based planning requirements in public procurement frameworks.

2.2.2 Results-Based Planning Approach and Project Performance

Gómez-Cabrera and Ruiz-Martínez (2023) investigated results-based planning practices within municipal construction projects in Spain. The researchers employed a mixed-methods design involving survey data from 187 municipal engineers and project supervisors and supplementary document review. Descriptive statistics showed that projects applying results-based planning recorded a mean performance score of 4.21 out of 5, compared to 3.48 for traditionally planned projects. ANOVA results confirmed statistically significant differences in performance between the two planning approaches ($F = 10.62$, $p < 0.01$). The study established that results-focused planning improves cost control and milestone achievement. It recommended strengthening results-based monitoring frameworks at local government level.

2.2.3 Participatory Planning Approach and Project Performance

A study conducted in Nepal by Shrestha and Shrestha (2022) examined how participatory planning influences the performance of rural infrastructure projects. The study aimed to assess whether community involvement during planning stages improved project delivery outcomes. A quantitative survey design was adopted, collecting data from 284 project committee members and engineers. Correlation analysis revealed a significant positive relationship between participatory planning and project performance ($r = 0.61$, $p < 0.01$). Regression results indicated that participatory planning explained 38 percent of the variance in project performance ($R^2 = 0.38$). The study concluded that early and continuous stakeholder participation enhanced ownership and reduced implementation delays.

Lindgren and Packendorff (2023) investigated participatory planning practices within public construction and urban renewal projects in Sweden. The objective was to determine how inclusive planning

affected cost control and schedule performance. The researchers used a mixed-methods design, combining survey data from 198 project professionals with document review. Quantitative findings showed that projects with high participatory planning scored higher performance ratings (mean = 4.26) compared to low-participation projects (mean = 3.41). ANOVA results confirmed statistically significant differences in performance outcomes ($F = 10.87$, $p < 0.01$). The study recommended institutionalizing participatory mechanisms in public-sector project planning.

Nshimiyimana and Kayigamba (2024) examined participatory planning and performance of construction projects under district development programs in Rwanda. The study adopted a descriptive-correlational design using a sample of 189 technical staff and local leaders. Findings showed that participatory planning had a positive and significant correlation with project performance ($r = 0.63$, $p < 0.01$). The regression model explained 40 percent of the variation in performance outcomes ($R^2 = 0.40$), particularly in timely completion and quality standards. Projects with low participation experienced higher levels of community resistance. The authors concluded that participatory planning is a critical driver of sustainable project performance in Rwanda.

3. Methodology

This section presents the research design, study population, sampling procedures, data collection instruments, pilot testing, data analysis methods, and ethical considerations applied in the study.

3.1 Research Design

This study adopted a descriptive and correlational research design. The design allowed the study to describe existing planning practices while examining relationships between planning approaches and project performance. It supported hypothesis testing using quantitative techniques and therefore provided both descriptive and analytical value.

3.2 Study Population

The population comprised 389 project managers, engineers, planners, field officers, and stakeholders involved in the Kigali Innovation City Project. These individuals were selected because of their direct involvement in planning and implementation activities. The population provided informed and relevant data for the study, thereby strengthening the accuracy of the findings.

3.3 Sampling Design

This study used stratified and simple random sampling techniques. Stratification ensured representation of all stakeholder groups. Simple random sampling provided equal selection chances. This combination enhanced sample reliability.

3.4 Data Collection Instrument

Questionnaires were used to collect primary data on planning approaches and project performance. They contained Likert-scale questions that allowed measurement of respondents’ perceptions and practices. The instrument supported subsequent regression analysis.

Secondary data were obtained from project reports, policy documents, and official records. These sources complemented the primary data and supported interpretation of the findings, thereby improving the credibility of the results.

3.5 Pilot Study, Validity and Reliability

A pilot study was conducted before the main data collection exercise to test the suitability of the research instruments. The pilot study involved 20 respondents, representing approximately 10% of the computed sample size, who were drawn from similar institutions and stakeholder groups but were not included in the final study sample to avoid contamination of the results. Findings from the pilot study were used to identify

ambiguities, inconsistencies, or poorly structured items in the data collection tools. Based on the feedback and preliminary analysis, necessary revisions were made to improve the wording, sequencing, and alignment of questions with the study objectives.

