



Project Resource Management Practices and the Performance of Sanitation Facilities Construction Project in Nyabiheke Refugee Camp

Marie Claire Murebwayire, Samuel Wabala
University of Kigali

<https://orcid.org/0009-0001-5801-614X>

Email: claimy12@gmail.com

Abstract: The study examined the effect of project resource management practices on the performance of the sanitation facilities construction project in Nyabiheke Refugee Camp, Rwanda. Specifically, it assessed project resources planning, resources utilization and assigning tasks, and project resources monitoring and evaluation against performance. The study was guided by the Resource-Based View Theory, Project Management Theory, and Systems Theory, explaining how planning, utilization, coordination, monitoring, and control of resources influence performance. A descriptive and correlational research design guided the quantitative strand, and questionnaires provided data from 96 respondents involved in implementation. The Statistical Package for Social Sciences (SPSS) supported descriptive statistics, Pearson correlation and multiple regression analysis. Correlation results showed positive relationships between project performance and resources planning ($r = 0.940$, $p = 0.000$), resources utilization ($r = 0.930$, $p = 0.000$), and project resources monitoring and evaluation ($r = 0.810$, $p = 0.000$). The regression model was statistically significant ($R = 0.965$, $R^2 = 0.932$, $F = 418.175$, $p = 0.000$). Project resources planning produced the strongest significant effect ($B = 0.557$, $\beta = 0.535$, $p = 0.000$), followed by resources utilization ($B = 0.342$, $\beta = 0.412$, $p = 0.000$), while monitoring and evaluation had a positive but statistically insignificant effect ($B = 0.057$, $\beta = 0.056$, $p = 0.280$). The study concluded that systematic planning and efficient utilisation are central to performance and recommended early planning, competency-based task allocation, improved material handling and storage, and closer integration of monitoring information into implementation decisions.

Keywords: Project Resource Management, Resource Planning, Resource Utilisation, Monitoring and Evaluation, Project Performance, Sanitation Facilities.

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1. Introduction

Construction projects play an important role in infrastructure development, employment creation and the delivery of essential public services. Their performance, however, depends greatly on how effectively project teams coordinate human, financial, material, equipment and time resources to achieve expected cost, quality and schedule outcomes. Effective resource management requires systematic planning, acquisition, allocation, development, utilization and

control of project resources throughout the project life cycle. Weak resource scheduling, inappropriate task allocation, equipment idleness, material wastage and delayed corrective action can disrupt implementation and contribute to cost overruns, schedule delays and quality deficiencies. Resource management therefore represents a strategic project management function through which available inputs are transformed into intended project outputs (Project Management Institute, 2021; Kerzner, 2017).

The relevance of resource management becomes even greater in humanitarian construction projects, where implementation commonly occurs under limited budgets, demanding schedules and strong accountability requirements. Sanitation facilities in refugee camps must address urgent beneficiary needs while meeting engineering, safety, accessibility and durability standards. Resource planning helps determine the quantities and timing of labor, finance, materials and equipment required for implementation, while resource utilization and task assignment determine how efficiently these inputs are deployed. Monitoring and evaluation further provide information on whether actual resource use corresponds with planned requirements and whether corrective action is necessary. These practices are therefore interdependent because efficient utilization depends on realistic planning, while monitoring information becomes valuable when it informs timely management decisions (Kerzner, 2019; Project Management Institute, 2021).

Evidence from Rwanda further demonstrates the importance of project resource planning in improving construction performance. Kimanuka (2024), in examining the Hinga Weze Project, established that resource identification, skills assessment, scheduling, allocation and budgeting positively influenced project performance. Similarly, Batamuriza and Dushimimana (2024) reported that human, material, financial and time resource planning contributed positively to the performance of the new maternity construction project at King Faisal Hospital. These findings indicate that effective resource planning improves coordination, reduces the risk of shortages and supports better control of project cost, time and quality. This is particularly important in resource-constrained projects, where inaccurate estimation or delayed mobilization of essential inputs can negatively affect implementation outcomes (Kimanuka, 2024; Batamuriza & Dushimimana, 2024).

