



Effect of Triple Constraint Management on Successful Implementation of Public Infrastructure Projects: A Case of Rubavu Modern Market, Rwanda

Boniface Niyibabarira and Emmy Chelangat Rotich
University of Kigali

Email: niyibabariraboniface@gmail.com

Abstract: *This study examined the effect of Triple Constraint Management on Successful Implementation of Public Infrastructure Projects, using Rubavu Modern Market in Rwanda as a case study. Specifically, the study attempted to examine the effect of project scope management on successful implementation of Public Infrastructure Projects a Case of Rubavu Modern Market, Rwanda. The study adopted a descriptive and correlational research design with a mixed-methods approach. The target population was 200 stakeholders, with a sample of 133 respondents. Of the 133 questionnaires distributed, 131 valid responses were obtained, while key informant interviews provided qualitative evidence. Data were analyzed using SPSS Version 27 through descriptive statistics, Pearson Product Moment Correlation, and regression analysis. The findings showed that project scope management practices were weak, with an overall mean of 1.14 (SD = 0.29). There was a strong positive and statistically significant relationship between project scope management and project implementation ($r = .855$, $p < .001$, $N = 131$). Regression analysis also showed a positive and statistically significant effect of project scope management ($B = .270$, $\beta = .289$, $t = 5.039$, $p < .001$). The null hypothesis was therefore rejected. The study concludes that effective project scope management contributes significantly to successful project implementation. It recommends clear scope definition, stakeholder participation, proper documentation and communication, and effective control of scope changes.*

Keywords: *Project scope management, Project implementation, Public infrastructure projects, Scope changes, Rubavu Modern Market, Rwanda*

How to cite this work (APA):

Boniface Niyibabarira, B. & Rotich, E. C. (2026). Effect of Triple Constraint Management on Successful Implementation of Public Infrastructure Projects. A Case of Rubavu Modern Market, Rwanda. *Journal of Research Innovation and Implications in Education*, 10(3), 2318 – 2329. <https://doi.org/10.59765/vhr8>

1. Introduction

Public infrastructure projects are important instruments for economic and social development because they provide facilities that support trade, public services, employment, and improved living conditions. Globally, governments and development institutions invest substantially in infrastructure projects to provide public facilities and support economic and social development. However,

successful implementation of infrastructure projects remains a major concern because projects may experience changes in requirements, unclear objectives, inadequate stakeholder involvement, and difficulties in controlling project activities. These challenges demonstrate the importance of effective project management practices, particularly the proper definition and control of project scope throughout the project life cycle (Flyvbjerg &

Gardner, 2023; Project Management Institute [PMI], 2021).

In developed countries, infrastructure projects are generally implemented through established project management systems that emphasize clear requirements, detailed planning, stakeholder coordination, documentation, monitoring, and formal control of changes. Effective scope management provides a basis for ensuring that project participants have a common understanding of the work to be delivered. When project requirements are clearly defined and communicated, project teams are better positioned to coordinate implementation activities and minimize unnecessary changes. However, even in well-developed project environments, inadequate definition of requirements and uncontrolled changes can create implementation challenges. Project success therefore depends not only on financial and technical resources but also on effective management of the approved project scope (Ika & Pinto, 2022; PMI, 2021).

In Sub-Saharan African countries, public infrastructure projects play an important role in supporting economic development, urbanization, trade, and the provision of public services. At the same time, infrastructure projects in the region may face implementation challenges associated with changing requirements, coordination among stakeholders, limited project management capacity, and inadequate control of project changes. Effective scope management is particularly important in such projects because unclear requirements may create different interpretations among project participants and lead to additional work, modifications, rework, and difficulties in achieving the intended project outputs. The management of project scope therefore provides an important foundation for improving the implementation of public infrastructure projects (PMI, 2021; World Bank, 2018).

Within East Africa, governments continue to invest in public infrastructure to support urban development, economic activities, and improved service delivery. Public infrastructure projects involve multiple stakeholders, including government institutions, contractors, consultants, project management teams, users, and local communities. Their different responsibilities and expectations make effective stakeholder participation and communication important during project planning and implementation. Ika and Pinto (2022) emphasize that clearly defined project requirements and meaningful stakeholder involvement can reduce misunderstandings and unnecessary changes during project implementation. Similarly, effective documentation and communication of the approved project scope can provide project participants with a common understanding of the work that the project is expected to deliver.

