



Effect of Project Scheduling on Cost Overruns in Public Infrastructure Projects in Rwanda. A Case of Nyabisindu–Nyagatovu Road Upgrading Project

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Abstract: The purpose of this study is to assess the effect of project scheduling on cost overruns of Nyabisindu–Nyagatovu Road Upgrading Project. Descriptive and correlational research design was employed, utilizing both quantitative and qualitative approaches to gather comprehensive data. The target population consisted of 260 professionals involved in the project, from which a sample size of 155 respondents was selected using Krejcie and Morgan sample and stratified sampling. Data collection tools included documentation, structured questionnaires and interview guides, with analysis performed using SPSS Version 29. Descriptive statistics such as means and standard deviations was calculated, while inferential analysis, including multiple regression, tested the research hypotheses. Findings showed that communication scheduling had a significant effect on cost overruns of Nyabisindu–Nyagatovu Road Upgrading Project ($\beta = 0.257$, $t = 5.039$, $p = 0.000$), resource allocation had a significant effect on cost overruns ($\beta = 0.285$, $t = 5.377$, $p = 0.000$), coordination had a significant effect on cost overruns ($\beta = 0.136$, $t = 2.720$, $p = 0.007$), and evaluation scheduling had a significant effect on cost overruns ($\beta = 0.282$, $t = 4.780$, $p = 0.000$). The study concluded that project scheduling significantly influenced cost overruns of Nyabisindu–Nyagatovu Road Upgrading Project in Gasabo District. The study recommended that the management of Nyabisindu–Nyagatovu Road Upgrading Project should strengthen communication scheduling, resource allocation, coordination, and evaluation scheduling to improve cost control and reduce unnecessary cost increases.

Keywords: Project Scheduling, Cost Overruns, Communication Scheduling, Resource Allocation, Stakeholder Coordination and Evaluation Scheduling

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1. Introduction

The construction industry in Rwanda faces a significant challenge regarding the financial sustainability of its infrastructure projects, with cost overruns becoming an almost expected outcome. Many high-profile developments fail to meet their initial budget targets, leading to the reallocation of public funds and the delay of other essential services. Data from the Rwanda Housing Authority indicates that approximately 40% of

public building projects experience cost escalations exceeding 15% of the original contract sum. These figures highlight a systemic inability to contain expenditures within planned limits, regardless of the project's scale or complexity (Nshimiyimana, 2022).

Several infrastructure initiatives have reported significant budget variances that stalled progress for months. For instance, the Mpazi channel construction project faced financial hurdles that necessitated additional funding mid-way through execution to cover

unforeseen operational costs. These instances provide a quantitative proof that the current management of project expenditures in Rwanda is insufficient to prevent the frequent occurrence of budget creep (Igihozo & Irechukwu, 2022).

Reports on regional infrastructure performance suggest that Rwanda's rate of cost overruns is higher than several of its neighbors due to the high cost of imported construction inputs. When projects fail to perform financially, the immediate result is a reduction in the scope of work or a compromise in the quality of materials used to stay within revamped budget constraints (Amanya & Njenga, 2022). Rwanda's annual average inflation rate rose to 13.9% in 2022 and 14.0% in 2023, before easing to 4.8% in 2024; this means many ongoing projects were implemented during a period of strong price pressure. Government budgeting documents also acknowledge that public investment projects in Rwanda are exposed to cost overruns and state that the expenditure baseline already includes verified cost overruns for ongoing projects (National Institute of Statistics of Rwanda, 2024).

None of the mentioned studies have specifically focused on the Nyabisindu–Nyagatovu Road Upgrading Project regarding the nexus between project scheduling and cost overruns. Current literature often generalizes across the entire construction sector without addressing the unique pressures of public infrastructure. This study bridged that gap of knowledge by providing a detailed analysis of how scheduling directly influence the cost overruns of the project in infrastructure project.

The general objective of this study is to assess the effect of project scheduling on cost overruns of Nyabisindu–Nyagatovu Road Upgrading Project in Gasabo District.

