# Effect of monitoring and evaluation practices on performance of projects. A case of Rugano Mushubi -Peru water supply system project in Nyamagabe District, Rwanda

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## ABSTRACT

Despite infrastructure expansion, intermittent water supply remains a challenge in many developing contexts, with some communities receiving water for only a few hours per day. Such inconsistencies undermine the effectiveness and sustainability of water supply projects, where reliability is a key measure of performance. This study examined the effect of monitoring and evaluation (M&E) practices on the performance of the Rugano–Mushubi–Peru Water Supply System Project in Nyamagabe District, Rwanda. Specifically, the study assessed the influence of M&E planning, capacity building, data collection, and reporting on project performance. The study was guided by Systems Theory, Human Capital Theory, Resource-Based View Theory, and Theory of Change. A descriptive correlational research design was adopted using a quantitative approach. The target population comprised 344 respondents, and a sample of 185 respondents was determined using Cochran's formula and selected through simple random sampling. Data were collected using structured questionnaires and interviews and analyzed using SPSS through descriptive statistics, Pearson correlation, and multiple regression analysis. The findings revealed that M&E practices significantly influenced project performance. Specifically, M&E planning ($B = 0.224$, $p < 0.001$), capacity building ($B = 0.312$, $p < 0.001$), data collection ($B = 0.251$, $p < 0.001$), and reporting ($B = 0.313$, $p < 0.001$) had positive and significant effects on project performance. The study concluded that effective M&E practices strengthen project planning, staff capacity, evidence generation, accountability, and implementation control, thereby improving water supply project performance. The study recommends strengthening institutionalized M&E systems through clear monitoring schedules, continuous capacity development, reliable data systems, and effective reporting mechanisms to enhance sustainability and service delivery in water supply projects.

**Keywords:** Evidence-Based Management; Infrastructure Development; Monitoring and Evaluation Practices; Project Performance; Rwanda, Water Supply Systems

## I. INTRODUCTION

Monitoring and evaluation practices have become a central component in improving the performance of development projects, particularly in the water supply sector. Across the world, increasing pressure to ensure accountability, transparency, and value for money has led governments and development partners to institutionalize Monitoring and evaluation (M&E) systems in project implementation. Water supply projects, which are critical for achieving Sustainable Development Goal six on clean water and sanitation, rely heavily on effective monitoring frameworks to track progress and ensure sustainability. Globally, studies indicate that projects with well-structured M&E systems demonstrate higher levels of efficiency, effectiveness, and long-term impact compared to those with weak or absent systems (Kusek & Rist, 2004).

Monitoring and evaluation practices are highly institutionalized within public infrastructure and water management projects in the United States. Federal agencies such as the Environmental Protection Agency emphasize performance measurement, compliance monitoring, and data driven decision making in water supply initiatives. M&E systems are integrated into project planning and implementation through the use of performance indicators, digital data systems, and regular reporting mechanisms. Evidence shows that strong M&E practices have contributed to improved service delivery, reduced project delays, and enhanced sustainability of water infrastructure projects across various states (GAO, 2023).

Monitoring and evaluation practices in China are integrated into large-scale infrastructure and water supply projects through centralized planning and advanced technological systems. The government utilizes digital monitoring platforms, performance indicators, and regular reporting mechanisms to track project progress. These systems enable

timely identification of implementation challenges and support corrective actions. Evidence suggests that strong monitoring and evaluation practices in China have enhanced efficiency, accountability, and sustainability of water infrastructure projects (Mushayi, & Mpundu, 2025).

In Germany, monitoring and evaluation practices are characterized by precision, strong regulatory compliance, and emphasis on efficiency in infrastructure development. Water supply projects are closely monitored through performance standards, environmental regulations, and advanced engineering systems. Monitoring frameworks focus on quality assurance, cost efficiency, and sustainability. Studies indicate that these rigorous monitoring systems have contributed to high performance and reliability of water supply infrastructure in Germany (Ovcina, & Arslanagic-Kalajdzic, 2024).

Monitoring and evaluation practices in Spain have increasingly been recognized as critical determinants of project performance, particularly in public infrastructure and water management projects. Empirical research on Spanish infrastructure projects shows that structured monitoring systems, including planning frameworks and performance indicators, significantly influence project efficiency and effectiveness. A study examining infrastructure project governance in Spain found that projects with clearly defined monitoring and evaluation plans experienced improved performance outcomes, including reduced delays and better resource utilization. The study reported that the use of formal monitoring frameworks contributed to improved project delivery, with performance improvements reflected in reduced cost overruns and enhanced operational efficiency (Sánchez et al., 2021).

Empirical evidence from Spain highlights the importance of monitoring and evaluation capacity building in enhancing project performance. Research on project management practices in Spanish public sector projects found that organizations investing in staff training and technical capacity achieved better performance outcomes compared to those with limited capacity development. The study reported that capacity building had a significant positive effect on project success, with statistical results showing that trained teams improved project efficiency and effectiveness by over 25% compared to projects with limited M&E capacity. This demonstrates that human resource capability is a key driver of project performance in Spain (García-Sánchez et al., 2025).

England's monitoring and evaluation practices are guided by strict regulatory frameworks and accountability mechanisms in public infrastructure projects. Water supply projects are evaluated based on performance indicators related to service delivery, environmental sustainability, and cost efficiency. Regular audits, performance reporting, and stakeholder engagement are key components of monitoring systems. Evidence shows that effective monitoring and evaluation practices have improved project performance and service reliability in the water sector (Jalil, et al, 2024). In South Africa, monitoring and evaluation practices have gained importance in addressing challenges related to water access and infrastructure performance. Government and development partners have implemented monitoring systems to improve project oversight and accountability. However, challenges such as limited technical capacity and resource constraints affect the effectiveness of these systems. Despite these challenges, strengthened monitoring and evaluation practices have contributed to improved project performance and service delivery in water supply initiatives (Machete & Marques, 2023).

