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Effect of Project Resource Planning on Performance of Construction Projects: A Case of Mulindi-Gasogi Road Project in Gasabo District, Rwanda

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Abstract: *Without clear and structured project planning, construction efforts face difficulties in achieving desired timelines, cost control, and quality standards. This study assessed the effect of project resource planning on the performance of the Mulindi-Gasogi Road Project in Gasabo District, Rwanda, focusing on financial resource planning, material resource planning and human resource planning. Stakeholder Theory, Resource-Based View Theory and Human Capital Theory guided the study. A descriptive and correlational design was used, combining questionnaires, interviews and documentation. The population comprised 319 employees, and a census approach was applied. Of 319 questionnaires distributed, 291 were completed, giving a 91.2% response rate. Data were analyzed using descriptive statistics, Pearson correlation and multiple regression. Financial resource planning ($r = 0.784$), material resource planning ($r = 0.770$) and human resource planning ($r = 0.765$) each had strong positive associations with project performance. The model explained 69.7% of the variance in performance ($R = 0.835$, $R^2 = 0.697$, adjusted $R^2 = 0.693$; $F = 219.554$, $p < 0.05$). All predictors made significant positive contributions: financial resource planning ($B = 0.354$, $p < 0.05$), material resource planning ($B = 0.197$, $p = 0.002$) and human resource planning ($B = 0.309$, $p < 0.05$). The study concluded that systematic planning of financial, material and human resources was associated with stronger road-project performance. It recommended stronger financial forecasting, procurement coordination, staff development and continuous monitoring of construction resources.*

Keywords: Project resource planning; financial resource planning; material resource planning; human resource planning; project performance; Mulindi-Gasogi Road Project

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1. Introduction

Project resource planning provides a structured basis for matching project activities with the funds, construction materials and human capabilities needed to deliver agreed outputs. Across the project life cycle, appropriate resource allocation supports efficiency, stakeholder accountability and sustainable project outcomes. In construction settings, resource scarcity and poor coordination can create risks for scope, quality, time and cost (Adebayo *et al.*, 2024).

International research demonstrates that resource planning is increasingly connected with sustainable project delivery. Projects require financial and organisational arrangements that continue to support outcomes after initial activities have ended. The emphasis on effective resource use and sustained benefits is relevant to infrastructure development

because delays and interruptions can reduce the value of completed works (Esteban & Olivié, 2022).

Construction projects in African countries face funding constraints and implementation weaknesses that can undermine the delivery of transport and other essential infrastructure. Effective planning requires adequate financial provisions, timely material supply and the allocation of qualified personnel. These arrangements help maintain construction activities while limiting the inefficient use of scarce resources (Mohamed, 2023).

In Rwanda, research on donor-funded projects identifies resource planning as an important contributor to performance. Mugorewase and Kwena (2024) emphasised human and financial resource planning in the Food and Education Project in Gasabo District. Likewise, Andinda (2023) discussed how budgeting, forecasting, procurement and workforce practices were connected to the performance of the Kigali International Airport upgrade.

The Mulindi-Gasogi Road Project in Gasabo District offered a specific road-construction setting for examining financial resource planning, material resource planning and human resource planning. Project performance was assessed through scope, quality, timeliness and cost, which reflect whether project resources were managed in a manner consistent with implementation objectives.

Construction-project performance remains a concern in Rwanda. Gakwaya *et al.* (2020) reported cost overruns in Kigali City construction projects, while Mukiza *et al.* (2021) examined delay factors in public construction projects. These problems may compromise completion schedules and increase costs. Quality and coordination challenges further indicate the importance of analysing resource-planning practices in their project context (Ingabire, 2021).

Existing research has investigated financial resource management in Kigali public institutions (Aradukunda & Sikubwabo, 2024), material management in construction (Yıldız *et al.*, 2024) and human resource planning in project implementation (Rono *et al.*, 2023). However, the available studies do not separately establish how these three resource-planning dimensions relate to performance at the Mulindi-Gasogi Road Project.

The study therefore addressed this context-specific evidence gap by examining how financial, material and human resource planning were associated with the performance of Mulindi-Gasogi Road Project in Gasabo District. The period covered by the dissertation was 2021 to 2024.