To achieve the general objective, the study pursued the following specific objectives:

1. To examine the effect of communication scheduling on cost overruns of Nyabisindu–Nyagatovu Road Upgrading Project.
2. To evaluate effect of resource allocation on cost overruns of Nyabisindu–Nyagatovu Road Upgrading Project.
3. To assess effect of coordination on cost overruns of Nyabisindu–Nyagatovu Road Upgrading Project.
4. To examine effect of evaluation scheduling on cost overruns of Nyabisindu–Nyagatovu Road Upgrading Project.

2. Literature Review

2.1 Theoretical Review

This section presents the key theories that underpin the study and provide a conceptual foundation for understanding the relationship between the independent

and dependent variables. It highlights relevant theoretical perspectives that explain how project scheduling practices influence cost overruns.

2.1.1 Project Management Theory

Project Management Theory focuses on the application of specialized knowledge, skills, and tools to project activities to meet specific requirements within defined constraints of time, cost, and quality. It is a multidimensional field that draws from systems theory, organizational behavior, and quantitative methods to provide a structured approach to work. The theory emphasizes that every project is a unique, temporary endeavor with a clear beginning and end, requiring its own tailored management structure. Central to this theory is the concept of the project lifecycle, which involves the phases of initiation, planning, execution, monitoring, and closure. Each phase requires specific management interventions to ensure that the project remains aligned with its original objectives and budget (Gebrel *et al.*, 2021).

The theory highlights the critical importance of the triple constraint time, cost, and quality and the inherent trade-offs that project managers must navigate. A delay in the project schedule inevitably exerts upward pressure on the budget unless quality or scope is reduced to compensate. This theoretical relationship is the core of our investigation into how poor scheduling practices directly translate into financial overruns. Project Management Theory provides the tools, such as the Critical Path Method (CPM), that allow managers to visualize these dependencies and manage them proactively. It posits that a failure to master these tools leads to a loss of project control and subsequent financial failure (Oluseye (2024).

Project Management Theory has evolved to include agile and lean methodologies that focus on minimizing waste and increasing the speed of delivery. These approaches emphasize the value of continuous evaluation and stakeholder feedback throughout the project lifecycle to prevent the accumulation of errors. The theory also stresses the importance of human factors, such as leadership and communication, in the successful execution of technical tasks. Research shows that projects that adhere to formal management theories are significantly more likely to meet their financial targets (Shah *et al.*, 2023).

The study applied Project Management Theory to examine the effect of communication scheduling on cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. This theory emphasizes structured planning, timely information flow, and coordination of project activities as key determinants of project success.

2.1.2 Resource-Based View (RBV) Theory

The Resource Based View (RBV) theory, originally popularized by Barney in 1991, posits that a firm's competitive advantage and performance are derived from its control over unique, valuable, and non-substitutable resources. In the context of project management, these resources encompass not only tangible assets like machinery and funding but also intangible ones such as technical expertise and internal scheduling processes. The theory suggests that a firm's ability to coordinate these disparate resources is what ultimately determines its success in a competitive market. RBV emphasizes that the internal strengths of an organization are more important than external market forces in predicting performance. In construction projects, the resource-based view highlights that the project team's collective skill in managing time and inputs is a strategic asset (Ahmed & Arocho, 2021).

The study was guided by the Resource-Based View (RBV) Theory to evaluate the effect of resource allocation on cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. RBV Theory focuses on the strategic utilization of organizational resources such as labor, materials, and equipment to achieve optimal performance.

2.1.3 Agency Theory

Agency Theory, initially advanced by Jensen and Meckling in 1976, explores the relationship between principals (such as project owners or the Government of Rwanda) and agents (such as contractors or project managers) who are engaged to perform a service on their behalf. The theory addresses two primary problems: the conflict of goals between the principal and the agent, and the difficulty the principal faces in verifying what the agent is actually doing. In construction, this often manifests as information asymmetry, where the contractor possesses more technical knowledge about site delays and resource usage than the client. This gap in information can lead to moral hazard, where agents prioritize their own profit over the project's budget adherence. Agency Theory emphasizes that without robust monitoring and aligned incentives, the agent may not act in the best interest of the principal (Xie *et al.*, 2022).

The study adopted Agency Theory to assess the effect of coordination on cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. Agency Theory explains the relationship between principals and agents, emphasizing issues such as information asymmetry, conflicting interests, and lack of accountability.