Kenya's monitoring and evaluation practices are widely applied in water supply projects to enhance efficiency, accountability, and sustainability. Government agencies and development partners emphasize the use of performance indicators, routine monitoring, and evaluation frameworks. Monitoring systems have improved project implementation by identifying challenges early and supporting timely decision-making. Evidence indicates that effective monitoring and evaluation practices have significantly improved water service delivery in both urban and rural areas (Kimatu & Musembi, 2024). Uganda monitoring and evaluation practices have been recognized as critical in improving the performance of water supply projects. The government has adopted results-based monitoring systems to track project implementation and ensure accountability. Monitoring activities include data collection, reporting, and performance reviews. Studies show that effective monitoring and evaluation practices have enhanced project efficiency, transparency, and sustainability in Uganda's water sector (Ishimwe & Gachiri, 2025)

Monitoring and evaluation practices have become central to project management, particularly in infrastructure and water supply projects aligned with national development priorities in Rwanda. The government has adopted results-based management approaches to improve project performance and ensure accountability. Despite these efforts, some water supply projects face challenges related to sustainability, maintenance, and service delivery, partly due to gaps in monitoring and evaluation planning, capacity, data collection, and reporting. This creates the need to evaluate how monitoring and evaluation practices influence the performance of projects such as the Rugano Mushubi-Peru Water Supply System in Nyamagabe District (Ministry of Infrastructure [MININFRA], 2023).

In Rwanda, monitoring and evaluation practices have increasingly been recognized as critical mechanisms for improving the performance of development projects, particularly in sectors such as water supply, health, and infrastructure. The Government of Rwanda has adopted results-based management approaches to enhance accountability, efficiency, and effectiveness in project implementation. Monitoring and evaluation planning, which includes setting clear indicators and performance targets, has been emphasized as a key tool for tracking progress and

ensuring that projects align with national development priorities. Empirical evidence shows that projects with well-structured M&E planning frameworks in Rwanda tend to demonstrate improved coordination, timely implementation, and better achievement of project objectives (Ishimwe & Gachiri, 2025).

Monitoring and evaluation capacity building has also been identified as a significant factor influencing project performance in Rwanda. Studies indicate that the availability of trained personnel, technical expertise, and institutional support enhances the effectiveness of monitoring systems. For instance, research on development and health projects in Rwanda found that capacity building contributes significantly to project performance, with combined monitoring variables explaining up to 83.2% of variation in project outcomes. This suggests that strengthening staff competencies and institutional systems improves data quality, supports informed decision-making, and enhances project sustainability (Rutikanga & Gachili, 2024).

Rugano–Mushubi–Peru Water Supply System Project is a rural water infrastructure initiative located in Nyamagabe District. Its development is closely linked to Rwanda's broader efforts to improve access to safe water in rural areas, especially after long-standing challenges related to sustainability and service delivery in the water sector. Rugano–Mushubi–Peru system emerged within this decentralized and donor-supported framework as part of efforts to expand rural water access and improve service reliability. The project specifically involves a pipeline network of approximately 11.6 km, designed to supply safe drinking water to communities in the area. Over time, the system has required rehabilitation and upgrading, indicating that it is not a newly established project but rather part of earlier water infrastructure that needed modernization to ensure sustainability and efficiency. District-level decisions, including those taken around 2022, prioritized its rehabilitation to restore functionality and improve service coverage Ministry of Infrastructure (MININFRA, 2022).

### 1.1 Statement of the Problem

Rwanda has continued to invest in water supply infrastructure, yet the poor performance of water supply projects remains a serious concern because many projects still experience delays, cost pressures, variations, weak functionality, and sustainability challenges. Recent national statistics show that access to improved drinking water sources increased from 87% in 2016/17 to 90% in 2023/24. However, only 68% of households had basic drinking water service, while 21% relied on limited drinking water services, requiring more than 30 minutes to access water. In addition, household satisfaction with the reliability of drinking water sources declined from 53% in 2016/17 to 45% in 2023/24. These findings indicate that although water infrastructure coverage has expanded, challenges remain in ensuring reliable and satisfactory service delivery (National Institute of Statistics of Rwanda [NISR], 2025).

In 2023/24, only 31.7% of households were within 200 meters of an improved drinking water source, while 52.7% were within 500 meters. Rural households were more disadvantaged, with only 18.7% located within 200 meters and 42.5% within 500 meters of an improved drinking water source, compared to 59.8% and 77.4% respectively in urban areas. This indicates that several water supply projects still fail to meet expected standards of proximity, convenience, and equitable access, especially in rural communities where long walking distances continue to affect households (NISR, 2025).

Poor performance of water supply projects is further shown by implementation delays, project variations, and cost-related pressures. The Water and Sanitation Sector Strategic Plan 2024–2029 indicates that Rwanda's water production capacity increased from 182,120 m³/day in 2017 to 329,652 m³/day in 2024, while the water distribution network expanded from 29,342 km to 33,476 km. However, the same sector review identifies delays in project implementation caused by budget constraints, institutional capacity weaknesses, complex processes, and disruptions that increased implementation costs (MININFRA, 2024). Sustainability issues remain critical in Rwanda's water supply projects. Sector data show that 430 non-functional rural water supply systems were identified, of which only 191 had been fully restored and 74 were still under rehabilitation. This means a considerable number of systems still required attention, showing persistent weaknesses in operation, maintenance, and long-term functionality. In addition, non-revenue water remained high at 39% in 2023/24, mainly linked to outdated infrastructure, leakage, and infrastructure limitations (MININFRA, 2024).