1.1 General Objective

The general objective of this study was to assess the effect of project resource planning on the performance of Mulindi-Gasogi Road Project in Rwanda.

1.2 Specific Objectives

1. To examine the effect of financial resource planning on performance of Mulindi-Gasogi Road Project in Gasabo District, Rwanda.
2. To identify the effect of material resource planning on performance of Mulindi-Gasogi Road Project in Gasabo District, Rwanda.
3. To assess the effect of human resource planning on the performance of Mulindi-Gasogi Road Project in Gasabo District, Rwanda.

2. Literature Review

This section presents the theoretical and empirical literature used to examine project resource planning and performance of Mulindi-Gasogi Road Project.

2.1 Theoretical Review

For this study, theoretical framework is a thorough look at and evaluation of the existing theories and ideas about the topic under study. It is the process of systematically analyzing and putting together information from different sources in order to get a full picture of issue.

2.1.1 Stakeholder Theory

Stakeholder Theory, first proposed by R. Edward Freeman in 1984, asserts that firms should consider the interests and well-being of all stakeholders, not just shareholders. Stakeholders are individuals or groups whose interests are influenced by the activities of an organization. This includes employees, customers, suppliers, governments, and the general public. This idea challenges the conventional emphasis on shareholder primacy, arguing that prioritizing the interests of all stakeholders results in more sustainable and ethical corporate operations. The reasoning is that firms that engage and satisfy their stakeholders generate more value and have more long-term success (Gutterman, 2023).

According to Stakeholder Theory, firms should maintain frequent and transparent contact with its stakeholders. This entails identifying stakeholder requirements, expectations, and concerns and incorporating this information into corporate decision-making processes. This inclusive approach makes stakeholders feel appreciated and respected, which may increase their loyalty and support. Organizations that actively engage with their workers and include them in decision-making

may boost job happiness and productivity, resulting in higher overall performance (Shah & Guild, 2022).

According to Mahajan *et al.* (2023), Stakeholder Theory promotes ethical behaviors and societal responsibility. Organizations are expected to be not just lucrative, but also socially and ecologically responsible. This larger view on value creation considers the long-term effects of corporate actions on society and the environment. Ethical practices may also have a beneficial reputational impact, as responsible businesses acquire the confidence and favor of customers and the general public. As a result, this may lead to competitive advantages such as increased consumer loyalty and the capacity to recruit and retain top people.

According to Yoshikawa *et al.* (2021), stakeholder theory advocates the concept of stakeholder-oriented corporate governance. This entails creating governance structures and regulations that promote accountability, justice, and openness. Effective governance builds confidence and collaboration among stakeholders, resulting in more strong and resilient organizations. Organizations may build long-term value by balancing the requirements and interests of multiple stakeholders.

This study utilized Stakeholder Theory to explain the importance of involving diverse stakeholders, such as contractors, suppliers, and local communities, in project resource planning. It demonstrated how engaging stakeholders ensures alignment of expectations, enhances collaboration, and minimizes resource-related disruptions, leading to improved performance in road construction projects.

2.1.2 Resource-Based View Theory

Wernerfelt's 1984 Resource-Based View (RBV) thesis, amended by Barney in 1991, assists organizations in understanding their competitive advantage. RBV thinks that a company's internal skills and resources determine success, as opposed to traditional perspectives that concentrate on market conditions or competition. According to this idea, a firm's potential to outperform competitors is determined by its unique combination of tangible and intangible resources, including physical assets, brand reputation, and intellectual capital (Putra *et al.*, 2021).

Physical resources include equipment and buildings, whereas human resources comprise employee skills and expertise, as well as organizational culture and processes. To maintain a competitive advantage, a resource must meet four VRIO criteria: value, rarity, inimitability, and organization. To assist a firm capitalize on opportunities or eliminate risks, resources must be rare, difficult to replicate, and well-organized (Andersson & Haque, 2024).

RBV in strategic planning enables businesses to properly analyze and align their internal capabilities with strategic objectives. Focusing on strengths and using unique resources may help enhance operational efficiency and market positioning. Proponents argue that a robust resource base may help firms overcome external challenges, notwithstanding RBV's limitations in adjusting to changing market circumstances. As a result, RBV remains an important strategic management framework for businesses seeking to optimize internal resources and gain a sustainable competitive advantage (Adama *et al.*, 2024).