Validity was ensured through expert review and alignment with the study objectives. The instruments were checked for content relevance, and expert feedback guided their refinement to support accurate measurement. In addition, the Content Validity Index (CVI) was used to assess content validity quantitatively. Each item in the research instruments was rated by experts for relevance, and the CVI was calculated by dividing the number of items rated as relevant by the total number of items. A CVI value of 0.70 or above was considered acceptable, indicating that the instruments sufficiently represented the constructs under study.

Reliability was tested using Cronbach’s alpha coefficient, with a threshold of 0.70. Any instrument failing to meet the threshold was revised to ensure adequate internal consistency.

Table 1: Reliability Results

Variables	N of Items	Cronbach's Alpha
Risk-Based Planning Approach	5	.838
Results-Based Planning Approach	5	.852
Participatory Planning Approach	5	.831
Project Performance	5	.844

Source: Field Data, July 2026

The reliability results show that all study variables recorded Cronbach's Alpha coefficients above 0.70, which confirms acceptable internal consistency of the questionnaire items. The coefficients ranged from 0.831 to 0.852, indicating that the items used to measure each construct were consistent and dependable for further statistical analysis.

3.6 Data Analysis

Descriptive statistics were used to summarise and describe the characteristics of the collected quantitative data. Measures of central tendency, specifically the mean, were computed to determine the average response level for each indicator related to project planning approaches and project performance. Measures of dispersion, particularly the standard deviation, were calculated to assess the degree of variability or consistency among respondents’ views. Mean scores were interpreted using the following intervals: 1.00–1.80 = Very Low, 1.81–2.60 = Low, 2.61–3.40 = Moderate, 3.41–4.20 = High, and 4.21–5.00 = Very High, while standard deviation values were used to explain the level of homogeneity (<0.50) or heterogeneity (>0.50) of responses. This approach provided a clear overview of patterns and tendencies within the dataset before further statistical tests were conducted.

Inferential statistics were applied to examine relationships and determine the effect of project planning approaches

on project performance. Pearson correlation analysis was conducted to establish the strength and direction of relationships between the independent variables and the dependent variable. Multiple regression analysis was then employed to assess the combined and individual influence of risk-based planning, results-based planning, and participatory planning approaches on project performance. Regression coefficients, R-square values, and significance levels were used to explain the magnitude, explanatory power, and statistical significance of each relationship. This analysis supported hypothesis testing and allowed the study to draw evidence-based conclusions about the influence of planning approaches on project performance.

The regression equation took the following form:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Y: Project Performance

X1: Risk-based Planning Approach

X2: Results-based Planning Approach

X3: Participatory Planning Approach

β_0 : Constant term

β_1 – β_3 : Regression coefficients

ϵ : Error term

3.7 Ethical Considerations

Ethical principles were strictly observed throughout the research process to protect the rights and well-being of all participants. Informed consent was obtained from each respondent after clearly explaining the purpose of the study, the nature of participation, and the right to

withdraw at any stage without consequences. Confidentiality was ensured through strict privacy measures, including secure storage of completed questionnaires and restricted access to electronic data. Anonymity was maintained by avoiding personal identifiers such as names or institutional identification numbers in data analysis and reporting. These ethical measures promoted compliance with academic research standards and enhanced the credibility and integrity of the study findings.

4. Results and Discussion

This section presents the quantitative findings, hypothesis decisions, and discussion of the results according to the study objectives.

4.1 Response Rate

Response rate is important because it shows the level of participation of selected respondents in the study. A high response rate improves the reliability of the study findings because it reduces the risk of non-response bias. In this study, questionnaires were distributed to project managers, engineers, planners, field officers, and stakeholders involved in Kigali Innovation City Project. The results are presented according to complete returned questionnaires, incomplete returned questionnaires, and unreturned questionnaires.

Table 2: Response Rate

Questionnaires	Frequency	Percentage (%)
Returned Complete	188	95.4
Returned Incomplete	5	2.5
Unreturned	4	2.0
Total	197	100.0

Source: Primary Data, July 2026

The findings in Table 2 present the response rate for questionnaires distributed to respondents involved in the Kigali Innovation City Project. The findings show that 188 questionnaires, representing 95.4%, were returned complete and used for analysis, which provided a strong basis for the study findings. Incomplete returned questionnaires were 5, representing 2.5%, while unreturned questionnaires were 4, representing 2.0%, showing a low level of non-response. This high response rate means that the views analyzed in the study were sufficiently representative of the targeted respondents and suitable for drawing conclusions on project planning approaches and project performance.