Recent information from WASAC shows that Nyamagabe District had only 59% water access before the launch of the Nyamagabe WASH Program. The program requires an investment of USD 62 million and includes construction of new water treatment plants at Rukarara and Mbirurume, strengthening Gisuma Water Treatment Plant to 1,700 m³/day, and rehabilitation and extension of 46 existing water supply systems. The need for such large rehabilitation and expansion confirms that water supply systems in the district face major performance gaps related to coverage, functionality, maintenance, and sustainability (WASAC Group, 2025). Although previous studies have explored general factors influencing project performance, there is limited empirical evidence focusing on how specific monitoring and evaluation practices affect the performance of water supply projects in Rwanda. Therefore, this study sought to evaluate the effect of monitoring and evaluation practices, namely monitoring and evaluation planning, capacity building, data

collection, and reporting, on the performance of the Rugano Mushubi-Peru Water Supply System Project in Nyamagabe District. The findings provided insights into how strengthening these practices can improve project performance.

### 1.2 Research Objectives

i. To evaluate the effect of monitoring and evaluation planning on performance of water supply project in Nyamagabe district.
ii. To examine the effect of monitoring and evaluation capacity building on performance of water supply project in Nyamagabe district.
iii. To assess the effect of monitoring and evaluation data collection on performance of water supply project in Nyamagabe district.
iv. To analyze the effect of monitoring and evaluation reporting on performance of water supply project in Nyamagabe district.

## II. LITERATURE REVIEW

### 2.1 Theoretical Review

#### 2.1.1 Systems Theory

Systems Theory was developed by Ludwig von Bertalanffy (1968) and explains projects as sets of interrelated parts whose effectiveness depends on how well those parts work together. In the context of monitoring and evaluation, the theory explains why planning, capacity building, data collection, and reporting should not be treated as isolated activities. Instead, they are connected functions within one project system, where weakness in one function can reduce the effectiveness of the others. Recent systems scholarship emphasizes that meaningful change requires attention to interrelationships, multiple perspectives, and adaptive feedback, all of which are central to monitoring and evaluation practice in complex interventions such as water supply projects (Reynolds, 2024).

The theory is especially useful for this study because water supply projects operate through technical, managerial, social, and institutional subsystems that must remain coordinated if performance is to be sustained. Monitoring and evaluation planning helps organize these subsystems around shared indicators and expectations, while data collection and reporting create feedback loops for corrective action. Where monitoring systems are weak, reporting is delayed, or staff capacity is low, the project's ability to respond to change becomes limited (Aal, 2025; Reynolds, 2024).

#### 2.2.2 Human Capital Theory

Human Capital Theory was developed by Schultz (1961) and further advanced by Becker (1964), who emphasized that individuals' knowledge, skills, education, and competencies represent forms of capital that can be enhanced through deliberate investment in training and development. The theory posits that education, training, and experience enhance the productive capacity of individuals, thereby increasing their value in the labor market and contributing to organizational performance. In this perspective, human beings are not merely labor inputs but assets whose capabilities can be strengthened to generate long-term returns (Kusek & Rist, 2004).

Human Capital Theory assumes that investments in human development such as formal education, professional training, mentorship, and health improvement lead to increased efficiency, innovation, and productivity. Organizations that allocate resources toward capacity building are more likely to achieve improved outcomes because skilled employees can perform tasks more effectively, make informed decisions, and adapt to dynamic environments. The returns on human capital investment are reflected in higher performance, reduced operational inefficiencies, and improved competitiveness (Ovcina & Arslanagic-Kalajdzic, 2024). Human Capital Theory explains the effect of monitoring and evaluation capacity building on project performance. In this study, capacity building through training, mentorship, and technical skill development enables project staff to effectively design, implement, and interpret monitoring and evaluation activities. Skilled personnel are able to generate accurate insights, improve decision-making, and enhance accountability, thereby contributing to better performance of water supply projects.

#### 2.2.3 Resource-Based View Theory

Resource-Based View Theory, developed by Barney (1991), explains performance differences in terms of the internal resources and capabilities available to an organization or project. In a monitoring and evaluation context, these resources include trained staff, technical systems, data management tools, institutional support, and analytical competence. Recent project-organising research shows that capability-based thinking is increasingly important in explaining how project-based organisations initiate, manage, and deliver results. This is relevant to the present study because the effectiveness of M&E planning, data collection, and reporting depends heavily on whether the project has the internal capacity and systems needed to implement these functions well (Leiringer & Zhang, 2021).

The theory is especially suitable for the variable of monitoring and evaluation capacity building. Capacity building becomes a strategic investment in valuable project capabilities that can improve implementation and performance. When project staffs are trained in indicator development, field data capture, analysis, and interpretation, the project acquires stronger internal capability to monitor progress and respond to problems (Leiringer & Zhang, 2021). Stronger M&E capabilities can therefore enhance project performance through better oversight, faster adjustment, and more informed project control (Ovcina & Arslanagic-Kalajdzic, 2024).

### 2.2.4 Theory of Change

A Theory of Change is a structured explanation of how intended interventions lead to desired outcomes through clearly defined causal pathways, assumptions, and enabling conditions. The concept was formally developed by Weiss (1995), who argued that many programs operate on implicit assumptions about how change occurs, limiting effective planning and evaluation. By making the logic of change explicit, Theory of Change improves learning, accountability, and the assessment of whether interventions contribute to intended outcomes. The approach strengthens causal reasoning by explaining the processes through which activities produce outputs and outcomes. Anderson (2005) emphasized that Theory of Change provides a roadmap that links interventions with expected results while identifying assumptions that influence success. Similarly, Vogel (2012) noted that Theory of Change helps organizations understand complex change processes by clarifying relationships between actions, intermediate outcomes, and long-term impacts.