This study applied Resource-Based View Theory to analyze how unique financial, material, and human resources contribute to performance of Mulindi-Gasogi Road Project. It evaluated how effectively managing and allocating these resources ensures value creation, strengthens competitive advantage, and achieves desired project outcomes.

2.1.3 Human Capital Theory

Human Capital Theory, created by economists Gary Becker and Theodore Schultz in the mid-twentieth century, explores the economic value of investing in education, training, and health. According to the idea, human capital, which includes skills, knowledge, and experiences, promotes productivity and economic growth. Human capital investments, like those made by firms to enhance profits, provide long-term economic benefits (Goldin, 2024).

According to Human Capital Theory, education and training increase job opportunities, income, and employability. Educated individuals earn more and are less likely to be unemployed. Health investments increase productivity because healthy individuals are more productive and engaged (Indrawati & Kuncoro, 2021).

Despite its relevance, Human Capital Theory has been critiqued for oversimplifying the complex relationship between education and economic success. Its detractors argue that it overlooks the social, cultural, and institutional factors that influence success. However, the idea continues to persuade governments and organizations to invest in education and skills to increase economic development and social mobility. Human capital development assists organizations and communities in developing a skilled workforce capable of adapting to changing economic conditions and maintaining prosperity (Wolhuter & Niemczyk, 2023).

This study relied on Human Capital Theory to highlight the effect of skilled labor in enhancing project resource planning of Mulindi-Gasogi Road Project. It examined how investments in training and capacity-building initiatives for project staff improve efficiency and

productivity, ultimately boosting the performance and timely delivery of the road construction project.

2.2 Empirical Review

It involved examining published studies, articles, and other relevant literature to gather and synthesize existing empirical evidence on a particular topic.

2.2.1 Financial Resource Planning and Project Performance

Aradukunda and Sikubwabo (2024) investigated the impact of financial resource management on project performance in Kigali City. Poor implementation of projects, due to misappropriation of public funds and inadequate performance measurement, particularly in subdivisions and surrounding villages, motivated the research. The study aimed to assess the influence of financial resource planning and control on project performance. Using financial literacy and resource dependency theories, the researchers reviewed relevant literature and targeted 312 employees, selecting a sample size of 175 through stratified sampling. Data were collected using questionnaires, interviews, and document reviews, and analyzed through descriptive statistics and regression analysis. Results revealed that financial resource management significantly impacts project performance, with an estimated performance level of 30.6% when financial management is absent. A unit increase in financial resource planning leads to a 0.731% improvement ($t = 6.008$, $p < 0.001$), while a 1% increase in financial resource control enhances performance by 0.500% ($t = 2.550$, $p = 0.025$). Both variables were statistically significant, affirming the importance of robust financial management in improving project outcomes in Kigali City.

Kamau *et al.* (2023) examined the influence of financial planning on the performance of floricultural projects in Kenya, focusing on Nakuru County. Guided by control theory, the investigation addressed concerns about project performance, highlighting the role of financial planning in mitigating socio-economic and political challenges faced by floricultural farmers. Data collection relied on questionnaires, and both descriptive and inferential statistics were applied for analysis. The findings revealed that financial planning significantly impacts project success, with descriptive results indicating that 35.4% of the variance in project performance was explained by financial planning practices. This suggests that improved financial planning can enhance the stability and outcomes of floricultural projects. The study underscores the importance of integrating financial planning into floricultural management to improve project efficiency and sustainability.

Odide (2021) examined the influence of financial resource management on students' academic performance in public secondary schools in Lang'ata Sub-county, Nairobi County, Kenya, using Kurt Lewin's behavioral leadership theory. It focused on the role of budget management, financial controls, and principals' challenges in shaping academic outcomes. A descriptive research design targeted five schools, with 260 participants, including principals, teachers, bursars, and students, using questionnaires, interviews, and observations for data collection. Findings showed that effective financial management positively influences academic performance, though not all staff are involved in budgeting, and students, especially in slum areas like Kibera, struggle with financial challenges. The study highlighted the need for financial stability to support school programs smoothly and improve student outcomes. It recommended appointing qualified bursars to prevent corruption, ensuring students are not dismissed over unpaid fees, and establishing support services for students' welfare. Further research was suggested to compare financial management practices between public and private schools in the region.