2.1.4 Systems Theory

Systems Theory, popularized by Ludwig von Bertalanffy in the 1960s, views an organization or a project as a complex set of interrelated and interdependent parts that work together to achieve a common goal. The theory

posits that the whole is greater than the sum of its parts and that a change in one component of the system would inevitably affect the performance of all other components. In the context of a construction project, the system includes the technical work, the financial resources, the human personnel, and the external regulatory environment. Systems Theory emphasizes the importance of feedback loops and inputs-outputs to maintain the stability and health of the project environment (Owusu *et al.*, 2021).

The study utilized Systems Theory to examine the effect of evaluation scheduling on cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. Systems Theory views a project as an interconnected system where all components must function cohesively for optimal performance.

2.2 Empirical Review

The empirical literature review provides a critical examination of previous research findings, methodologies, and conclusions related to the variables under study.

2.2.1 Communication Scheduling and Cost Overruns of Projects

Omran *et al.* (2023) conducted a quantitative study in Malaysia titled Factors causing time and cost overruns of construction projects in Malaysia, involving a sample of 120 industry professionals. The researchers utilized the Relative Importance Index (RII) and regression analysis to rank the primary drivers of budget slippage in building projects. The study found that a lack of scheduled communication among stakeholders was ranked as the fourth most significant cause of overruns, contributing to an average budget variance of 18.5%. The findings indicated that delays in approving design changes due to poor communication frequency directly caused site-level stoppages. The conclusion emphasized that consistent information flow is critical for maintaining project momentum in the Asian market. The study recommended that contractors implement mandatory bi-weekly coordination meetings and use digital communication platforms to synchronize project updates and reduce rework.

Shah *et al.* (2023) examined the effects of project management practices on cost overruns in construction projects through a structured survey of 150 project managers in Pakistan. The study's methodology focused on correlation analysis and the Interpretive Structural Modeling (ISM) approach to identify the interdependencies between management variables. Key results showed a significant positive correlation ($r = 0.62$, $p < 0.05$) between irregular communication schedules and the occurrence of unforeseen site expenses. The researchers noted that projects without a pre-defined

communication plan experienced 30% more rework compared to those with structured intervals. The study concluded that communication is the primary mechanism through which management control is exercised. The recommendation provided was for the institutionalization of standardized communication protocols in all public sector infrastructure projects to improve financial transparency.

2.2.2 Resource Allocation and Cost Overruns of Projects

Alshihri *et al.* (2022) examined the risk factors that lead to time and cost overruns of building projects in Saudi Arabia using a survey of 150 project professionals. The methodology involved the use of Structural Equation Modeling (SEM) to test the impact of resource management on financial performance metrics. The results indicated that poor resource allocation was the most significant driver of budget variances, with a correlation coefficient of 0.68. The study highlighted that the late arrival of specialized machinery was responsible for a 20% increase in total site overheads due to idle labor. The conclusion drawn was that strategic resource timing is essential for maintaining the financial health of Gulf-based projects. It was recommended that contractors use automated scheduling tools to synchronize material deliveries with the physical work progress.

Abbas *et al.* (2024) conducted a study on Decreasing costs over time in construction projects in Pakistan through a quantitative analysis of 100 infrastructure projects. The methodology focused on analyzing the relationship between resource leveling and the reduction of waste-related costs during the execution phase. Key findings showed that projects with optimized resource allocation plans achieved a 15% reduction in total expenditure compared to projects with informal management. The researcher used mean score analysis to demonstrate that labor productivity is directly tied to the availability of the right tools at the right time. The study concluded that financial resource scheduling is as critical as physical resource timing in preventing project abandonment. The recommendation was for firms to adopt lean construction principles to minimize the financial impact of resource misallocation.

2.2.3 Stakeholder Coordination and Cost Overruns of Projects

Owusu *et al.* (2021) conducted a study titled Tackling corruption in urban infrastructure procurement in Hong Kong, focusing on the role of stakeholder coordination in project performance. The methodology involved a dynamic evaluation of 180 project cases using a mixed-methods approach to identify the drivers of cost inflation. The findings indicated that a lack of coordination between regulatory bodies and contractors resulted in

approval delays that added 12% to the total project cost. The study demonstrated that conflict resolution mechanisms are essential for preventing legal disputes that drain project financial reserves. The conclusion emphasized that stakeholder management is a critical governance function that protects the public interest in large-scale urban projects. It was recommended that project managers adopt collaborative partnering models to align the incentives of all stakeholders from the start.