Efficient resource utilization is equally important after project resources have been mobilized. Project teams are expected to assign responsibilities according to employee skills and available capacity, minimize idle resources, reduce material wastage and ensure that equipment and construction materials are properly handled and preserved. Ndahiro and Amolo (2025) established that effective management of human, financial, material and technological resources contributed significantly to the performance of housing construction projects in Musanze District. Ishimwe and Gachiri (2024) likewise demonstrated that effective resource allocation supported construction project performance. These findings show that project success depends not only on the availability of resources but also on the efficiency with which those resources are assigned, protected and utilized during project implementation (Ndahiro & Amolo, 2025; Ishimwe & Gachiri, 2024).

Monitoring and evaluation provide important control and learning mechanisms for comparing actual project implementation with planned resource requirements. Regular tracking of resource consumption, variance analysis, reporting and feedback can enable project managers to identify shortages, excessive consumption, cost pressures and schedule risks before they significantly affect project outcomes. Hjelmbrekke et al. (2017) showed that effective governance arrangements can strengthen value creation by linking project strategy, decision-making and control functions, while Too and Weaver (2014) emphasized the importance of governance oversight and management systems in maintaining alignment between project outputs and organizational objectives. In the Nyabiheke Refugee Camp sanitation facilities construction project, resource management was examined through resource identification, estimation and scheduling; wastage minimization, proper handling, storage and task assignment; and monitoring of actual resource use against planned baselines, efficiency, effectiveness, reporting and feedback. Project performance was assessed through quality of delivered outcomes, cost performance, schedule performance and beneficiary satisfaction, reflecting the interconnected nature of resource management and project performance in construction settings (Hjelmbrekke et al., 2017; Too & Weaver, 2014; Project Management Institute, 2021).

Despite growing evidence on construction project management in Rwanda, the dissertation identified a contextual gap concerning resource management practices in sanitation facilities implemented within refugee camps. Earlier studies concentrated mainly on general construction projects, urban infrastructure or other development projects, leaving limited empirical evidence on humanitarian sanitation construction where resource constraints, stakeholder coordination and accountability requirements are particularly pronounced. The problem was therefore not merely whether resources were available, but whether they were systematically planned, efficiently utilised and effectively monitored in ways that improved project outcomes. Addressing this gap was important for understanding which resource management practices made the strongest contribution to performance and which practices required stronger integration into managerial decision-making.

Against this background, the study assessed the effect of project resource management practices on the performance of the sanitation facilities construction project in Nyabiheke Refugee Camp. Attention focused on project resources planning, resources utilisation and assigning tasks, and project resources monitoring and evaluation. By analysing these practices together, the study sought to establish their relationships with project performance and determine their individual contributions when considered simultaneously. The resulting evidence provides a basis for improving resource planning, reducing wastage, strengthening task

allocation and ensuring that monitoring information is converted into corrective action in sanitation construction projects operating in humanitarian settings.

1.1 General Objective

The general objective of the study was to assess the effect of project resource management practices on the performance of the sanitation facilities construction project in Nyabiheke Refugee Camp.

1.2 Specific Objectives

- i. To assess the effect of project resources planning on the performance of the sanitation facilities construction project in Nyabiheke Refugee Camp.
- ii. To assess the effect of project resources utilization and assigning tasks on the performance of the sanitation facilities construction project in Nyabiheke Refugee Camp.
- iii. To assess the effect of project resources monitoring and evaluation on the performance of the sanitation facilities construction project in Nyabiheke Refugee Camp.

2. Literature Review

The literature review presents the theoretical perspectives and empirical evidence that guided the examination of project resource management practices and sanitation facilities construction performance.

2.1 Theoretical Review

The study drew on the Resource-Based View, Project Management Theory and Systems Theory to explain how resource planning, utilisation, coordination and control influence project performance.