2.2.2 Material Resource Planning and Project Performance

Yıldız *et al.* (2024) investigated the impact of material management activities, planning, supply, logistics, transport, stock, and waste control, on project performance within the construction industry, where materials significantly influence performance metrics such as cost, time, quality, and efficiency. Material management practices were evaluated using 15 criteria categorized under five headings, while project performance was assessed using 13 criteria across three categories, based on surveys conducted with industry personnel at various construction sites. Multiple regression analyses were performed to analyze the collected data, focusing on the impacts of material management practices on project time, cost, efficiency, waste performance, and overall project performance. The results indicated that material supply, handling, and stock and waste control positively impacted overall project performance. Conversely, material planning and logistics did not show statistically significant effects. This study's findings enhance understanding of the relationship between material management and project performance, providing valuable insights for stakeholders to improve their material management practices.

Acido and Kilongkilong (2022) investigated the resource management practices of a public higher institution in the Philippines amidst the challenges posed by the ongoing epidemic. The study focused on four key dimensions: planning, budgeting, allocation, and control. Using a descriptive research design, data was collected from 253 randomly selected administrators, teaching, and non-teaching staff through a validated questionnaire. The findings indicated that budgeting and allocation practices were more consistent, while planning and control

procedures were used less frequently. The study recommended the implementation of projects involving information and communication technologies to enhance resource management. Additionally, the standardization of policies and procedures was highlighted as a way to improve overall resource management. The study also stressed the importance of adequate financial allocation for the success of the planned development programs. Ultimately, the research offers insight into how strategic financial management can address the ongoing funding issues that impact the quality of education in the Philippines.

Asefa (2021) examined the contribution of material management to the performance of construction projects. Specifically, it assessed the effects of material planning, procurement, handling, logistics, and stock and waste control on project outcomes. Utilizing both descriptive and multi-regression analyses, a combination of qualitative and quantitative approaches was employed. Data collection involved questionnaires distributed across thirty construction sites, with a sample size of ten sites generating 60 responses. The analysis was conducted using the Statistical Package for Social Sciences (SPSS) version 21.0, revealing that the mean values for material management practices exceeded 3. The multi-regression analysis indicated that material planning, logistics, handling, and stock and waste control positively influenced project performance, while material procurement negatively impacted it. Statistically, material planning, procurement, and stock and waste control were significant, whereas logistics and handling were insignificant. The findings suggest that companies should enhance their material management practices to improve project performance effectively.

2.2.3 Human Resource Planning and Project Performance

Rono *et al.* (2023) examined how human resource planning affected project outcomes in the Konoin subcounty. The findings might provide the education ministry with the information they need to formulate project planning regulations based on facts, which would guarantee that schools get their money's worth. Philosophy of project management had an impact on this study. Primary schools served as the study population, with the whole population being sampled via census sampling. In order to collect information, questionnaires were used. We addressed ethical issues, such as obtaining permission from the NACOSTI research and obtaining approval from the County Director of Education, before we collected any data. We used SPSS version 22.0 for statistical analysis, which included descriptive statistics and regression analysis, after we collected quantitative data from closed-ended questions. Results showed that projects performed far better after using a human resource planning strategy. The study shows that if you follow the essentials of project planning, your project performance will be much improved. The study's authors indicate that the human resource development division of the ministry of education provides training to school management teams on project human resource development.

Mikongo (2020) looked at the Kinondoni Municipal Council (KMC) in Tanzania's Dar es Salaam region to see how well local governments there prepare for and implement human resources and how well they provide services. Understanding the challenges faced by local governments in Tanzania regarding HRP and service delivery is the primary objective of this study. The worth of government agencies and services is an issue for HRP. The mistaken belief that there is an abundance of workers in the economy causes time-consuming and expensive human resource forecasting, which is one of the problems. Human resource planning also has the problem of erroneous demand and supply. HRP is ineffectual because to factors such as labor turnover, seasonal employment, market volatility, and technological changes. Insufficient HR engagement in strategic planning might result in ineffective HRP in organizations. Male workers outnumber female employees in KMC, with the majority aged 34-57. The study found that KMC practices HRP, which involves human resources services inside the firm. External recruitment (58%), promotions (23%), and transfers (19%) were all known to be ways the KMC filled its voids. The researcher indicated that the KMC implements an IT section with specialized software to aid the HR department in addressing challenges. Additionally, the government should establish policies to guide various aspects of HR, such as motivation.