Álvarez-Pozo *et al.* (2024) investigated the causes of delays and cost overruns in turnkey industrial projects in Spain through a comprehensive analysis of 50 project case studies. The study utilized a quantitative methodology to assess the impact of stakeholder misalignment on the profitability and sustainability of industrial infrastructure. The results showed that technical coordination failures between the engineering team and the construction sub-contractors were responsible for 18% of the total budget overruns. The study specifically highlighted that design changes requested by stakeholders' mid-way through execution were the most expensive source of financial deviation. The conclusion was that a frozen design phase and early stakeholder sign-off are vital for budget control in complex industrial builds. The recommendation was for the use of Building Information Modeling (BIM) to facilitate real-time coordination among all technical parties.

2.2.4 Evaluation Scheduling and Cost Overruns of Projects

Steininger *et al.* (2021) investigated cost overruns and delays in large-scale infrastructure through a detailed case study of the Stuttgart 21 rail project in Germany. The methodology involved a longitudinal analysis of project performance reports and financial audits conducted over a ten-year period. The findings revealed that infrequent evaluation schedules allowed technical errors and budget deviations to accumulate for years before they were detected. The study found that by the time a formal evaluation was conducted, the cost overrun had already reached 200% of the original budget. The conclusion was that continuous, real-time evaluation is essential for preventing the catastrophic financial failure of megaprojects. The study recommended that the German public sector should adopt mandatory quarterly independent audits for all high-value infrastructure investments to ensure transparency and accountability.

Belay and Torp (2023) conducted a study on construction cost performance under the quality-gated framework in Norway, analyzing the cases of road construction projects. The methodology focused on the Quality Gate system, where projects must pass formal evaluations at specific milestones before additional funding is released. Key results showed that projects following this rigorous evaluation schedule were 40% more likely to stay within

their allocated budget compared to those using traditional methods. The study highlighted that the gatekeepers were able to identify and mitigate financial risks at the earliest possible stage. The conclusion drawn was that structured evaluation schedules serve as a primary governance tool for project owners in the Norwegian construction industry. It was recommended that this gated framework be adopted globally to improve the fiscal discipline of public infrastructure projects.

3. Methodology

3.1 Research design

For this study, a descriptive and correlational research design was employed, incorporating both quantitative and qualitative approaches. This design is highly relevant as it allowed the researcher to describe the current scheduling practices while simultaneously measuring the strength of the statistical relationship between these practices and project cost overruns.

3.2 Study Population and Sampling Techniques

The target population for this study consisted of 260 professionals involved in Nyabisindu–Nyagatovu Road Upgrading Project. According to the Krejcie and Morgan sample size determination table, a population of 260 respondents corresponds to a sample size of 155 respondents. The study therefore used 155 respondents as the sample size for data collection. The study utilized stratified and simple random sampling techniques to select the 155 respondents from Nyabisindu–Nyagatovu Road Upgrading Project. Stratified sampling was used first to divide the population into professional categories such as engineers, managers, and contractors. This was followed by simple random sampling within each category to pick the specific individuals who received the questionnaires. This combined approach ensured that the specific technical views of engineers are as well-represented as the administrative views of project leads.

3.3 Data Collection Instruments

The researcher used three primary instruments to collect data: a documentation review, a structured questionnaire, and a semi-structured interview guide. These tools were designed to measure the independent variables of scheduling and the dependent variable of cost overruns. Using multiple instruments allowed for the triangulation of data, ensuring that the findings are cross-verified and comprehensive.

The researcher distributed a structured questionnaire featuring a five-point Likert scale to the 155 sampled professionals at the project site. The collection procedure

involved hand-delivery of the questionnaires to the site offices, followed by a week-long window for the respondents to complete them. The questionnaire included specific sections for communication scheduling, resource allocation, stakeholder coordination, and evaluation scheduling. The data collected from these questionnaires was the primary source for the statistical analysis of scheduling impacts.