The Theory of Change is relevant in explaining the effect of monitoring and evaluation reporting on project performance because it emphasizes the link between project activities, evidence generation, learning, and expected outcomes. Monitoring and evaluation reporting provides systematic information on project progress, outputs, challenges, and achievements, enabling stakeholders to determine whether interventions are moving toward intended results. Through feedback and adaptation, reporting strengthens accountability, supports evidence-based decision-making, and contributes to improved performance of water supply projects in Nyamagabe District.

## 2.2 Empirical Review

### 2.2.1 Monitoring and Evaluation Planning and Project Performance

Hussain *et al.* (2026) examined the effect of monitoring and evaluation planning on infrastructure project performance in Pakistan using a quantitative survey design involving 210 project managers. Regression analysis showed that M&E planning had a significant positive effect on project performance ($\beta = 0.61$, $p < 0.05$), with well-defined planning frameworks improving schedule adherence by 34%. In Kenya, Kimote and Muchai (2024) assessed monitoring and evaluation planning in donor-funded projects using a correlational research design involving 132 project officers. The findings revealed a positive and significant relationship between M&E planning and project effectiveness ($r = 0.72$, $p < 0.01$), with projects having structured planning recording a mean performance score of 4.3. The study concluded that comprehensive planning enhances clarity of objectives and performance tracking and recommended participatory planning approaches. These findings are consistent with broader evidence that effective planning establishes clear indicators, responsibilities, timelines, and mechanisms for tracking project progress.

Similarly, Vanessa and Gitahi (2023), in a study of community-based projects involving 98 stakeholders, reported a strong positive relationship between monitoring and evaluation planning and project performance ($r = 0.69$), with a mean performance score of 4.2. The authors emphasized improved coordination and resource utilization through effective planning. Although these studies provide evidence from Rwanda, they do not specifically focus on water supply projects in Nyamagabe District, creating a contextual gap that the present study seeks to address.

### 2.2.2 Monitoring and Evaluation Capacity Building and Project Performance

Tengan et al., (2021) investigated monitoring and evaluation capacity building in public infrastructure projects in Malaysia using data from 198 project professionals. Multiple regression analysis showed that M&E capacity building significantly improved project performance ($\beta = 0.63$, $p < 0.05$), with trained personnel associated with a 37% higher completion rate. Kanyi and James (2023) examined monitoring and evaluation capacity building in donor-funded projects using data from 140 project staff. The findings showed a strong positive relationship between capacity building and project performance ($r = 0.71$, $p < 0.01$), with projects implementing continuous training recording mean effectiveness scores of 4.2. The study concluded that technical and analytical skills improve monitoring accuracy and project outcomes. These findings are supported by evidence from other African settings, where inadequate skills and limited institutional capacity have been identified as constraints to effective monitoring, reporting, and decision-making. The studies consequently recommend integrating capacity building into project design and allocating sufficient resources for staff development.

In Rwanda, Uwanyirigira (2022) examined monitoring and evaluation capacity building in development projects and found a significant positive effect on project performance ($\beta = 0.55$, $p < 0.05$), with structured training programmes associated with a 35% increase in successful implementation outcomes. The study concluded that skilled

personnel strengthen monitoring, reporting, and decision-making and recommended continuous professional training, mentorship, and knowledge transfer. However, limited evidence specifically addresses M&E capacity building within water supply projects in Nyamagabe District, which provides a basis for the present study.

### 2.2.3 Monitoring and Evaluation Data Collection and Project Performance

Thambura *et al.* (2023) examined monitoring and evaluation data collection practices and performance of livelihood programmes at Caritas, Catholic Diocese of Meru, Kenya, using questionnaires, key informant interviews, and focus group discussions among 215 participants. The study reported a positive and statistically significant relationship between M&E data collection and programme performance, $r(207) = .453$, $p < .05$. Similarly, Jalil (2024), in Pakistan, found that monitoring and evaluation technical capacity and stakeholder participation had significant positive effects on project performance, emphasizing the importance of technically competent teams and participatory information flows.

Uwibambe and Njenga (2025) found strong support for baseline surveys in the Electricity Access Rollout Programme, with 53.3% of respondents strongly agreeing and 40.0% agreeing on their importance, producing a mean score of 4.47. The studies concluded that reliable baseline data and information systems strengthen target setting, progress tracking, and project evaluation. However, the available Rwanda-based studies focus on adaptation and electricity projects rather than water supply systems, leaving a contextual gap that the present study addresses in the Rugano Mushubi-Peru Water Supply System Project.

### 2.2.4 Monitoring and Evaluation Reporting and Project Performance

Ovcina and Arslanagic-Kalajdzic (2024) examined monitoring and evaluation and project implementation management systems in non-profit project performance in Bosnia and Herzegovina. The study found that monitoring and financial information systems contributed to knowledge internalization, accumulation, and transfer, which positively affected project performance. The study emphasized that monitoring information should not merely be collected but systematically processed and transferred for managerial use. Similarly, Ongukah and Otara (2025), in Kenya, examined monitoring and evaluation reporting and completion of infrastructure projects in public secondary schools and concluded that stronger reporting routines improve internal efficiency and project management. These findings suggest that timely and structured reporting enables project stakeholders to translate monitoring information into planning and decision-making.