Aryal and Singh (2023) examine cooperative human resource planning empirically. It evaluates how anticipating manpower demand and strategic action affect these organizations' success. This article analyzes the complex link between HR planning and organizational performance. Stratified sampling was used to choose cooperative enterprises. Exploratory study was chosen to discover and comprehend reality. This quantitative analysis included data from 54 Kalimati, Balkhu, and Teku cooperative workers. A well-designed structured questionnaire was used, and SPSS version 20 analyzed the data. Data was collected via convenience sampling. The research found a link between HR planning and organizational success. According to the results, cooperatives and human resource managers should regularly undertake personnel audits and planning. They may proactively examine labor market demand and availability before recruiting.

3. Methodology

This section explains the research procedures applied to assess the effect of financial, material and human resource planning on the performance of Mulindi-Gasogi Road Project.

3.1 Research Design

The study used descriptive and correlational research designs. Descriptive analysis summarised assessments of project resource-planning practices and performance, while correlation and multiple regression examined statistical relationships among the variables. Quantitative responses were obtained through a structured questionnaire and complemented by interviews and project documentation.

3.2 Study Population

The target population consisted of 319 employees associated with Mulindi-Gasogi Road Project in Gasabo District, including 7 project managers, 30 coordinators, 58 team leaders, 43 site engineers and 181 technical and supporting staff. These categories were selected because they had roles in resource allocation, procurement, workforce coordination and project implementation.

3.3 Sampling Design

A census approach was used, with all 319 eligible employees included in the intended survey rather than drawing a smaller probability sample. In the completed field exercise, 291 questionnaires were returned filled, and these constituted the valid quantitative responses, representing 91.2% of the targeted population. Project managers and team leaders also supplied interview information because they held responsibilities directly related to project resource planning.

3.4 Data Collection Instrument

Data were collected using questionnaires, interviews and documentation. The questionnaire measured financial resource planning, material resource planning, human resource planning and project performance through closed-ended statements rated on a five-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree). The questionnaire offered comparable numerical responses across the employee categories.

Interviews with project managers and team leaders provided qualitative evidence on budgeting, material procurement, personnel allocation and implementation challenges. Documentation supplied secondary information on the project and its performance. Using the three methods supported interpretation of the questionnaire findings in the specific road-construction setting.

3.5 Pilot Study, Validity and Reliability

The dissertation reported a pilot test equal to 10% of the study size, used to examine questionnaire clarity and refine the instruments before the full survey. The place where the pilot was conducted was not specified. The instruments were also reviewed for relevance to the study objectives. Content validity was assessed using the Content Validity Index (CVI), with 0.70 adopted as the minimum acceptable threshold. The study reported a CVI of 0.80, which exceeded the established benchmark, indicating acceptable content validity of the research instrument.

Reliability was tested through Cronbach's Alpha, with coefficients of 0.70 or higher treated as acceptable internal consistency. The reported values were 0.813 for financial resource planning, 0.821 for material resource planning, 0.801 for human resource planning and 0.827 for project performance. Composite reliability for the 16 questionnaire items was 0.816. All reported coefficients exceeded the study's minimum reliability benchmark.

3.6 Data Analysis

Completed questionnaires were checked, edited, coded and tabulated before the statistical analysis. The responses were analysed using SPSS. Frequencies and percentages described participation, while means and standard deviations summarised Likert-scale responses. Means of 1.0–1.8, 1.9–2.6, 2.7–3.4, 3.5–4.2 and 4.3–5.0 were interpreted as very low, low, neutral, high and very high respectively. A standard deviation at or below 0.50 indicated homogeneous responses, whereas a value greater than 0.50 indicated heterogeneous responses.

Pearson correlation evaluated the direction and strength of the bivariate relationships between each resource-planning variable and project performance. Multiple linear regression estimated the contribution of financial resource planning, material resource planning and human resource planning to the dependent variable, using a 0.05 significance level for decisions on the null hypotheses. Model summary, ANOVA and coefficient statistics were used for the regression analysis; the normality test, tolerance, VIF and Durbin–Watson statistic were used to examine diagnostic conditions.