In Rwanda, infrastructure development remains an important component of national development, with public investments directed toward facilities such as roads, markets, housing, and other public infrastructure. Modern markets are among the public facilities intended to provide organized and functional spaces for commercial activities and to support local economic development. The Rubavu District Development Strategy identified modern market infrastructure as an important intervention for promoting local economic development, improving the business environment, and enhancing traders' working conditions (Rubavu District, 2018). Effective implementation of such projects therefore requires clear definition of project requirements and continuous management of the approved scope.

Successful implementation of an infrastructure project requires a clear understanding of what the project is expected to deliver. Project scope management provides this foundation by defining project objectives, identifying requirements, documenting the approved work, communicating requirements to project participants, and controlling changes during implementation. When the scope is unclear, project participants may have different interpretations of the required work. Such differences may result in additional activities, misunderstandings, rework, scope creep, and difficulties in achieving the intended project outputs (PMI, 2021).

Stakeholder participation is also important in scope management because public infrastructure projects involve several groups with different responsibilities and expectations. Meaningful stakeholder participation during the planning stage allows the project team to identify practical requirements before implementation begins and creates a common understanding of what should be delivered. Ika and Pinto (2022) emphasize that clearly defined requirements and meaningful stakeholder involvement can reduce misunderstandings and unnecessary changes during project implementation. Therefore, involving relevant stakeholders in defining project requirements can contribute to better management of the approved project scope.

The importance of scope management is particularly relevant in public infrastructure because changes made after implementation has started may affect project coordination and the achievement of intended outcomes. Kerzner (2022) emphasizes the importance of planning and control systems that enable project managers to manage requirements and changes throughout the project life cycle. Therefore, scope management should not be considered only a planning activity; it should continue throughout implementation through monitoring, communication, documentation, and formal change control.

The Rubavu Modern Market Project provides a relevant setting for examining this issue. The source study reports weaknesses in the definition of project objectives, stakeholder involvement, documentation and communication of project scope, and control of scope changes. Interview evidence also indicated that changes in project activities and additional works occurred during implementation. These conditions make project scope management an important issue for understanding implementation outcomes in the project. Previous studies have examined project success and project management practices in different contexts, including infrastructure projects in Rwanda, but limited attention has been given specifically to the relationship between project scope management and successful implementation of public market infrastructure in Rubavu. The present study therefore focuses specifically on examining the effect of project scope management on the successful implementation of public infrastructure projects, using the Rubavu Modern Market Project in Rwanda as a case study.

1.1 Statement of the Problem

Public infrastructure projects are expected to produce planned outputs that satisfy established requirements and serve the needs of intended beneficiaries. However, achieving these outcomes can be difficult when the project scope is not clearly defined and controlled. Unclear objectives, inadequate stakeholder participation, poor documentation, weak communication of approved requirements, and uncontrolled changes can create differences between the work originally approved and the work actually implemented. Such deviations may increase implementation difficulties and reduce the likelihood that the project will achieve its intended outputs (Ika & Pinto, 2022; PMI, 2021).

The problem is relevant to the Rubavu Modern Market Project because the evidence in the source dissertation indicates that respondents expressed strong disagreement with statements concerning the clarity of project objectives, stakeholder participation in defining requirements, documentation and communication of the project scope, and control of scope changes. The overall mean for project scope management was 1.14, indicating that respondents perceived the scope-management practices as weak. Interview findings also identified scope creep and changes in project activities as challenges during implementation.

Although previous studies have established the importance of project requirements and project management practices for project outcomes, limited empirical evidence directly addresses the effect of project scope management on implementation of public market infrastructure in Rwanda. Ika and Pinto (2022) provide broader evidence on

requirements and stakeholder involvement, while Zingiro and Kwenya (2025) provide evidence from infrastructure projects in Rwanda. However, their contexts differ from the Rubavu Modern Market Project. This creates a contextual gap concerning how scope management influences implementation in a public market infrastructure project in Rubavu District.

This study therefore addressed the identified empirical and contextual gap by examining the relationship between project scope management and successful project implementation in the Rubavu Modern Market Project. The study focused on objective clarity, stakeholder participation, documentation and communication of approved scope, and control of scope changes as the main elements of project scope management.

1.2 Purpose of the Study

The purpose of this study was to examine the effect of Triple Constraint Management on Successful Implementation of Public Infrastructure Projects. A Case of Rubavu Modern Market, Rwanda, using the Rubavu Modern Market Project in Rwanda as a case study. The study concentrated on the extent to which project objectives were clearly defined, stakeholders participated in defining requirements, approved scope was documented and communicated, and scope changes were properly controlled.

1.3 Specific Objective

To examine the effect of project scope management on successful implementation of public infrastructure projects: a case of Rubavu Modern Market, Rwanda.