2.1.1 Resource-Based View Theory

The Resource-Based View (RBV) explains performance in terms of the resources and capabilities available to an organisation and the manner in which those resources are deployed. Barney (1991) argues that valuable, rare, difficult-to-imitate and non-substitutable resources can provide sustained advantage when they are effectively organised. Applied to the Nyabiheke sanitation facilities construction project, the theory suggests that human skills, finance, construction materials, equipment and managerial capabilities create value only when they are properly identified, scheduled, allocated and utilised. The RBV therefore supports the study variables by explaining why resource planning and efficient

utilisation can improve quality, cost efficiency, schedule adherence and beneficiary satisfaction.

2.1.2 Project Management Theory

Project Management Theory provides a practical basis for coordinating project constraints and resources across the project life cycle. The Project Management Institute (2021) emphasises planning, acquisition, development, management and control of resources so that project teams can achieve intended outcomes. In the study context, the theory links project resources planning, task assignment, utilisation, monitoring and evaluation with project performance. It assumes that effective resource coordination reduces shortages, idle time, wastage and implementation interruptions while strengthening cost control, timely completion and quality delivery. The theory was therefore relevant to explaining how managerial processes convert available project resources into sanitation infrastructure outcomes.

2.1.3 Systems Theory

Systems Theory views a project as a set of interconnected components whose interactions determine overall performance. Von Bertalanffy (1968) emphasised that systems should be understood through the relationships among their constituent parts rather than through isolated elements. Sanitation construction at Nyabiheke Refugee Camp involved planning, resource mobilisation, task execution, contractors, monitoring, beneficiaries and performance outcomes that operated as an interdependent system. A weakness in one component, such as poor estimation, inappropriate storage or delayed corrective action, could affect cost, time, quality and user satisfaction elsewhere in the project. The theory therefore supports an integrated interpretation of project resource management practices.

2.2 Empirical Review

Empirical evidence was reviewed according to the three specific objectives, with emphasis on study context, design, sample, analytical procedures, findings and relevance to project performance.

2.2.1 Project Resources Planning and Project Performance

Kamali, Hakorimana, and Twambazimana (2023) performed research titled Planning a project Practices and Performance of Construction Firms in Rwanda. The study used a descriptive and correlational research approach to target 120 registered construction businesses, from whom 92 project managers were selected using stratified sampling. Structured questionnaires were used to gather data, which were then analyzed using SPSS for descriptive statistics and

multiple regression analysis. The results showed that good resource planning has a substantial impact on project success in terms of cost management, timeliness, and quality.

Ishimwe and Irechukwu (2022) conducted research titled "The Effects of Planning and Delivery on the Performance of Public Construction Activities in Rwanda." The study employed a cross-sectional survey design with a population of 85 public construction projects, from which 70 respondents were selected. Correlation and regression tests were used to assess the data. The analysis found that insufficient planning of financial and material resources was a significant driver to project delays and cost overruns.

Memon, Rahman, and Aziz (2019) investigated the role of asset management in successful building projects in low-income nations. A quantitative research approach was performed using a sample of 150 respondents from Pakistan's construction industry. The data were examined using structural equation modeling (SEM). The study discovered that good resource planning has a significant favorable influence on building project performance, notably on time and expenses optimization.

Kabeza, Niyonkuru, and Semakula (2024) Rwandan development projects' resources planning and performance were studied. The study used a descriptive survey approach and had 76 respondents out of 95 project workers. Data were studied using regression analysis, and the findings showed that good resource planning greatly improved project performance, particularly budget adherence and project sustainability.