The adopted regression equation was $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$, where Y represented Project Performance, X_1 represented Financial Resource Planning, X_2 represented Material Resource Planning, X_3 represented Human Resource Planning, β_0 was the intercept, β_1–β_3 were the regression coefficients and ε represented the error term.

3.7 Ethical Considerations

Institutional permission was obtained to conduct the fieldwork. Respondents were informed of the academic purpose of the study, participation was voluntary, and confidentiality and privacy were maintained during questionnaire administration and interviews. Responses were used for the stated research purpose.

4. Results and Discussions

This section presents the survey response rate, inferential results, decisions on the null hypotheses and discussion of the three study objectives using the reported evidence from Mulindi-Gasogi Road Project.

4.1 Response Rate

The response rate indicates the share of targeted participants who provided filled out questionnaires suitable for analysis.

Table 1: Response rate

Questionnaire	Frequency	Percent
Filled	291	91.2
Unfilled	28	8.8
Total	**319**	**100.0**

Source: Research Findings, 2025

Table 1 shows that 291 of the 319 questionnaires distributed were filled, representing 91.2%, while 28 were unfilled (8.8%). The 291 complete responses formed the quantitative dataset. The response rate indicated strong participation among the employees selected from Mulindi-Gasogi Road Project.

4.2 Inferential Statistics

Pearson correlation was used to assess the direction and strength of relationships between the three resource-planning variables and project performance. Multiple regression estimated their joint explanatory power and individual contributions to performance, with statistical decisions evaluated at a significance threshold of 0.05.

4.2.1 Correlation Analysis

Correlation analysis assessed the relationship between financial resource planning, material resource planning, human resource planning and performance of Mulindi-Gasogi Road Project. The probability values reported as 0.000 were treated as $p < 0.001$ rather than a literal probability of zero.

Table 2: Correlation between study variables and project performance

		Financial Resource Planning	Material Resource Planning	Human Resource Planning	Project performance
Financial Resource Planning	Pearson Correlation	1	.842**	.752**	.784**
	Sig. (2-tailed)		.000	.000	.000
	N	291	291	291	291
Material Resource Planning	Pearson Correlation	.842**	1	.782**	.770**
	Sig. (2-tailed)	.000		.000	.000
	N	291	291	291	291
Human Resource Planning	Pearson Correlation	.752**	.782**	1	.765**
	Sig. (2-tailed)	.000	.000		.000
	N	291	291	291	291
Project performance	Pearson Correlation	.784**	.770**	.765**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	291	291	291	291

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

Source: Research Findings, 2025

Table 2 indicates a strong, positive and statistically significant correlation between financial resource planning and project performance ($r = 0.784$, $p < 0.05$). This suggests that stronger financial resource-planning practices were associated with better project performance among the employees surveyed. The relationship directly addressed the first specific objective.

Material resource planning had a positive correlation with project performance ($r = 0.770$, $p < 0.05$). The coefficient indicates that stronger practices in material estimation, procurement, inventory and distribution were associated with higher perceived project performance. The second specific objective therefore identified a statistically significant relationship.

Human resource planning also demonstrated a positive and statistically significant correlation with project performance ($r = 0.765$, $p < 0.05$). The association suggests that personnel allocation, recruitment, training and workforce performance were related to road project outcomes. These bivariate relationships do not alone establish causality.

4.2.2 Regression Analysis

Multiple regression assessed the combined predictive contribution of the three resource-planning practices to project performance. The original dissertation reported Kolmogorov–Smirnov significance of 0.088 and Shapiro–Wilk significance of 0.079 for the project-performance variable; both exceeded 0.05. These tests describe the observed dependent-variable distribution, not regression-residual normality. The reported VIF statistics ranged from 2.787 to 4.158, and the Durbin–Watson statistic was 1.971.

Table 3: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.835[a]	.697	.693	.27552	1.971

a. Predictors: (Constant), Human Resource Planning, Financial Resource Planning, Material Resource Planning
b. Dependent Variable: Project performance

Source: Research Findings, 2025

Table 3 shows a multiple correlation coefficient of $R = 0.835$, indicating a strong combined association of financial, material and human resource planning with performance. The R^2 value of 0.697 indicates that the three predictors jointly explained 69.7% of observed performance variance, with 30.3% not explained by the model. The adjusted R^2 was 0.693, while the standard error of the estimate was 0.27552. Durbin–Watson = 1.971 was close to 2, suggesting no marked first-order autocorrelation in the model residuals.