3.4 Data Analysis

For this study, the Statistical Package for the Social Sciences (SPSS) Version 29 was used to ensure the accuracy of all findings. The researcher conducted three levels of analysis: descriptive analysis for profiling the sample, inferential analysis for testing the hypotheses, and qualitative analysis for the interviews.

3.4.1 Inferential Analysis

The researcher performed bivariate correlation to measure the strength of the link between the individual scheduling variables and project cost performance. This was followed by multiple regression analysis to determine the combined effect of all four scheduling factors on the total project budget. The study tested the significance of each relationship at the 0.05 level to provide a definitive answer to the research hypotheses. The multiple linear regression model was also assumed to be used by the researcher on the assumption of a linear relationship between the explanatory and the dependent variables and thus this model is illustrated as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Where:

- Y: Cost overruns (dependent variable)
- X₁: Communication scheduling
- X₂: Resource allocation
- X₃: Stakeholder coordination
- X₄: Evaluation scheduling
- β₀: Intercept
- β₁, β₂, β₃, β₄: Regression coefficients (slopes)
- ε: Residual (error)

3.5 Ethical Considerations

The researcher formally presented an introductory letter from the University of Kigali to the project's lead steering committee to obtain written authorization to access site personnel and records. No personal names or job IDs was recorded on the questionnaires, and the final research report only presented findings in an aggregate, statistical format to protect individual identities.

4. Results and Discussion

The findings indicate the response rate of respondents involved in the study on project scheduling and cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. The results show that 141 respondents, representing 90.97%, completed and returned the questionnaires, while 14 respondents, representing 9.03%, submitted incomplete questionnaires. Inferential statistics were used to examine the relationship and effect between project scheduling variables and cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. This section presents correlation and regression analysis. Correlation analysis was used to determine the strength

and direction of the relationship between communication scheduling, resource allocation, stakeholder coordination, evaluation scheduling, and cost overruns. Regression analysis was used to determine the effect of each independent variable on cost overruns.

4.1 Correlation Analysis

Correlation analysis was used to assess the relationship between each project scheduling variable and cost overruns. The Pearson correlation coefficient was interpreted using the significance level of 0.05. A p-value below 0.05 showed a statistically significant relationship.

Table 1: Correlations

		Communication scheduling	Resource allocation	Stakeholder coordination	Evaluation scheduling	Cost overruns
Communication scheduling	Pearson Correlation	1	.603**	.644**	.649**	.762**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	141	141	141	141	141
Resource allocation	Pearson Correlation	.603**	1	.557**	.656**	.752**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	141	141	141	141	141
Stakeholder coordination	Pearson Correlation	.644**	.557**	1	.743**	.737**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	141	141	141	141	141
Evaluation scheduling	Pearson Correlation	.649**	.656**	.743**	1	.804**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	141	141	141	141	141
Cost overruns	Pearson Correlation	.762**	.752**	.737**	.804**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	141	141	141	141	141

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

Source: Primary data (2026)

The results in Table 1 indicate correlation analysis between project scheduling variables and cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. Communication scheduling had a positive and significant relationship with cost overruns, with Pearson correlation coefficient of 0.762 and p-value of 0.000. Since the p-value is below 0.05, this shows that communication scheduling was significantly related to cost overruns. This means that better communication scheduling was associated with better control of cost overruns in the project.

Resource allocation had a positive and significant relationship with cost overruns, with Pearson correlation coefficient of 0.752 and p-value of 0.000. Since the p-value is below 0.05, the relationship was statistically significant. This implies that effective allocation of labour, materials, equipment, and budget was associated with improved control of cost overruns. Therefore, proper resource allocation played an important role in the Nyabisindu–Nyagatovu Road Upgrading Project.

Stakeholder coordination had a positive and significant relationship with cost overruns, with Pearson correlation coefficient of 0.737 and p-value of 0.000. The p-value

was below 0.05, showing that the relationship was statistically significant. This means that improved coordination among stakeholders was associated with better management of cost overruns. Therefore, coordination helped reduce misunderstandings, delays, and unnecessary project costs.

Evaluation scheduling had a positive and significant relationship with cost overruns, with Pearson correlation coefficient of 0.804 and p-value of 0.000. Since the p-value is below 0.05, the relationship was statistically significant. This indicates that evaluation scheduling had the strongest relationship with cost overruns among the independent variables. This implies that scheduled audits, variance tracking, quality inspections, and progress reporting were strongly associated with cost control in the project.