Kimanuka (2024), in a study entitled "Effect of Project Resource Planning on Project Performance in Rwanda: A Case of Hinga Weze Project," examined how resource planning practices influence project performance in Rwanda. The study used a cross-sectional research design combining quantitative and qualitative approaches. A census sampling technique was applied to a population of 62 employees involved in the Hinga Weze Project. Data were collected using questionnaires, interviews, and documentary review, while descriptive statistics, correlation, and multiple regression analysis were used for data analysis. The findings revealed that resource identification, scheduling, allocation, skills assessment, and budgeting positively and significantly influenced project performance. The study concluded that effective resource planning contributes greatly to timely completion, cost control, and achievement of project outcomes.

Batamuriza and Dushimimana (2024), in their study titled "Influence of Resource Planning on Project Performance in Rwanda: A Case Study of Construction of New Maternity Project at King Faisal Hospital in Kigali," investigated the relationship between resource

planning and project performance. The study adopted a descriptive research design and targeted 360 respondents, including project staff, consultants, and subcontractors. Data were analyzed using descriptive and inferential statistics. The findings showed that human resource planning, material resource planning, financial resource planning, and time planning had a significant positive effect on project performance. The researchers concluded that effective resource planning improves efficiency, quality, and timely delivery of construction projects in Rwanda.

Rangira and Gathiru (2023), in the study "Effect of Adaptive Planning on Performance of Construction Projects in Rwanda: A Case of Cheetah Construction Services Ltd," examined the role of adaptive planning in improving construction project performance. The study employed a descriptive survey design involving 120 respondents with experience in project management. Data were analyzed using descriptive statistics and correlation analysis. The findings indicated that adaptive planning improves project flexibility, minimizes risks, and enhances project outcomes. The study concluded that planning practices are essential in addressing uncertainties and improving construction project performance in Rwanda.

Nyetweka (2024), in their study titled "Project Planning Practices and Project Performance: A Case of King Faisal Maternity Ward Project Implementation in Gasabo District, Rwanda," assessed the effect of project planning practices on project performance. The study used a descriptive survey research design and collected data from project stakeholders through questionnaires. Data were analyzed using SPSS through descriptive statistics and regression analysis. The findings revealed that scope planning and risk planning positively affected project performance by improving quality, cost management, and timely completion of activities. The study recommended strengthening planning practices in construction projects to enhance project success.

2.2.2 Project Resources Utilisation and Project Performance

Olawale and Sun (2018) did a study entitled Using Resources and Performance in Construction. The study used a method of quantitative investigation with an average number of UK construction enterprises and a sample size of 200 survey participants. The data was evaluated using factor analysis, and regression models. The results showed that optimal resource use considerably decreased project delays and cost increases.

Kamanzi and Mulyungi (2021) investigated the impact of resource use on the performance of construction projects in Rwanda. The study used a descriptive survey approach and included 62 respondents out of 80 project staff. SPSS regression analysis was used to evaluate the

data, and the findings revealed that efficient use of resources and equipment increased building quality while reducing waste.

Amoatey and Ankrah (2019) conducted a study called Resource Optimization Strategies and Construction the performance of projects in Ghana. The study used a cross-sectional survey approach, with 150 construction employees selected. Data were evaluated using multiple regression analysis, which revealed that poor resource usage was a key driver of project cost overruns.

2.2.3 Project Resources Monitoring and Evaluation and Project Performance

Kerzner (2019) conducted a study titled Project Monitoring and Control Practices and Construction Project Performance. The study used an approach to descriptive research with a population of project managers and a sample size of 140 respondents. The data was evaluated using trend analysis and regression methods. The findings showed that efficient control and surveillance techniques led to better cost management and project completion times.

Munyaneza and Habimana (2022) investigated the Monitoring and Control Practices and Performance of Public Construction Projects in Rwanda. The study used a cross-sectional survey approach and recruited 60 respondents from 75 public projects. Data were evaluated using SPSS regression analysis, and the findings revealed that insufficient monitoring resulted in project delays and quality faults.

Too and Weaver (2018) conducted a research entitled Project Management System and the Achievement of Goals in Construction. The study used a qualitative method with an initial sample size of 160 construction professionals. The data was assessed using route analysis, which revealed that robust tracking and control mechanisms considerably improved project performance.