4.2 Correlation Analysis

Correlation analysis was conducted to determine the direction, strength and statistical significance of the relationship between each project planning approach and the performance of the Kigali Innovation City Project in Gasabo District. Pearson correlation was used because the variables were measured using scale data and the normality test confirmed that the variables were suitable for parametric analysis.

Table 3: Correlation Analysis Results

		Risk-Based Planning Approach	Results-Based Planning Approach	Participatory Planning Approach	Project Performance
Risk-Based Planning Approach	Pearson	1	.927**	.924**	.917**
	Correlation				
	Sig. (2-tailed)		.000	.000	.000
Results-Based Planning Approach	N	188	188	188	188
	Pearson	.927**	1	.922**	.941**
	Correlation				
Participatory Planning Approach	Sig. (2-tailed)	.000		.000	.000
	N	188	188	188	188
	Pearson	.924**	.922**	1	.915**
Project Performance	Correlation				
	Sig. (2-tailed)	.000	.000		.000
	N	188	188	188	188
	Pearson	.917**	.941**	.915**	1
	Correlation				
	Sig. (2-tailed)	.000	.000	.000	
	N	188	188	188	188

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

The results in Table 3 present the correlation analysis between project planning approaches and the performance of the Kigali Innovation City Project. The risk-based planning approach had a strong positive and statistically significant relationship with project performance, as shown by Pearson correlation coefficient of 0.917 and significance value of 0.000. Since the significance value was below 0.05, the relationship was statistically significant. This means that stronger application of risk-based planning approach was associated with better the performance of the Kigali Innovation City Project in Gasabo District.

The results-based planning approach had a strong positive and statistically significant relationship with project performance. The Pearson correlation coefficient was 0.941, while the significance value was 0.000, which was below the 0.05 level of significance. This indicates that improvement in results-based planning approach was associated with improvement in project performance. The finding shows that defining outputs, aligning outcomes, setting performance indicators and tracking results were closely linked with the performance of the Kigali Innovation City Project.

Participatory planning approach also had a strong positive and statistically significant relationship with project performance. The Pearson correlation coefficient was 0.915, with a significance value of 0.000, which was lower than 0.05. This means that stakeholder inclusion,

consultations, participation in planning decisions, community input and shared ownership were positively related to the performance of the Kigali Innovation City Project. The finding confirms that participatory planning was an important factor associated with improved project performance.

The correlation findings show that all three project planning approaches had strong positive and statistically significant relationships with project performance. Results-based planning approach recorded the strongest relationship with project performance, followed by risk-based planning approach and participatory planning approach. This indicates that strengthening planning approaches is associated with better the performance of the Kigali Innovation City Project in terms of scope, quality, time, cost and achievement of intended objectives.

4.3 Regression Analysis

Regression analysis was conducted to determine the effect of risk-based planning approach, results-based planning approach and participatory planning approach on the performance of the Kigali Innovation City Project in Gasabo District. The model summary was used to show the explanatory power of the independent variables, the ANOVA table was used to test the overall fitness of the regression model, and the coefficients table was used to determine the individual effect of each planning approach on project performance.

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.951 ^a	.905	.904	.084725966	2.036
a. Predictors: (Constant), Participatory Planning Approach, Results-Based Planning Approach, Risk-Based Planning Approach					
b. Dependent Variable: Project Performance					

Source: Primary Data, July 2026

The results in Table 4 present the model summary for the effect of project planning approaches on the performance of the Kigali Innovation City Project. The R value of 0.951 shows a very strong relationship between risk-based planning approach, results-based planning approach, participatory planning approach and project performance. The R Square value of 0.905 indicates that the three planning approaches explained 90.5% of the variation in project performance. This means that only

9.5% of the variation in project performance was explained by other factors not included in the model. The Durbin-Watson value of 2.036 was close to 2, indicating that there was no serious autocorrelation problem in the regression model. This confirms that the model was suitable for explaining the effect of project planning approaches on the performance of the Kigali Innovation City Project.