The correlation results show that all project scheduling variables had positive and significant relationships with cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. Evaluation scheduling had the strongest relationship, followed by communication scheduling, resource allocation, and stakeholder coordination. This means that improving project

scheduling practices contributed to better control of cost overruns. The findings confirm that scheduling practices were important in managing cost performance in the road upgrading project.

The discussion of Table 1 shows that the significant positive relationships between all project scheduling variables and cost overruns confirm the importance of scheduling practices in cost control. The strongest relationship was between evaluation scheduling and cost overruns, which supports Ndikumana et al. (2023), who found that automated evaluation schedules improved budget adherence and reduced material waste in Rwandan construction projects. The positive relationship for communication scheduling also agrees with Omran et al. (2023), who reported that poor scheduled communication contributed to budget variance in construction projects.

The positive relationship between resource allocation and cost overruns is supported by Mugweru and Muchelule (2022), who found that resource allocation efficiency was strongly related to cost adherence in road

construction projects. Similarly, the positive relationship between stakeholder coordination and cost overruns agrees with Hatumimana and Dushimimana (2024), who found that stakeholder coordination improved project performance and cost adherence. Theoretically, these results support Project Management Theory and Systems Theory because they show that scheduling variables do not work separately; they interact as part of an integrated project-control system.

4.2 Regression Analysis

Regression analysis was used to determine the effect of communication scheduling, resource allocation, stakeholder coordination, and evaluation scheduling on cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. The model summary shows the explanatory power of the independent variables. The ANOVA table shows whether the regression model was statistically significant. The coefficient table shows the individual effect of each independent variable on cost overruns.

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.895 ^a	.801	.796	.162

a. Predictors: (Constant), Evaluation scheduling, Communication scheduling, Resource allocation, Stakeholder coordination

Source: Primary data (2026)

The results in Table 2 indicate the model summary for project scheduling and cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. The R value was 0.895, showing a strong positive relationship between communication scheduling, resource allocation, stakeholder coordination, evaluation scheduling, and cost overruns. The R Square value was 0.801, meaning that 80.1% of the variation in cost overruns was explained by the four project scheduling variables. This indicates that communication scheduling, resource allocation, stakeholder coordination, and evaluation scheduling had a strong explanatory power on cost overruns. The remaining 19.9% may be explained by other factors not included in this model. The Durbin-Watson value was not shown in the provided model summary table; therefore it could not be interpreted.

The discussion of Table 2 shows that the model had strong explanatory power because communication scheduling, resource allocation, stakeholder

coordination, and evaluation scheduling explained 80.1% of the variation in cost overruns. This means that project scheduling practices were not minor administrative activities but central predictors of cost performance in the Nyabisindu–Nyagatovu Road Upgrading Project. The result is consistent with Project Management Theory, which emphasizes that cost performance is influenced by the management of time, scope, resources, communication, monitoring, and control.

The high R Square value also supports Systems Theory because the four predictors together represent interconnected scheduling components that influence the financial behaviour of the project. The remaining 19.9% suggests that other factors such as inflation, procurement conditions, contract variations, or external site risks may also explain cost overruns, but the dominant explanation remained within the project scheduling practices measured in this study.

Table 3: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.415	4	3.604	138.615	.000 ^b
	Residual	3.573	136	.026		
	Total	17.989	140			

a. Dependent Variable: Cost overruns

b. Predictors: (Constant), Evaluation scheduling, Communication scheduling, Resource allocation, Stakeholder coordination

Source: Primary data (2026)

The findings in Table 3 indicate ANOVA results for project scheduling and cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. The regression model had an F-value of 138.615 and a significance value of 0.000. Since the p-value is below 0.05, the model was statistically significant. This means that communication scheduling, resource allocation, stakeholder coordination, and evaluation scheduling jointly had a significant effect on cost overruns. The findings show that the regression model was suitable for explaining cost overruns in the Nyabisindu–Nyagatovu Road Upgrading Project. Therefore, project scheduling variables were important predictors of cost overruns.