Hjelmbrekke, Klakegg, and Lohne (2019) explored the governance, monitoring, and control of construction projects. The study used a case study research design for significant public infrastructure projects. The data were studied using qualitative content analysis, and the results showed that constant monitoring and effective control mechanisms more transparency and the whole project's success.

3. Methodology

The methodology applied quantitative procedures aligned with the three study objectives and the project resource management variables.

3.1 Research Design

A descriptive and correlational research design guided the study. The descriptive component summarised respondents' assessments of project resources planning, resource utilisation, monitoring and evaluation, and project performance, while the correlational component examined the strength, direction and statistical significance of relationships among the variables.

3.2 Study Population and Sampling

The study focused on personnel involved in the sanitation facilities construction project, including participants from engineering, project management, environmental compliance, monitoring and evaluation, finance and WASAC-related functions. The wider dissertation identified 126 project implementers and project beneficiaries within the study setting. Purposive sampling was applied to select participants with direct knowledge of project implementation, and 96 completed questionnaires formed the quantitative dataset analysed in the study.

3.3 Data Collection Instrument

Quantitative data were collected using a structured questionnaire organised around project resources planning, resource utilisation and task assignment, project resources monitoring and evaluation, and project performance. A five-point Likert scale generated standardised responses suitable for descriptive and inferential statistical analysis. Interview material from the wider study was excluded from the manuscript.

3.4 Pilot Study, Validity and Reliability

The questionnaire was pilot-tested with 10 respondents before the main data collection to assess comprehension and suitability. Feedback from the pilot informed refinement of the instrument. Reliability was judged against the 70% minimum benchmark stated in the dissertation. Content validity was assessed using the Content Validity Index, expressed as $CVI = n/N$, where n represented relevant questionnaire items and N represented the total number of items. No numerical CVI result was reported in the source document.

3.5 Data Analysis

Data were analysed using the Statistical Package for Social Sciences (SPSS). Means and standard deviations summarised responses, Pearson correlation assessed relationships, and multiple regression determined the effects of project resource management practices on performance at the 5% significance level. The model was: $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \varepsilon$, where Y = project

performance; X_1 = resources planning; X_2 = resources utilisation; and X_3 = project resources monitoring and evaluation.

3.6 Ethical Considerations

Participation was voluntary and respondents were informed about the academic purpose of the study. Confidentiality and anonymity were maintained, identifying information was excluded from reporting, and the study followed the relevant institutional authorisation procedures. Data were reported without manipulation and scholarly sources were acknowledged.

4. Results and Discussions

Quantitative findings are presented according to the study objectives before being discussed in relation to the theoretical and empirical literature.

4.1 Inferential Statistics

Inferential analysis examined the relationships between project resource management practices and project performance and then estimated their independent contributions through multiple regression.

4.1.1 Correlation Analysis

Pearson correlation analysis examines the strength and direction of association between project resources planning, resources utilisation, project resources monitoring and evaluation, and sanitation facilities construction performance.

Table 1: Correlations among the Variables of the Study

		Resources planning	Resources Utilization	Project resources M&E	Nyabiheke Sanitation facilities Construction Performance
Resources planning	Pearson Co	1	.879**	.756**	.940**
	Sig. (2-tailed)		.000	.000	.000
	N	96	96	96	96
Resources Utilization	Pearson Co	.879**	1	.847**	.930**
	Sig. (2-tailed)	.000		.000	.000
	N	96	96	96	96
Project resources M&E	Pearson Co	.756**	.847**	1	.810**
	Sig. (2-tailed)	.000	.000		.000
	N	96	96	96	96
Nyabiheke Sanitation facilities Construction Performance	Pearson Co	.940**	.930**	.810**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	96	96	96	96

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

Source: Primary Data (2026)

Table 1 shows strong positive and statistically significant relationships between the three project resource management practices and project performance. Project resources planning recorded the strongest correlation with performance ($r = 0.940$, $p = 0.000$), followed by resources utilisation ($r = 0.930$, $p = 0.000$) and project resources monitoring and evaluation ($r = 0.810$, $p = 0.000$). The results indicate that stronger resource planning, utilisation and monitoring practices were associated with better sanitation facilities construction performance.