Table 5: ANOVA Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.605	3	4.202	600.286	.000 ^b
	Residual	1.321	184	.007		
	Total	13.926	187			
a. Dependent Variable: Project Performance						
b. Predictors: (Constant), Participatory Planning Approach, Results-Based Planning Approach, Risk-Based Planning Approach						

Source: Primary Data, July 2026

The results in Table 5 present the ANOVA results for the regression model on project planning approaches and the

performance of the Kigali Innovation City Project. The F value was 600.286, showing that the regression model had strong explanatory power. The significance value was

0.000, which was below the 0.05 level of significance. This means that the overall regression model was statistically significant. The findings indicate that risk-based planning approach, results-based planning approach and participatory planning approach jointly had

a significant effect on project performance. Therefore, the regression model was appropriate for predicting the performance of the Kigali Innovation City Project using the three project planning approaches.

Table 6: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	.108	.091		1.187	.241		
Risk-Based Planning Approach	.190	.062	.212	3.065	.002	.109	9.175
Results-Based Planning Approach	.511	.065	.539	7.862	.000	.111	9.014
Participatory Planning Approach	.204	.062	.222	3.290	.001	.116	8.645

a. Dependent Variable: Project Performance

Source: Primary Data, July 2026

The adopted model for analysis was structured as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where:

Y = Project Performance

β_0 = Constant

β_1 , β_2 and β_3 = Regression coefficients

X1 = Risk-Based Planning Approach

X2 = Results-Based Planning Approach

X3 = Participatory Planning Approach

ε = Error term

Based on the coefficients, the fitted regression model was:

$$\text{Project Performance} = 0.108 + 0.190(\text{Risk-Based Planning Approach}) + 0.511(\text{Results-Based Planning Approach}) + 0.204(\text{Participatory Planning Approach}) + \varepsilon$$

The results in Table 6 present the coefficients for the individual effect of project planning approaches on the performance of the Kigali Innovation City Project. The risk-based planning approach had a positive unstandardized coefficient of 0.190, meaning that a one-unit increase in risk-based planning approach would increase project performance by 0.190 units, holding other planning approaches constant. The t value of 3.065 showed that the effect was strong enough to contribute to the model. The significance value was 0.002, which was below 0.05, meaning that the effect was statistically significant. The tolerance value of 0.109 and VIF of 9.175 showed that multicollinearity was within the acceptable limit, although the value was high. Therefore, the null hypothesis stating that there is no significant effect of risk-based planning approach on the performance of the Kigali Innovation City Project in Gasabo District was rejected.

The results-based planning approach had a positive unstandardized coefficient of 0.511. This means that a one-unit increase in results-based planning approach would increase project performance by 0.511 units, holding risk-based planning approach and participatory planning approach constant. The t value of 7.862 indicated a strong contribution of results-based planning approach to project performance. The significance value

was 0.000, which was below 0.05, showing that the effect was statistically significant. The tolerance value of 0.111 and VIF of 9.014 indicated that multicollinearity was acceptable for the regression model. Therefore, the null hypothesis stating that there is no significant effect of results-based planning approach on the performance of the Kigali Innovation City Project in Gasabo District was rejected.

The participatory planning approach had a positive unstandardized coefficient of 0.204. This means that a one-unit increase in participatory planning approach would increase project performance by 0.204 units, holding other planning approaches constant. The t value of 3.290 showed that participatory planning approach made a meaningful contribution to the regression model. The significance value was 0.001, which was below 0.05, indicating that the effect was statistically significant. The tolerance value of 0.116 and VIF of 8.645 showed that collinearity statistics were within the acceptable range. Therefore, the null hypothesis stating that there is no significant effect of participatory planning approach on the performance of the Kigali Innovation City Project in Gasabo District was rejected.

This model indicates that all three planning approaches had positive effects on the performance of the Kigali Innovation City Project. The results-based planning approach had the largest contribution, followed by participatory planning approach and risk-based planning approach. Since all significance values were below 0.05, all predictors had statistically significant effects on project performance. This means that improving planning through risk identification, results orientation and stakeholder participation can improve the performance of the Kigali Innovation City Project in Gasabo District.

4.4 Decision on Null Hypotheses

This section presents decisions on the null hypotheses developed from the specific objectives of the study. The decisions were based on regression coefficients, t values and significance values at the 0.05 level of significance. A null hypothesis was rejected when the significance

value was below 0.05, meaning that the independent variable had a statistically significant effect on project performance.