The discussion of Table 3 confirms that the overall regression model was statistically significant, meaning that the four project scheduling variables jointly predicted cost overruns of the Nyabisindu–Nyagatovu

Road Upgrading Project. This finding agrees with the empirical position of Tukundane and Yang (2024), who found that project control practices significantly influenced project cost performance in construction companies. It also relates to Obuo and Nyang’au (2024), who showed that cost management processes significantly explained performance in road projects.

The ANOVA result strengthens the argument that cost overrun control should not be addressed through one isolated practice. Instead, communication scheduling, resource allocation, stakeholder coordination, and evaluation scheduling should be managed together because weakness in one component can affect the others. This interpretation is supported by Systems Theory, which explains that project performance depends on the coordinated functioning of interdependent components within the project system.

Table 4: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.187	.181		1.033	.303
Communication scheduling	.257	.051	.281	5.039	.000
Resource allocation	.285	.053	.288	5.377	.000
Stakeholder coordination	.136	.050	.166	2.720	.007
Evaluation scheduling	.282	.059	.309	4.780	.000

a. Dependent Variable: Cost overruns

Source: Primary data (2026)

The results in Table 4 indicate coefficient results for the effect of project scheduling variables on cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. Communication scheduling had an unstandardized coefficient B of 0.257, t-value of 5.039, and p-value of 0.000. Since the p-value is below 0.05, communication scheduling had a statistically significant effect on cost overruns. This means that a unit increase in communication scheduling increased cost overrun control by 0.257 units when other variables were held constant. The collinearity statistics were not included in the provided coefficient table, therefore tolerance and VIF could not be interpreted for this variable.

Resource allocation had an unstandardized coefficient B of 0.285, t-value of 5.377, and p-value of 0.000. Since the p-value is below 0.05, resource allocation had a statistically significant effect on cost overruns. This means that a unit increase in resource allocation increased cost overrun control by 0.285 units when other variables were held constant. The result implies that proper scheduling of labour, materials, equipment, and budget helped control cost overruns in the project. The collinearity statistics were not provided, therefore tolerance and VIF could not be assessed.

Stakeholder coordination had an unstandardized coefficient B of 0.136, t-value of 2.720, and p-value of

0.007. Since the p-value is below 0.05, stakeholder coordination had a statistically significant effect on cost overruns. This means that a unit increase in stakeholder coordination increased cost overrun control by 0.136 units when other variables were held constant. The result shows that coordination among stakeholders contributed to controlling project costs. The collinearity statistics were not shown in the table, therefore multicollinearity could not be interpreted for this variable.

Evaluation scheduling had an unstandardized coefficient B of 0.282, t-value of 4.780, and p-value of 0.000. Since the p-value is below 0.05, evaluation scheduling had a statistically significant effect on cost overruns. This means that a unit increase in evaluation scheduling increased cost overrun control by 0.282 units when other variables were held constant. This implies that scheduled audits, variance tracking, quality inspections, and progress reporting helped control cost overruns. The collinearity statistics were not included in the provided table, therefore tolerance and VIF could not be interpreted.

Based on the coefficient results, the fitted regression model was:

$$\text{Cost overruns} = 0.187 + 0.257\text{CS} + 0.285\text{RA} + 0.136\text{SC} + 0.282\text{ES} + \varepsilon$$

Generally, the coefficient results show that all independent variables had positive and significant effects on cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. Resource allocation had the highest unstandardized coefficient, followed by evaluation scheduling, communication scheduling, and stakeholder coordination. This means that resource allocation contributed more to cost overrun control compared to other variables in the model. The results confirm that project scheduling practices played a significant role in controlling cost overruns in the project.

The discussion of Table 4 indicates that all four predictors had positive and statistically significant effects on cost overruns, meaning that each scheduling dimension contributed uniquely to cost overrun control. Communication scheduling was supported by Álvarez-Pozo et al. (2024) and Nguyen et al. (2025), who linked

timely information flow with reduced delays and financial risks. Resource allocation was supported by Khursheed et al. (2024) and Chandra et al. (2023), who emphasized that accurate timing of labour, materials, equipment, and financial resources reduces waste and productivity losses.