4.1.2 Regression Analysis

Multiple regression analysis determines how project resources planning, resources utilisation, and project resources monitoring and evaluation contribute individually and jointly to sanitation facilities construction performance.

Table 2: Model Summary Regression Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.965 ^a	.932	.929	.19238

a. Predictors: (Constant), Project resources M&E, Resources planning, Resources Utilization

Source: Primary Data (2026)

Table 2 indicates a very strong positive relationship between the combined project resource management practices and project performance. The regression model produced a correlation coefficient ($R = 0.965$), suggesting a very strong positive relationship between project resource management practices and the performance of the sanitation facilities construction project in Nyabiheke Refugee Camp. The coefficient of determination ($R^2 = 0.932$) indicates that 93.2% of the variation in project performance is explained jointly by project resources planning, resources utilization, and project resources monitoring and evaluation. This implies that only 6.8% of the variation in project performance is explained by other factors not included in the regression model.

Furthermore, the adjusted coefficient of determination (Adjusted $R^2 = 0.929$) is very close to the R^2 value, indicating that the regression model is stable and provides a reliable explanation of the relationship between the study variables. The standard error of the estimate (0.19238) is relatively low, suggesting that the predicted values are close to the observed values and that the model has a good level of accuracy in predicting project performance. Thus, the findings indicate that project resource management practices play a significant role in determining the performance of sanitation facilities construction projects in Nyabiheke Refugee Camp. The high explanatory power of the model demonstrates that effective planning, efficient utilization, and proper monitoring of project resources collectively contribute to improved project performance.

Table 3: ANOVA Regression Results

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	46.429	3	15.476	418.175	.000 ^b
Residual	3.405	92	.037		
Total	49.833	95			

a. Dependent Variable: Nyabiheke Sanitation facilities Construction Performance
b. Predictors: (Constant), Project resources M&E, Resources planning, Resources Utilization

Source: Primary Data (2026)

Table 3 presents the Analysis of Variance (ANOVA) results for the regression model. The findings show that the regression model is statistically significant, as indicated by an F-statistic of 418.175 with a significance level of $p = 0.000$, which is less than the conventional significance level of 0.05. This implies that the independent variables, when considered together, significantly predict the performance of the sanitation facilities construction project in Nyabiheke Refugee Camp.

The regression sum of squares (46.429) is substantially higher than the residual sum of squares (3.405), indicating that a large proportion of the variation in

project performance is explained by the project resource management practices included in the model. The relatively small residual variance further confirms that only a small proportion of project performance remains unexplained. These findings demonstrate that the regression model provides a good fit for the data and is appropriate for explaining the relationship between project resource management practices and project performance. Therefore, it can be concluded that project resources planning, resources utilization, and project resources monitoring and evaluation jointly have a statistically significant influence on the performance of sanitation facilities construction projects in Nyabiheke Refugee Camp.

Table 4: Multiple Regression Coefficients Results

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1 (Constant)	.227	.147		1.540	.127
Resources planning	.557	.060	.535	9.341	.000
Resources Utilization	.342	.059	.412	5.836	.000
Project resources M&E	.057	.052	.056	1.087	.280

Source: Primary Data (2026)

Table 4 presents the multiple regression coefficients showing the individual contribution of each project resource management practice to the performance of the sanitation facilities construction project in Nyabiheke Refugee Camp.

The regression equation shows that, holding all other factors constant, project performance is expected to increase by 0.557 units for every one-unit improvement in project resources planning, 0.342 units for every one-unit improvement in resources utilization, and 0.057 units for every one-unit improvement in project resources monitoring and evaluation. The constant value (0.227) indicates the expected level of project performance when all the independent variables are held at zero.