1.4 Research Hypothesis

H₀₁: Project scope management has no significant effect on the successful implementation of public infrastructure projects in the case of Rubavu Modern Market, Rwanda.

2. Literature Review

This section reviews literature directly related to the specific objective of the study. The review focuses on project scope management and successful implementation of public infrastructure projects. It presents the conceptual meaning of project scope management, the meaning of successful project implementation, the theoretical basis of the study, empirical evidence from previous studies, and the research gap. Consistent with the specific objective, the

discussion does not develop separate sections for other independent variables.

2.1 Project Scope Management

Project scope management refers to the processes used to determine, document, communicate, monitor, and control the work required to achieve project objectives. It establishes the boundaries of a project and provides a common understanding of the deliverables and requirements that project participants are expected to implement. According to PMI (2021), effective scope management includes defining requirements, establishing the scope, validating deliverables, and controlling changes to approved project work.

In the present study, project scope management was considered through four closely related elements. The first was clarity of project objectives, which concerns whether project participants understood what the project was expected to achieve before implementation. The second was stakeholder participation in defining requirements, which concerns the involvement of relevant stakeholders in identifying and validating project needs. The third was documentation and communication of the approved scope, which provides a common reference for project participants. The fourth was control of scope changes, which concerns the formal assessment, approval, documentation, and communication of changes after the scope has been approved.

Effective scope management helps project teams maintain alignment between planned work and actual implementation. Clear objectives reduce uncertainty about expected outputs, while stakeholder participation can improve the completeness and practicality of requirements. Documentation and communication reduce the possibility of conflicting interpretations, and change control helps prevent unauthorized additions to the approved work. Ika and Pinto (2022) and PMI (2021) therefore present scope management as a continuous process that begins during planning and continues throughout implementation.

2.2 Successful Implementation of Public Infrastructure Projects

Project implementation refers to the process through which planned activities are executed, coordinated, monitored, and transformed into actual project outputs. Successful implementation is concerned not only with physical completion but also with whether the project achieves its intended objectives and produces outputs that meet established requirements (Pinto & Slevin, 1987; Meredith & Mantel, 2012).

For a public infrastructure project such as the Rubavu Modern Market, successful implementation involves translating approved requirements into a functional facility that serves its intended purpose. From the perspective of scope management, successful implementation depends on maintaining a clear connection between what was planned and what is delivered. Where project objectives and requirements are clearly understood, implementation teams can coordinate their activities around a common target. Conversely, unclear or frequently changing requirements can create uncertainty and implementation inefficiencies.

2.3 Theoretical Framework

Theoretical frameworks provide a foundation for explaining the relationships between concepts examined in a study. They help researchers identify the principles that guide the interpretation of research variables and provide a basis for explaining how and why particular factors may influence project outcomes. In project management research, theoretical perspectives are useful for understanding how planning, coordination, communication, monitoring, and control contribute to successful project implementation. Since this study focuses specifically on the effect of project scope management on the successful implementation of public infrastructure projects, it is primarily guided by Project Implementation Theory.

2.3.1 Project Implementation Theory

The study was primarily informed by Project Implementation Theory. Pinto and Slevin (1987) explain project implementation as the process of transforming project plans into actual outputs through effective execution, coordination, communication, monitoring, and control. The theory emphasizes that successful implementation requires project participants to understand the project objectives and coordinate their activities in accordance with the approved project plan.

The theory is directly relevant to project scope management because scope defines the work and requirements that must be implemented. When project objectives and requirements are clearly defined and communicated, project participants have a common basis for executing and monitoring the required work. When the scope is unclear, different interpretations may emerge, increasing the possibility of misunderstandings, additional work, scope creep, and uncontrolled changes. The theory therefore supports the expectation that effective project scope management contributes to successful project implementation. In the context of the Rubavu Modern Market Project, the theory provides a basis for examining whether clear objectives, stakeholder participation, proper

documentation and communication of requirements, and effective control of scope changes contribute to the successful implementation of the project.

2.4 Empirical Review

Empirical literature provides evidence from previous studies concerning the relationship between project scope management and project implementation. The review in this study concentrates on evidence concerning clarity of project requirements, stakeholder participation, scope documentation and communication, and control of scope changes because these elements directly correspond to the specific objective. The purpose is to establish what previous research has found, identify similarities and differences across contexts, and determine the remaining gap that justifies the present study.