The coefficient results also show that stakeholder coordination and evaluation scheduling significantly affected cost overruns. This agrees with Owusu et al. (2021) and Okolie and Edo (2023), who linked stakeholder coordination with reduced disputes and delays, and with Belay and Torp (2023) and Steininger et al. (2021), who emphasized the role of scheduled evaluations in identifying deviations before they become serious cost problems. Based on the unstandardized coefficients, resource allocation made the strongest contribution, showing that the timing and availability of labour, equipment, materials, and funds were the most influential practical drivers of cost overrun control in the project.

Table 5: Hypothesis Testing Using Coefficient Table P-Values

No	Hypotheses	p-value	Decision
H₀₁	There is no significant effect of communication scheduling on cost overruns of Nyabisindu–Nyagatovu Road Upgrading Project.	0.000	Reject H ₀₁
H₀₂	There is no significant effect of resource allocation on cost overruns of Nyabisindu–Nyagatovu Road Upgrading Project.	0.000	Reject H ₀₂
H₀₃	There is no significant effect of coordination on cost overruns of Nyabisindu–Nyagatovu Road Upgrading Project.	0.007	Reject H ₀₃
H₀₄	There is no significant effect of evaluation scheduling on cost overruns of Nyabisindu–Nyagatovu Road Upgrading Project.	0.000	Reject H ₀₄

The findings in Table 5 indicate hypothesis testing using coefficient table p-values for the Nyabisindu–Nyagatovu Road Upgrading Project. All four null hypotheses were rejected because their p-values were below 0.05. This confirms that communication scheduling, resource allocation, stakeholder coordination, and evaluation scheduling had significant effects on cost overruns. The findings show that project scheduling was an important factor in controlling cost overruns in the Nyabisindu–Nyagatovu Road Upgrading Project.

The study concluded that resource allocation significantly contributed to controlling cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. Proper scheduling of labour, materials, equipment, and budget disbursements helped reduce waste, idle time, and implementation delays. The inferential findings confirmed that resource allocation had a significant effect on cost overruns. Therefore, strong resource allocation practices are important for improving financial control in the project.

5. Conclusion and Recommendations

5.1 Conclusion

The study concluded that communication scheduling played an important role in controlling cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. Scheduled meetings, timely progress reports, accurate information sharing, and regular feedback improved decision-making and reduced delays. The inferential findings confirmed that communication scheduling had a significant effect on cost overruns. Therefore, effective communication scheduling remains necessary for better cost control in the project.

The study concluded that stakeholder coordination had a significant effect on cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. Clear roles, conflict resolution, alignment of stakeholder interests, and technical compatibility supported smooth project execution. The inferential findings confirmed that stakeholder coordination contributed to cost overrun control. Therefore, effective coordination among stakeholders is necessary for reducing unnecessary project costs.

The study concluded that evaluation scheduling was important in controlling cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project. Scheduled audits, performance tracking, quality

inspections, and progress reporting helped management identify deviations and take corrective actions. The inferential findings confirmed that evaluation scheduling had a significant effect on cost overruns. Therefore, regular evaluation scheduling is essential for maintaining cost discipline in the project.

The study concluded that project scheduling had a significant impact on cost overruns of the Nyabisindu–Nyagatovu Road Upgrading Project in Gasabo District. Communication scheduling, resource allocation, stakeholder coordination, and evaluation scheduling all contributed to better cost control. The findings showed that proper scheduling practices reduce delays, waste, conflicts, and weak monitoring. Therefore, effective project scheduling should remain a central practice in road construction and upgrading projects.

5.2 Recommendations

In light of the findings and conclusions reached, the study proposes the following recommendations for improvement.

1. The management of the Nyabisindu–Nyagatovu Road Upgrading Project should strengthen communication scheduling through regular project meetings and timely progress reporting. This would improve decision-making and reduce delays that may increase project costs.
2. The project management team should improve feedback scheduling among project teams. This would help workers and supervisors address implementation issues before they develop into costly problems.
3. The authorities responsible for the Nyabisindu–Nyagatovu Road Upgrading Project should ensure that labour, materials, and equipment are scheduled according to real construction needs. This would reduce idle resources, waste, and unnecessary cost increases.
4. Stakeholders involved in the Nyabisindu–Nyagatovu Road Upgrading Project should strengthen coordination meetings to clarify roles and responsibilities. This would reduce duplication of activities and improve accountability among all parties.

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