The findings further reveal that project resources planning has a positive and statistically significant effect on the performance of the sanitation facilities construction project ($B = 0.557$, $\beta = 0.535$, $t = 9.341$, $p = 0.000$). Since the p-value is less than the 0.05 significance level, the effect is statistically significant. This implies that improving project resources planning significantly enhances project performance. Among the three predictor variables, project resources planning has the highest standardized beta coefficient ($\beta = 0.535$), making it the strongest predictor of project performance. This finding suggests that effective identification of resource requirements, realistic resource estimation, proper scheduling, and timely planning are critical factors for achieving successful sanitation facilities construction projects in Nyabiheke Refugee Camp.

Similarly, resources utilization was found to have a positive and statistically significant influence on project performance ($B = 0.342$, $\beta = 0.412$, $t = 5.836$, $p = 0.000$). The positive regression coefficient indicates that efficient utilization of project resources contributes significantly to improving project performance. Specifically, a one-unit improvement in resources utilization results in a 0.342-unit increase in project performance while holding other variables constant. The standardized beta coefficient ($\beta = 0.412$) further demonstrates that resources utilization is the second most influential predictor of project performance. This finding implies that assigning tasks according to employees' skills, minimizing resource wastage, and ensuring efficient allocation and use of available resources contribute substantially to the successful implementation of sanitation facilities construction projects.

In contrast, project resources monitoring and evaluation was found to have a positive but statistically insignificant effect on project performance ($B = 0.057$, $\beta = 0.056$, $t =$

1.087, $p = 0.280$). Although the regression coefficient is positive, indicating that improvements in monitoring and evaluation are associated with improved project performance, the p-value is greater than the 0.05 level of significance. This means that project resources monitoring and evaluation does not independently predict project performance after controlling for the effects of project resources planning and resources utilization. Therefore, its contribution to explaining project performance in this study is not statistically significant.

Overall, the regression results demonstrate that project resource management practices positively influence the performance of sanitation facilities construction projects in Nyabiheke Refugee Camp. However, only project resources planning and resources utilization make statistically significant contributions to project performance. Project resources planning emerged as the strongest predictor of project performance, followed by resources utilization, while project resources monitoring and evaluation, despite having a positive coefficient, did not significantly influence project performance. These findings suggest that greater emphasis should be placed on strengthening resource planning and improving resource utilization practices to enhance the performance of sanitation facilities construction projects in Nyabiheke Refugee Camp.

4.2 Discussion of Research Findings

The discussion relates the regression and correlation findings to the theoretical perspectives and previous literature while keeping table interpretations focused on the study data.

4.2.1 Project Resources Planning and Project Performance

Project resources planning emerged as the strongest predictor of sanitation facilities construction performance. The finding indicates that identifying resource requirements, estimating quantities realistically, preparing resource schedules and communicating resource needs are fundamental to effective project implementation. Kimanuka (2024) similarly established a strong positive relationship between resource planning practices and Hinga Weze Project performance, showing that resource identification, scheduling, allocation, skills assessment and budgeting jointly explained a substantial share of performance. Batamuriza and Dushimimana (2024) also found that human, material, financial and time resource planning positively influenced the performance of the

King Faisal Hospital maternity project. The convergence of these studies with the Nyabiheke findings indicates that construction performance improves when resource planning begins early and remains aligned with project priorities throughout implementation.

The result is also consistent with the Resource-Based View because planning helps project managers organise available human, material, financial and technical resources so that they generate greater value. Within a refugee-camp setting, where resources are constrained and delays in mobilising essential inputs can directly affect sanitation services, systematic planning reduces uncertainty and strengthens coordination. The evidence therefore supports institutionalising formal resource identification, estimation and scheduling tools rather than treating planning as a one-off activity at project commencement.