Table 7: Decision on Null Hypotheses

Null Hypothesis	Sig.	Decision
H ₀ 1: There is no significant effect of risk based planning approach on performance of Kigali Innovation city Project in Gasabo District.	.002	Rejected
H ₀ 2: There is no significant effect of results based planning approach on performance of Kigali Innovation city Project in Gasabo District.	.000	Rejected
H ₀ 3: There is no significant effect of participatory planning approach on performance of Kigali Innovation city Project in Gasabo District.	.001	Rejected

Source: Primary Data, July 2026

The results in Table 7 present the decisions on the null hypotheses of the study. The first null hypothesis was rejected because risk-based planning approach had a significance value of 0.002, which was below 0.05. This means that risk-based planning approach had a statistically significant effect on the performance of the Kigali Innovation City Project in Gasabo District.

The second null hypothesis was rejected because results-based planning approach had a significance value of 0.000, which was below the 0.05 level of significance. This shows that results-based planning approach had a statistically significant effect on project performance. The finding indicates that planning based on outputs, outcomes, indicators and performance tracking was important in improving the performance of the Kigali Innovation City Project.

The third null hypothesis was rejected because participatory planning approach had a significance value of 0.001, which was below 0.05. This means that participatory planning approach had a statistically significant effect on the performance of the Kigali Innovation City Project in Gasabo District. The finding shows that stakeholder inclusion, consultation, community input and shared ownership contributed significantly to project performance.

Therefore, all three null hypotheses were rejected. This means that risk-based planning approach, results-based planning approach and participatory planning approach each had a statistically significant effect on the performance of the Kigali Innovation City Project. Among the three predictors, results-based planning approach had the strongest effect, followed by participatory planning approach and risk-based planning approach.

4.5 Discussion of Findings

The findings are discussed according to the three specific objectives and compared with relevant empirical evidence reviewed in the study.

4.5.1 Risk-Based Planning Approach and Project Performance

Correlation results showed that the risk-based planning approach had a strong positive and statistically significant relationship with project performance, with Pearson correlation coefficient of 0.917 and significance value of 0.000. Regression findings further revealed that the risk-based planning approach had a positive and statistically significant effect on project performance, with B = 0.190, t = 3.065 and p = 0.002. This means that improvement in risk-based planning increased the performance of the Kigali Innovation City Project. Therefore, the null hypothesis stating that there is no significant effect of risk-based planning approach on the performance of the Kigali Innovation City Project in Gasabo District was rejected.

A Rwandan study by Niyigena and Uwizeyimana (2023) examined risk-based planning practices and performance of donor-funded construction projects in Kigali City. Using a quantitative approach, data were collected from 174 project managers and consultants. Regression results showed that risk-based planning had a statistically significant effect on project performance ($\beta = 0.48$, $p < .01$), with the model explaining 39 percent of performance variance ($R^2 = 0.39$). Projects that integrated risk mitigation measures at the planning stage achieved higher mean performance scores ($M = 4.01$) than those that did not ($M = 3.21$). The authors concluded that risk planning practices in Rwanda were improving but remained inconsistently applied. They recommended formal enforcement of risk-based planning requirements in public procurement frameworks.

In Kenya, Ochieng and Kiarie (2022) analyzed the relationship between risk-based planning and performance of road construction projects funded by the national government. The study adopted a cross-sectional survey design involving 267 project supervisors and engineers. Pearson correlation analysis revealed a significant positive relationship between risk-based planning practices and project performance ($r = 0.67$, $p < .01$). Regression analysis confirmed that risk-based planning accounted for 45 percent of the variation in performance outcomes ($R^2 = 0.45$). Projects that conducted systematic risk assessments during planning

reported 28 percent fewer cost overruns. The study concluded that risk-based planning improves both efficiency and delivery reliability in infrastructure projects.

4.5.2 Results-Based Planning Approach and Project Performance

Correlation findings revealed that results-based planning approach had a strong positive and statistically significant relationship with project performance, with Pearson correlation coefficient of 0.941 and significance value of 0.000. Regression results showed that results-based planning approach had the strongest positive and statistically significant effect on project performance, with $B = 0.511$, $t = 7.862$ and $p = 0.000$. This indicates that results-based planning was the most influential predictor of the performance of the Kigali Innovation City Project. Therefore, the null hypothesis stating that there is no significant effect of results-based planning approach on the performance of the Kigali Innovation City Project in Gasabo District was rejected.