2.4.1 Project Scope Management and Successful Project Implementation

Ika and Pinto (2022) examined the contribution of project management to development and project success and emphasized the importance of clearly defined project requirements and stakeholder involvement. Their work indicates that projects are more likely to achieve intended outcomes when requirements are sufficiently understood before implementation and when relevant stakeholders participate in defining those requirements. Clear requirements provide a basis for deciding what activities should be undertaken, what outputs should be produced, and what boundaries should be respected. Stakeholder participation further reduces the possibility that important needs will be omitted during planning. This evidence is relevant to the Rubavu Modern Market Project because the present study assesses both objective clarity and stakeholder participation as central components of scope management.

The findings discussed by Ika and Pinto (2022) also indicate that weak scope definition can create misunderstandings among project participants. When different stakeholders interpret project requirements differently, implementation may involve activities that were not adequately anticipated during planning. Such circumstances can produce scope creep and make coordination more difficult. The implication for public infrastructure projects is that scope should be sufficiently defined before implementation and should be understood by the parties responsible for delivering, supervising, funding, and using the infrastructure. In the Rubavu Modern Market case, this perspective provides a basis for examining whether weaknesses in objective definition and stakeholder involvement were associated with implementation challenges.

PMI (2021) provides a complementary project-management perspective by emphasizing the systematic definition and management of project requirements and the formal control of changes. The guidance recognizes that a project scope establishes the work to be performed and that approved changes should be evaluated rather than introduced informally. Documentation and communication are important because the approved scope must be understood by those responsible for project execution and monitoring. Effective change control is equally important because changes can alter the nature of the work and create implementation consequences. These principles are directly related to the present study, which examines documentation, communication, and control of scope changes as dimensions of project scope management.

The relevance of scope control is particularly strong in infrastructure projects because implementation normally involves many participants, including project managers, technical staff, consultants, contractors, government officials, and beneficiaries. Where a change is introduced without adequate assessment and communication, different participants may work from different versions of the project requirements. This can weaken coordination and make it difficult to determine whether completed work remains consistent with the approved project objectives. Kerzner (2022) similarly emphasizes the importance of planning and control systems for managing project requirements and changes across the project life cycle. The literature therefore suggests that scope management should continue after project planning and should be actively monitored during implementation.

Evidence from Rwanda also supports the importance of effective project constraint and requirement management. Zingiro and Kwenya (2025) examined project constraint management in infrastructure projects in Kigali and reported a relationship between management practices and implementation performance. Although their study focused on road construction rather than a public market, it provides local evidence that management of project requirements and constraints is relevant to infrastructure performance. The present study builds on this evidence by narrowing the analysis to project scope management and examining its relationship with implementation in the Rubavu Modern Market Project.

The empirical evidence reviewed above shows a consistent argument that clear requirements, stakeholder participation, documentation, communication, and change control are important for effective implementation. However, the studies differ in their geographical and project contexts. Ika and Pinto (2022) provide broader development and project-management evidence, PMI (2021) provides professional guidance rather than case-specific statistical evidence, and Zingiro and Kwenya (2025) provide Rwandan evidence from road construction

projects. None of these sources directly isolates the effect of project scope management on successful implementation of a public modern market project in Rubavu District. This creates a contextual gap that the present study addresses using empirical data from stakeholders involved in the Rubavu Modern Market Project.

2.5 Research Gap

Previous studies provide evidence that clear project requirements, stakeholder involvement, documentation, communication, and control of changes are important for project outcomes. Nevertheless, an empirical gap remains because limited research has specifically examined the effect of project scope management on implementation of public market infrastructure in Rwanda. The existing Rwandan evidence identified in the source dissertation is mainly drawn from other infrastructure contexts, including road construction. A contextual gap therefore exists because the implementation conditions of a public market may differ from those of other infrastructure projects. The present study addresses this gap by examining project scope management in the Rubavu Modern Market Project and by using quantitative and qualitative evidence from stakeholders associated with the project.

3. Methodology

The study adopted a descriptive and correlational research design using a mixed-methods approach. The descriptive component was used to establish the extent to which project scope management practices were perceived to be implemented, while the correlational component was used to establish the strength and direction of the relationship between project scope management and project implementation. Quantitative data were collected using structured questionnaires and analyzed using SPSS Version 27. Qualitative information obtained through key informant interviews was used to support interpretation of the quantitative findings.

The target population consisted of 200 stakeholders associated with the Rubavu Modern Market Project. Using Yamane's finite population formula at a 5% margin of error, a sample size of 133 respondents was determined. Proportionate sampling was used to distribute the sample across stakeholder categories, while purposive sampling was used for key informants and simple random sampling was used for other respondents. Of the 133 questionnaires distributed, 131 valid questionnaires were returned and used for quantitative analysis, giving a questionnaire

response rate of 98.5%. The study also conducted 30 key informant interviews.