4.2.2 Project Resources Utilisation and Project Performance

Resources utilisation produced the second strongest independent effect on sanitation facilities construction performance. This finding shows that project outcomes depend on how efficiently available resources are assigned and used after they have been mobilised. Ndahiro and Amolo (2025) found that effective management of human, financial, material and technological resources improved housing construction performance in Musanze District. Ishimwe and Gachiri (2024) likewise identified resource allocation as an important component of project planning and construction performance. Both studies support the Nyabiheke result by demonstrating that productivity, cost efficiency and implementation progress improve when resources are matched with tasks and used in accordance with project priorities.

The result further reflects the Resource-Based View, which emphasises that resources create value through effective deployment rather than mere possession. For the Nyabiheke project, competency-based task assignment, reduction of idle resources and control of wastage were therefore important performance mechanisms. The dissertation also identified weaker practices in material handling and preservation, indicating that additional performance gains could be achieved through improved storage, inventory control, transportation and equipment maintenance.

4.2.3 Project Resources Monitoring and Evaluation and Project Performance

Project resources monitoring and evaluation had a strong positive bivariate relationship with project performance but did not retain a statistically significant independent effect after resources planning and utilisation were considered simultaneously. This suggests that

monitoring and evaluation function mainly as supportive management mechanisms whose value depends on how findings are used. Hjelmbrekke et al. (2017) showed that construction project governance can strengthen value creation by linking strategy, decision-making and control functions. Too and Weaver (2014) similarly emphasised governance oversight and effective project management systems as mechanisms for maintaining alignment between project outputs and organisational objectives. These perspectives support the present finding that monitoring information becomes valuable when it informs timely managerial action.

From a Systems Theory perspective, monitoring and evaluation connect resource use with other project components by identifying deviations and generating feedback. Their comparatively weaker independent effect does not imply that they are unimportant; rather, it indicates that tracking, reporting and variance analysis alone cannot improve performance unless project managers use the information to revise plans, reallocate resources and correct implementation problems. Strengthening the link between monitoring results and operational decisions is therefore essential for improving sanitation construction outcomes.

5. Conclusions and Recommendations

Conclusions were drawn from the major findings, while recommendations focus on strengthening project resource management and sanitation facilities construction performance.

5.1 Conclusion

The study concludes that project resource management practices are central to the performance of sanitation facilities construction projects in humanitarian settings. Project resources planning plays the most important role because it establishes what resources are required, when they are needed and how they should be coordinated. Effective planning reduces uncertainty, supports timely mobilisation of inputs and creates a foundation for cost, schedule and quality control.

Resource utilisation is also essential because available human, financial, material and equipment resources must be matched with project priorities and used economically. Competency-based task assignment, reduced idle time, proper allocation and stronger control of material wastage can improve implementation efficiency. Monitoring and evaluation remain important for accountability, transparency and learning, but their contribution depends on whether monitoring information is converted into corrective decisions. Overall, integrated planning, efficient utilisation and results-oriented monitoring provide a stronger basis for delivering safe,

functional and satisfactory sanitation facilities in Nyabiheke Refugee Camp.

5.2 Recommendations

Based on the study findings and conclusions, the following recommendations were proposed to improve the identified areas

1. Humanitarian organizations and implementing partners should institutionalize early and comprehensive resource planning through realistic needs assessment, resource estimation, resource schedules and formal planning tools before and during project implementation.
2. Project managers and construction teams should strengthen competency-based task assignment, minimize idle resources and material wastage, and improve the handling, transportation, storage and maintenance of construction materials and equipment.
3. Monitoring and evaluation systems should be linked directly to management decisions by requiring resource-use reports, variance analyses and beneficiary feedback to trigger timely corrective actions and updates to resource plans.
4. MINEMA, district authorities, donors and development partners should support coordinated oversight, staff capacity building and appropriate digital resource-management tools to improve transparency, accountability and sustainability in humanitarian construction projects.

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