Gómez-Cabrera and Ruiz-Martínez (2023) investigated results-based planning practices within municipal construction projects in Spain. The researchers employed a mixed-methods design involving survey data from 187 municipal engineers and project supervisors and supplementary document review. Descriptive statistics showed that projects applying results-based planning recorded a mean performance score of 4.21 out of 5, compared to 3.48 for traditionally planned projects. ANOVA results confirmed statistically significant differences in performance between the two planning approaches ($F = 10.62$, $p < 0.01$). The study established that results-focused planning improves cost control and milestone achievement. It recommended strengthening results-based monitoring frameworks at local government level.

4.5.3 Participatory Planning Approach and Project Performance

Correlation results indicated that participatory planning approach had a strong positive and statistically significant relationship with project performance, with Pearson correlation coefficient of 0.915 and significance value of 0.000. Regression findings showed that participatory planning approach had a positive and statistically significant effect on project performance, with $B = 0.204$, $t = 3.290$ and $p = 0.001$. This means that stakeholder inclusion and participation in planning contributed to improved project performance. Therefore, the null hypothesis stating that there is no significant effect of participatory planning approach on the performance of the Kigali Innovation City Project in Gasabo District was rejected.

Nshimyimana and Kayigamba (2024) examined participatory planning and performance of construction projects under district development programs in Rwanda. The study adopted a descriptive-correlational design using a sample of 189 technical staff and local leaders. Findings showed that participatory planning had a positive and significant correlation with project

performance ($r = 0.63$, $p < 0.01$). The regression model explained 40 percent of the variation in performance outcomes ($R^2 = 0.40$), particularly in timely completion and quality standards. Projects with low participation experienced higher levels of community resistance. The authors concluded that participatory planning is a critical driver of sustainable project performance in Rwanda.

A study conducted in Nepal by Shrestha and Shrestha (2022) examined how participatory planning influences the performance of rural infrastructure projects. The study aimed to assess whether community involvement during planning stages improved project delivery outcomes. A quantitative survey design was adopted, collecting data from 284 project committee members and engineers. Correlation analysis revealed a significant positive relationship between participatory planning and project performance ($r = 0.61$, $p < 0.01$). Regression results indicated that participatory planning explained 38 percent of the variance in project performance ($R^2 = 0.38$). The study concluded that early and continuous stakeholder participation enhanced ownership and reduced implementation delays.

5. Conclusions and Recommendations

This section presents the conclusions drawn from the findings and the recommendations proposed on the basis of the study results.

5.1 Conclusions

The conclusions are presented according to the three project planning approaches examined in the study.

The study concludes that risk-based planning approach had a significant effect on the performance of the Kigali Innovation City Project in Gasabo District. Risk identification, risk prioritisation, mitigation planning, risk monitoring and timely risk response improved project performance. This implies that effective management of risks during the planning stage strengthened the ability of the project to achieve its intended scope, quality, time and cost expectations.

The study also concludes that results-based planning approach had a significant effect on the performance of the Kigali Innovation City Project in Gasabo District. Planning based on expected outputs, targeted outcomes, performance indicators and tracking mechanisms improved project performance. This shows that projects perform better when planning decisions are guided by clearly defined results rather than only by activity completion.

The study further concludes that participatory planning approach had a significant effect on the performance of the Kigali Innovation City Project in Gasabo District. Stakeholder inclusion, planning consultations, community input and shared ownership improved project performance. This means that involving relevant actors in planning increased commitment, coordination and support for project implementation.

The study concludes that project planning approaches are important determinants of the performance of the Kigali Innovation City Project. The findings confirmed that risk-based planning, results-based planning and participatory planning all contributed positively to project performance. Therefore, effective project planning should combine risk management, results orientation and stakeholder participation to improve project outcomes.

5.2 Recommendations

Based on the study findings and conclusions, the following recommendations are proposed to strengthen project planning and improve the performance of the Kigali Innovation City Project.

1. Kigali Innovation City Project management should strengthen risk identification during the planning stage.
2. Project planners should improve risk prioritisation practices by ranking risks according to their possible effect on cost, time, quality and scope.
3. The project management team should develop clear mitigation plans for all high-priority risks.
4. Stakeholder participation should be strengthened through regular planning consultations with relevant institutions, community representatives, technical teams and beneficiaries.
5. Project management should ensure that stakeholder views are considered in major planning decisions related to scope, scheduling and resource allocation.

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