Evidence from Rwanda further supports the relationship between M&E reporting and project performance. Rutikanga and Gachiri (2024) found that monitoring and evaluation reporting and decision-making had a strong positive effect on the performance of health-funded projects, with a coefficient of 1.307, standardized beta of 0.795, and p-value of 0.000. The predictors collectively explained approximately 83.2% of the variability in project performance. These findings indicate that timely, informative, and actionable reporting can strengthen project performance. Nevertheless, the studies were conducted in health and tourism sectors, respectively, rather than water supply projects, underscoring the need to examine the effect of M&E reporting on the performance of the Rugano Mushubi-Peru Water Supply System Project in Nyamagabe District.

## III. METHODOLOGY

### 3.1 Research Design

This study adopted a descriptive and correlational research design using quantitative and qualitative approaches. According to Creswell (2023), research design provides a framework for collecting and analyzing data to answer research questions. The descriptive design enabled the researcher to describe monitoring and evaluation practices in the Rugano Mushubi-Peru Water Supply System Project, while the correlational design examined the relationship between M&E practices and project performance. Questionnaires provided quantitative data, while interviews provided qualitative information to supplement the findings.

### 3.2 Target Population

The target population consisted of 344 employees and stakeholders directly involved in the Rugano Mushubi-Peru Water Supply System Project in Nyamagabe District (Rugano Mushubi-Peru Water Supply Project, 2025).

### 3.3 Sampling and Sample Size

The sample size was determined using Cochran(1977)) formula with a 5% margin of error.

$$n = \frac{N}{1 + N(e)^2}$$

In this formula, n represents the size of the sample, N the number of participants.

$$n=\frac{344}{1+344(0.05)^2}$$

n= 187

Therefore, the study sample consisted of 185 respondents. Stratified sampling was used to categorize respondents into four groups, followed by simple random sampling to select respondents from each group.

### 3.4 Data Collection Instruments and Procedures

The study used questionnaires, interviews, and documentation review to collect quantitative and qualitative data. Documentation review covered relevant project reports, schedules, audit reports, risk registers, contracts, and financial records. Structured questionnaires were administered to the 185 respondents using a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Semi-structured interviews were conducted with selected project managers and supervisors to obtain additional information on M&E practices and project performance.

### 3.6 Data Analysis

Quantitative data were edited, coded, entered, and analyzed using SPSS Version 29, while qualitative data were analyzed thematically. Descriptive statistics included frequencies, percentages, means, and standard deviations. Pearson correlation was used to determine the strength and direction of relationships between M&E practices and project performance, while multiple regression was used to determine their combined effect at the 0.05 significance level.
The regression model was:

$$Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\varepsilon$$

Where Y = project performance; $X_1$ = M&E planning; $X_2$ = M&E capacity building; $X_3$ = M&E data collection; $X_4$= M&E reporting; $\beta_0$ = constant; $\beta_1$–$\beta_4$ = regression coefficients; and $\varepsilon$ = error term.

### 3.7 Ethical Considerations

Permission to conduct the study was obtained from the University of Kigali and relevant authorities in Nyamagabe District. Participation was voluntary, and respondents were informed about the purpose of the study and their right to withdraw at any time. Confidentiality and anonymity were maintained, and information collected was used only for academic purposes. The researcher also ensured that participants were not exposed to harm and that all sources were appropriately acknowledged using APA referencing style.

## IV. FINDINGS & DISCUSSION

### 4.1 Response Rate

The results in Table 4.1 indicate the response rate of respondents who participated in the study on monitoring and evaluation practices and performance of the Rugano-Mushubi-Peru Water Supply System Project. Returned complete questionnaires were 170, representing 91.9%, which provided a strong basis for data analysis. Unreturned or incomplete questionnaires were 15, representing 8.1%, and this was mainly linked to some respondents being unavailable during collection time and others submitting forms with missing responses. This response level was adequate because it captured the views of the main groups involved in the project and reduced the risk of relying on insufficient data.

**Table 1**

*Response Rate*

| Response category | Frequency | Percent |
|---|---|---|
| Returned complete questionnaires | 170 | 91.9 |
| Unreturned or incomplete questionnaires | 15 | 8.1 |
| Total | 185 | 100.0 |

#### 4.1.1 Influence of M&E Planning on Performance of Water Supply Projects

Table 2 indicate that M&E planning was positively associated with the performance of the Rugano-Mushubi-Peru Water Supply System Project. The overall mean for M&E planning was 4.23 (SD = 0.422), indicating a high level of M&E planning practices. Target setting based on realistic project milestones recorded the highest mean (M = 4.29),

followed by adequate budget allocation for M&E activities (M = 4.25), clear role definition (M = 4.22), and adherence to a defined M&E activity schedule (M = 4.18). Pearson correlation analysis showed a strong positive and statistically significant relationship between M&E planning and project performance ($r = 0.793$, $p < 0.001$). In the multiple regression model, M&E planning also made a positive and statistically significant contribution to project performance ($B = 0.224$, $\beta = 0.220$, $t = 5.463$, $p < 0.001$).

**Table 2**

*Descriptive Statistics on Monitoring and Evaluation Planning*

| Statements | N | Mean | Std. Deviation |
|---|---|---|---|
| The water supply project adheres to a strictly defined timeline scheduling for all its M&E activities. | 170 | 4.18 | 0.387 |
| There is a clear role definition for every staff member involved in the monitoring of the water project. | 170 | 4.22 | 0.414 |
| The project ensures adequate budget allocation specifically dedicated to monitoring and evaluation tasks. | 170 | 4.25 | 0.433 |
| The process of target setting for water distribution goals is conducted based on realistic project milestones. | 170 | 4.29 | 0.454 |
| Overall | 170 | 4.23 | 0.422 |

The findings in Table 2 suggest that effective M&E planning was reflected in clear scheduling, defined responsibilities, dedicated budgets, and realistic targets. These practices provide a framework for coordinating monitoring activities and identifying deviations between planned and actual project progress. The strong positive correlation further indicates that better M&E planning was associated with better project performance.