Table 4: ANOVA results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	50.002	3	16.667	219.554	.000[b]
	Residual	21.787	287	.076		
	Total	71.789	290			

a. Dependent Variable: Project performance
b. Predictors: (Constant), Human Resource Planning, Financial Resource Planning, Material Resource Planning

Source: Research Findings, 2025

Table 4 reports a regression sum of squares of 50.002, a residual sum of squares of 21.787 and $F(3, 287) = 219.554$ with reported $p = 0.000$ ($p < 0.001$). Since the probability was below 0.05, the overall regression model was statistically significant. The combined set of financial, material and human resource planning variables therefore explained a statistically significant share of performance variation in Mulindi-Gasogi Road Project.

Table 5: Regression coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.518	.129		4.016	.000		
	Financial Resource Planning	.354	.062	.360	5.747	.000	.269	3.718
	Material Resource Planning	.197	.064	.205	3.098	.002	.240	4.158
	Human Resource Planning	.309	.050	.334	6.154	.000	.359	2.787

a. Dependent Variable: Project performance

Source: Research Findings, 2025

Table 5 indicates that financial resource planning was positively associated with project performance ($B = 0.354$, $\beta = 0.360$, $t = 5.747$, $p < 0.05$), holding the remaining predictors constant. Its tolerance value was 0.269 and VIF was 3.718. Financial resource planning recorded the largest standardised coefficient among the three predictors, and H01 was rejected.

Material resource planning also made a positive and significant contribution (B = 0.197, β = 0.205, t = 3.098, p = 0.002). The reported tolerance was 0.240 and VIF was 4.158, below the commonly applied benchmark of 5. The regression result supported rejection of H02. Its smaller coefficient in the multivariable model compared with the bivariate correlation may partly reflect shared variance with the other planning variables.

Human resource planning had a positive and statistically significant regression coefficient (B = 0.309, β = 0.334, t = 6.154, p < 0.05). Tolerance was 0.359 and VIF was 2.787. Its contribution remained significant when the other two resource-planning variables were controlled, and H03 was rejected.

The fitted equation was: Project Performance = 0.518 + 0.354(Financial Resource Planning) + 0.197(Material Resource Planning) + 0.309(Human Resource Planning) + ε. The unstandardised coefficients describe predicted changes in project performance for one-unit differences in each predictor, with the other predictors held constant.

4.3 Decision on Null Hypotheses

The null hypotheses were assessed using the regression coefficients and the 0.05 statistical significance benchmark. A hypothesis was rejected where the corresponding predictor recorded p < 0.05.

Table 6: Decision on null hypotheses

Null Hypotheses	p value	Decision
H_{01}: There is no significant effect of financial resource planning on performance of Mulindi-Gasogi Road Project in Gasabo District, Rwanda.	p<0.05	Rejected
H_{02}: There is no significant effect of materials resource planning on performance of Mulindi-Gasogi Road Project in Gasabo District, Rwanda.	p<0.05	Rejected
H_{03}: There is no significant effect of human resource planning on performance of Mulindi-Gasogi Road Project in Gasabo District, Rwanda.	p<0.05	Rejected

Source: Research Findings, 2025

Table 6 summarises the decisions on H01, H02 and H03. Financial resource planning was significant at p < 0.05; material resource planning was significant at p = 0.002; and human resource planning was significant at p < 0.05. All three null hypotheses were rejected, demonstrating significant positive adjusted associations between the resource-planning dimensions and performance of Mulindi-Gasogi Road Project.

4.4 Discussion of Research Findings

This section discusses the findings according to the three specific objectives and compares them with the empirical studies and theories presented in Section 2.

4.4.1 Effect of Financial Resource Planning on Project Performance

Financial resource planning had a strong positive correlation with project performance (r = 0.784) and a statistically significant adjusted regression coefficient (B = 0.354, β = 0.360, p < 0.05). The result indicates that effective budgeting, forecasting, financial allocation and expenditure monitoring were associated with stronger implementation performance at Mulindi-Gasogi Road Project. Financial resource planning was the strongest of the three predictors according to the standardised regression coefficients.