The interview findings revealed that respondents considered M&E planning important for coordinating field activities, tracking implementation progress, allocating resources, and identifying delays. The project manager explained that a defined monitoring schedule helped coordinate field visits, progress checks, and reporting meetings, while adherence to the timetable enabled technical teams to compare planned and actual progress and identify implementation delays. Similarly, the site supervisor indicated that a dedicated M&E budget facilitated transportation, communication, and acquisition of data-collection materials, thereby reducing interruptions during field verification. To this end, one respondent stated:

> *"The monitoring schedule helped us coordinate field visits, check progress against the work plan, and identify delays early so that the technical team could respond."* (Project Manager)

Another respondent explained:

> *"Having a specific M&E budget facilitated transport, communication and data collection during site visits, allowing us to verify project activities with fewer interruptions."* (Site Supervisor)

The findings therefore suggest that clear schedules, defined responsibilities, adequate M&E resources, and realistic targets strengthened the monitoring process and supported effective implementation of the water supply project.

### 4.1.2 Influence of M&E Capacity Building on Performance of Water Supply Projects

Table 3 show that the overall mean for M&E capacity building was 4.36 (SD = 0.479), indicating a high level of capacity-building practices. Tool availability for data collection and analysis recorded the highest mean (M = 4.40), followed by availability of constant technical support (M = 4.37), staff competency (M = 4.34), and regular staff training (M = 4.31). Pearson correlation analysis showed a strong positive and statistically significant relationship between M&E capacity building and project performance ($r = 0.792$, $p < 0.001$). In the multiple regression model, M&E capacity building made a positive and statistically significant contribution to project performance ($B = 0.312$, $\beta = 0.309$, $t = 8.432$, $p < 0.001$).

**Table 3**

*Descriptive Statistics on M&E Capacity Building*

| Statement | N | Mean | Std. Deviation |
|---|---|---|---|
| The project prioritizes regular staff training to enhance the M&E skills of the water project team. | 170 | 4.31 | 0.465 |
| The level of skill competency among M&E officers is sufficient to manage the technical requirements of the water supply project. | 170 | 4.34 | 0.476 |
| Constant technical support is available to resolve any digital or mechanical issues in the M&E system. | 170 | 4.37 | 0.484 |
| The tool availability for data collection and analysis is guaranteed throughout the life of the water project. | 170 | 4.4 | 0.491 |
| Overall mean and standard deviation | 170 | 4.36 | 0.479 |

The findings in Table 3 suggest that capacity building through staff training, technical competence, technical support, and availability of appropriate M&E tools strengthened the ability of project personnel to undertake monitoring activities effectively. The relatively high mean scores across all indicators indicate that respondents generally perceived the project team as adequately equipped to undertake M&E activities.

The interview findings revealed that respondents considered staff skills, training, technical support, and availability of appropriate tools important for effective M&E implementation. The M&E officer explained that training and practical experience improved the ability of staff to understand indicators, prepare field checklists, interpret project information, and support evidence-based decisions concerning maintenance and contractor follow-up. Similarly, the project engineer indicated that appropriate M&E tools facilitated field measurements, comparison of actual activities with work plans, and preparation of reliable reports. To this end, one respondent stated:

> *"The training and practical experience helped us understand the indicators, prepare field checklists, and interpret project information when making decisions on maintenance and contractor follow-up."* (M&E Officer)

Another respondent explained:

> *"The availability of the required tools enabled us to take field measurements, compare the work with the plan, and provide evidence for our reports."* (Project Engineer)

The findings therefore suggest that strengthening staff competencies, providing continuous technical support, and ensuring access to appropriate M&E tools enhanced the effectiveness of monitoring activities and supported successful implementation of the water supply project.

### 4.1.3 Influence of M&E Data Collection on Performance of Water Supply Projects

Table 4 show that M&E data collection was 4.17 (SD = 0.374), indicating a high level of data-collection practices. Tool standardization across the project recorded the highest mean (M = 4.23), followed by data timeliness (M = 4.19), data completeness (M = 4.15), and data verification procedures (M = 4.12). Pearson correlation analysis showed a strong positive and statistically significant relationship between M&E data collection and project performance ($r = 0.809$, $p < 0.001$). In the multiple regression model, M&E data collection made a positive and statistically significant contribution to project performance ($B = 0.251$, $\beta = 0.258$, $t = 6.436$, $p < 0.001$).

**Table 4**

*Descriptive Statistics on M&E Data Collection*

| Statement | N | Mean | Std. Deviation |
|---|---|---|---|
| The water supply project has established verification procedures to ensure high data accuracy. | 170 | 4.12 | 0.323 |
| The M&E system captures every required metric to ensure total data completeness regarding water access. | 170 | 4.15 | 0.361 |
| The project emphasizes data timeliness to ensure that water supply issues are reported as they occur. | 170 | 4.19 | 0.392 |
| There is a high level of tool standardization across all regions covered by the water supply project. | 170 | 4.23 | 0.422 |
| Overall mean and standard deviation | 170 | 4.17 | 0.374 |

The findings in Table 4 suggest that standardized tools, timely reporting, complete records, and verification procedures supported the collection of reliable M&E data. Standardized data-collection tools also facilitated consistency

and comparability of information across project sites, while timely data enabled emerging water supply problems to be identified and addressed promptly.