This result agrees with Aradukunda and Sikubwabo (2024), who reported that financial resource management was significant for project performance in Kigali City, and Kamau *et al.* (2023), who identified financial planning as an important factor in Kenyan floricultural projects. Odide (2021) likewise connected financial resource management with institutional performance, although the educational setting differed from road construction. Stakeholder Theory provides an additional explanation through the importance of transparent allocation and coordination among parties responsible for managing project funds.

4.4.2 Effect of Material Resource Planning on Project Performance

Material resource planning showed a strong positive correlation with performance (r = 0.770) and a significant unique contribution to the regression model (B = 0.197, β = 0.205, p = 0.002). The findings suggest that material estimation, timely procurement, inventory control and distribution were relevant to construction continuity and control of time, cost and quality in Mulindi-Gasogi Road Project.

The result is consistent with Asefa (2021), who found that selected material-management practices were significantly related to construction-project outcomes. Yıldız *et al.* (2024) similarly identified positive roles for material supply, handling and stock-and-waste control, although their findings did not show all material-planning activities to be significant. Acido and Kilongkilong (2022) emphasised the contribution of structured resource management in a different institutional setting. Resource-Based View Theory supports interpretation of the project's material supply

and handling arrangements as capabilities that may contribute to performance when effectively organised.

4.4.3 Effect of Human Resource Planning on Project Performance

Human resource planning was positively correlated with project performance ($r = 0.765$) and remained significant in multiple regression ($B = 0.309$, $\beta = 0.334$, $p < 0.05$). This indicates that workforce allocation, recruitment, training and personnel performance arrangements were closely associated with outcomes in the Mulindi-Gasogi Road Project, after the other planning dimensions were held constant.

The finding is consistent with Rono *et al.* (2023), who established a positive relationship between human resource planning and project performance in Konoin Sub County. Mikongo (2020) also identified practical human resource-planning challenges in local government, while Aryal and Singh (2023) showed a relationship between human resource planning and organisational performance in cooperatives. Human Capital Theory explains this association through the contribution of staff knowledge, skills, recruitment and training to productivity. These theoretical and empirical perspectives support the importance of workforce planning in road-project implementation.

5. Conclusions and Recommendations

This section presents conclusions and recommendations drawn from the findings on financial, material and human resource planning in Mulindi-Gasogi Road Project.

5.1 Conclusion

The study concluded that financial resource planning was positively and significantly associated with project performance, demonstrating the importance of appropriate budgeting, forecasting and monitoring of funds. Material resource planning also had a significant positive relationship with performance, showing the value of timely procurement, effective inventory management and coordination of materials during construction. Human resource planning contributed positively and significantly through appropriate staffing, training, role allocation and employee performance management.

The combined explanatory power of the three resource-planning dimensions was substantial, with the regression model accounting for 69.7% of the observed variance in project performance. Financial resource planning had the largest standardised regression coefficient, followed by human resource planning and material resource planning. These results showed that the dimensions were jointly relevant to performance of the Mulindi-Gasogi Road Project. The findings also indicated that effective resource planning should be accompanied by continued attention to timeliness, quality, cost and scope of road-construction activities.

5.2 Recommendations

The following recommendations address the resource-planning practices measured in the study and the performance needs of Mulindi-Gasogi Road Project.

1. Project managers should strengthen budgeting, expenditure forecasting and timely financial allocation. Regular financial monitoring and coordination meetings with relevant stakeholders should be used to address funding-related constraints before they interrupt planned construction activities.
2. Project coordinators should prepare accurate material estimates, align procurement schedules with construction milestones and maintain appropriate stock and distribution records. Site engineers should regularly monitor the availability, quality and use of materials on site to reduce avoidable interruptions and waste.
3. Team leaders and project managers should improve human resource planning by clarifying staff responsibilities, assessing labour requirements, strengthening recruitment and providing relevant skills training. Routine performance feedback should be linked to the technical and scheduling demands of the road project.
4. Technical and supporting staff should use consistent progress-reporting formats to communicate information on resources, implementation delays and corrective actions.
5. Future studies may examine stakeholder engagement, environmental sustainability and project communication in road construction settings.

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