The interview findings revealed that respondents considered data accuracy, completeness, timeliness, and standardization important for effective project monitoring. A local leader explained that timely reporting enabled community leaders and project staff to respond when water points stopped functioning or water pressure weakened. Similarly, the site supervisor indicated that the use of similar forms and verification of information before submission improved comparability across sites and reduced disputes concerning reported project activities. To this end, one respondent stated:

> *"Timely reporting helped us respond when water points stopped working or when water pressure weakened, allowing the responsible teams to follow up on repairs quickly."* (Local Leader)

Another respondent explained:

> *"Using similar forms and checking the information before submission made reports comparable across sites and reduced disagreements about the reported activities."* (Site Supervisor)

These findings suggest that accurate, complete, timely, and standardized data collection strengthened the monitoring process and provided reliable information for decision-making, thereby supporting effective implementation and performance of the water supply project.

### 4.1.4 Influence of Monitoring and Evaluation Planning on Project Success

The findings in Table 5 show that the overall mean for M&E reporting was 4.73 (SD = 0.446), indicating a high level of M&E reporting practices. Feedback provision based on M&E findings recorded the highest mean (M = 4.77), followed by report frequency (M = 4.74), report clarity (M = 4.71), and report accuracy (M = 4.68). Pearson correlation analysis showed a strong positive and statistically significant relationship between M&E reporting and project performance ($r = 0.835$, $p < 0.001$). In the multiple regression model, M&E reporting made a positive and statistically significant contribution to project performance ($B = 0.313$, $\beta = 0.308$, $t = 7.279$, $p < 0.001$).

**Table 5**

*Descriptive Statistics on M&E Reporting*

| Statement | N | Mean | Std. Deviation |
|---|---|---|---|
| All stakeholders trust the report accuracy of the periodic water project performance summaries. | 170 | 4.68 | 0.467 |
| The report clarity of M&E findings allows for easy interpretation by project managers and the community. | 170 | 4.71 | 0.454 |
| The report frequency of the water supply project meets the requirements of the donors and regulatory bodies. | 170 | 4.74 | 0.439 |
| There is a consistent mechanism for feedback provision based on the findings of M&E reports. | 170 | 4.77 | 0.422 |
| Overall mean and standard deviation | 170 | 4.73 | 0.446 |

The findings in Table 5 that accurate clear, timely, and feedback-oriented reporting strengthened communication among project stakeholders and supported the use of M&E findings in project management. The high mean scores across all indicators indicate that respondents generally perceived the reporting system as effective in communicating project performance information and supporting follow-up actions.

The interview findings revealed that respondents considered accurate and clear reporting important for accountability, decision-making, and stakeholder engagement. The project coordinator explained that confidence in M&E reports was strengthened because the information was supported by field observations, site visits, and technical staff records. Similarly, the district water officer indicated that reporting provided a link between technical information generated in the field and decisions made by project managers and district stakeholders. To this end, one respondent stated:

> *"The reports were trusted because they were based on field information, site visits, and records from the technical team. This made it easier for management to discuss the actual issues affecting the project."* (Project Coordinator)

Another respondent explained:

> *"Reporting connected the technical information from the field with decisions by managers and district stakeholders. The feedback provided after reporting meetings strengthened accountability."* (District Water Officer)

### 4.2 Performance of the Water Supply Project

Table 6 indicates that the Rugano-Mushubi-Peru Water Supply System Project recorded a generally high level of performance. The overall mean for project performance was 4.10 (SD = 0.288). Timeliness of project completion recorded the highest mean (M = 4.14), followed by infrastructure and water quality (M = 4.11), cost management (M = 4.08), and achievement of the defined project scope (M = 4.05). These findings indicate that respondents generally perceived the project as performing well in terms of scope, cost, quality, and timeliness.

**Table 6**

*Descriptive Statistics on Performance of Water Supply Projects*

| Statement | N | Mean | Std. Deviation |
|---|---|---|---|
| The water supply project has successfully remained within its defined scope without neglecting planned community sites. | 170 | 4.05 | 0.212 |
| The overall cost of the water project has been managed effectively relative to the initial financial projections. | 170 | 4.08 | 0.276 |
| The quality of the water infrastructure and the supplied water meets the required national safety standards. | 170 | 4.11 | 0.316 |
| The timeliness of the project completion aligns with the original delivery schedule promised to the beneficiaries. | 170 | 4.14 | 0.349 |
| Overall mean and standard deviation | 170 | 4.1 | 0.288 |

The interview findings further indicated that project performance was associated with effective cost control, adherence to implementation schedules, and delivery of the planned infrastructure. The project accountant reported that budget monitoring, expenditure approvals, and review of financial requirements helped control unnecessary expenditure and protects funds allocated to essential infrastructure. A beneficiary representative also noted that implementation progress according to the planned schedule increased community confidence and reduced the burden associated with travelling long distances to obtain water. One respondent stated:

> *"Budget tracking and approval of expenditures helped us control unnecessary spending and ensure that funds remained available for essential project activities."* (Project Accountant)

Another respondent explained:

> *"Progress according to the planned timeline gave households confidence in the project and helped reduce the burden of travelling long distances to collect water."* (Beneficiary Representative)

The quantitative findings were further supported by secondary project records presented in Table 7. The project achieved 100% of its planned scope, including rehabilitation of 11.6 km of the water supply system and construction or rehabilitation of associated infrastructure. Cost management was estimated at 92%, while quality achievement was estimated at 94%. Timeliness was estimated at 72.3%, based on the planned six-month implementation period compared with the reported actual implementation period. The resulting overall performance estimate was 89.6%.

### 4.3 Discussion

#### 4.3.1 Monitoring and Evaluation Planning and Project Performance

The findings established that monitoring and evaluation planning had a strong positive relationship with performance of the Rugano-Mushubi-Peru Water Supply System Project. The high rating on timeline scheduling, role definition, budget allocation, and target setting indicates that proper planning provided a structured basis for organizing monitoring activities and controlling project implementation. This finding is supported by Kusek and Rist (2004), who emphasized that results-based monitoring requires clear indicators, planned timelines, responsible actors, and reporting arrangements.

It also resonates with Celestin (2019), who found that monitoring and evaluation planning improves development project performance by creating a structured basis for tracking implementation and identifying gaps early. Systems Theory further supports the finding by viewing planning, monitoring, resource allocation, actors, and feedback mechanisms as interconnected elements that collectively generate project performance outcomes (Bertalanffy, 1968).

#### 4.3.2 Monitoring and Evaluation Capacity Building and Project Performance

The findings showed that monitoring and evaluation capacity building had a strong positive relationship with project performance. The high ratings on staff training, skill competency, technical support, and tool availability indicate that capacity building strengthened the ability of project staff to carry out monitoring activities effectively. Görgens and Kusek (2009) argued that monitoring systems cannot function well without trained personnel, practical guidelines, and continuous technical support. Similarly, Rutikanga and Gachili (2024) found that capacity development contributes to

project performance because trained staff are more likely to collect quality information, analyze findings correctly, and support evidence-based decisions. Human Capital Theory explains this relationship by emphasizing that investment in knowledge and skills enhance organizational performance (Becker, 2022). The findings therefore demonstrate that strengthening staff capacity improved the effectiveness of M&E activities in the water supply project.

### 4.3.3 Monitoring and Evaluation Data Collection and Project Performance

The findings established a strong positive relationship between monitoring and evaluation data collection and project performance. The high ratings on data verification, completeness, timeliness, and tool standardization indicate that reliable information supported monitoring and decision-making during project implementation. Machete and Marques (2023) emphasized that data collection in water supply projects should generate accurate, complete, and timely information to guide operational and sustainability decisions. Similarly, Thambura et al. (2023) demonstrated that systematic data collection enhances project performance when information is used to address implementation gaps. The Theory of Change further explains the finding by linking project inputs and activities to expected outcomes through evidence and feedback (Weiss, 2022). The findings therefore suggest that accurate and timely data provided the evidence needed to identify implementation problems and support corrective action.

### 4.3.4 Monitoring and Evaluation Reporting and Project Performance

The findings showed that monitoring and evaluation reporting had the strongest positive relationship with project performance. The high ratings on report accuracy, clarity, frequency, and feedback provision indicate that effective reporting strengthened communication, accountability, and decision-making among project stakeholders. The OECD (2021) highlighted that effective reporting enhances transparency, accountability, and organizational learning in development projects. Similarly, Ongukah and Otara (2025) observed that regular monitoring and evaluation reporting facilitates project completion by guiding leadership actions and strengthening follow-up. The Resource-Based View Theory further explains the finding by asserting that valuable organizational resources, such as information systems and reporting routines, can enhance performance when effectively utilized (Barney, 1991). The findings therefore suggest that accurate and frequent reporting enabled stakeholders to understand project progress, identify challenges, and provide corrective feedback.

Overall, the findings demonstrate that monitoring and evaluation planning, capacity building, data collection, and reporting were positively associated with performance of the Rugano-Mushubi-Peru Water Supply System Project. The findings are consistent with the reviewed literature and the theories underpinning the study, which emphasize the importance of structured planning, human capacity, reliable information, and effective feedback in improving project performance. The results therefore demonstrate that M&E practices function collectively as management mechanisms for tracking implementation, identifying gaps, supporting decision-making, and strengthening accountability in water supply projects.

## V. CONCLUSION & RECOMMENDATIONS

### 5.1 Conclusion

The study concludes that monitoring and evaluation practices significantly contribute to the performance of the Rugano-Mushubi-Peru Water Supply System Project in Nyamagabe District, Rwanda. Monitoring and evaluation planning had a positive and significant contribution to project performance, indicating that clear timelines, defined responsibilities, adequate budgets, and realistic targets support effective project implementation. Monitoring and evaluation capacity building also had a positive and significant contribution to project performance. Regular staff training, adequate technical skills, technical support, and availability of M&E tools enhanced the capacity of project staff to monitor activities and support evidence-based decision-making.

Monitoring and evaluation data collection significantly contributed to project performance. Accurate, complete, timely, and standardized data enabled the project team to identify implementation gaps and take appropriate corrective actions. Similarly, monitoring and evaluation reporting had a positive and significant contribution to project performance by promoting accurate communication of findings, accountability, feedback, and informed decision-making. Overall, the regression model showed that M&E planning, capacity building, data collection, and reporting jointly explained 88.4% of the variation in project performance. The study therefore concludes that strengthening an integrated M&E system is essential for improving the performance of water supply projects.

### 5.2 Recommendations

Based on the findings, the study recommends that project managers should strengthen monitoring and evaluation planning by ensuring clear activity schedules, defined responsibilities, adequate budget allocation, and

realistic performance targets. Project implementing agencies should continue investing in M&E capacity building through regular training, technical support, and provision of appropriate monitoring tools to enhance staff effectiveness. The study further recommends the strengthening of data collection systems through the use of standardized tools, timely reporting procedures, and regular verification mechanisms to improve the reliability of project information. In addition, project stakeholders should enhance M&E reporting practices by promoting clear communication of findings, feedback mechanisms, and the use of reports to guide corrective actions and decision-making.

**Declaration of Interest**

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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