The questionnaire contained statements measuring project scope management and project implementation. Project scope management was assessed through clarity of project objectives, stakeholder participation in defining requirements, documentation and communication of approved scope, control of scope changes, and the perceived contribution of scope management to implementation outcomes. Responses were recorded using a five-point Likert scale. Validity was supported through supervisor and expert review, while reliability was assessed using Cronbach's Alpha during the pilot study.

Data processing involved editing, coding, classification, tabulation, and entry into SPSS Version 27. Descriptive statistics, including means and standard deviations, were used to summarize the respondents' perceptions. Pearson Product Moment Correlation was used to determine the strength and direction of the relationship between project scope management and project implementation. Regression analysis was used to assess the statistical contribution of project scope management. The decision on the research hypothesis was made at the 5% significance level.

An important reporting consideration is that the available regression coefficient for project scope management was obtained from the dissertation's original multivariable regression model. Therefore, the coefficient is reported as the contribution of project scope management within that original model and is not presented as a newly estimated single-predictor regression coefficient. This preserves the statistical meaning of the available source results.

4. Results and Discussion

This section presents the findings of the study and discusses them in relation to the study objective and relevant literature. It focuses specifically on the effect of project scope management on the successful implementation of public infrastructure projects at Rubavu Modern Market.

4.1 Response Rate

The study targeted 133 questionnaire respondents. A total of 131 completed questionnaires were returned and used for quantitative analysis, while 2 questionnaires were not returned. This produced a response rate of 98.5%. The high response rate provided sufficient information for analyzing the relationship between project scope management and project implementation.

Table 1. Response rate of respondents

Response status	Frequency	Percentage (%)
Returned questionnaires	131	98.5
Unreturned questionnaires	2	1.5
Total	133	100.0

Source: Primary data, 2026.

Table 1 shows that out of the 133 questionnaires distributed to respondents, 131 were successfully returned, representing a response rate of 98.5%. Only 2 questionnaires were not returned, representing 1.5%. The high response rate indicates that the study obtained sufficient responses for the analysis of the effect of project scope management on the successful implementation of public infrastructure projects at Rubavu Modern Market.

Respondents were asked to indicate their level of agreement with statements concerning project scope management. The results presented in Table 2 show generally low ratings for the scope-management practices examined. The findings indicate weaknesses in the definition of objectives, stakeholder participation, documentation and communication, and control of scope changes.

4.2 Descriptive Statistics on Project Scope Management

Table 2: Level of agreement of project scope management

Statements	N	Mean	SD
Project objectives were clearly defined before implementation	131	1.14	0.388
Stakeholders were actively involved in defining project requirements	131	1.14	0.346
Project scope was clearly documented and communicated	131	1.11	0.320
Scope changes were properly controlled	131	1.18	0.426
Effective scope management improved project implementation outcomes	131	1.15	0.432

Source: Primary data, 2026.

The results show that respondents strongly disagreed with the statement that project objectives were clearly defined before implementation, which recorded a mean of 1.14 and a standard deviation of 0.388. A similar mean of 1.14 was recorded for stakeholder involvement in defining project requirements. These results suggest that important stakeholders may not have been sufficiently involved in establishing and confirming the requirements that guided implementation. Weaknesses at this stage can create different interpretations of what the project should deliver.

The lowest mean was recorded for the statement that project scope was clearly documented and communicated, with a mean of 1.11 and a standard deviation of 0.320. This finding indicates particularly strong disagreement concerning documentation and communication of the approved scope. Without clear documentation and communication, project participants may not have a common reference against which implementation activities can be assessed. The finding is therefore important because documentation and communication are mechanisms

through which the approved requirements are transferred from planning into implementation.

The statement concerning control of scope changes recorded a mean of 1.18 and a standard deviation of 0.426, while the statement that effective scope management improved project implementation outcomes recorded a mean of 1.15 and a standard deviation of 0.432. The overall mean of 1.14, with a standard deviation of 0.29, indicates that respondents generally perceived project scope management practices to be inadequately implemented. The relatively small overall standard deviation also suggests that respondents' perceptions were fairly consistent.

4.3 Correlation Analysis

Pearson Product Moment Correlation analysis was conducted to determine the strength and direction of the relationship between project scope management and

project implementation. The results are presented in Table 3.

Table 3: Correlation matrix between independent and dependent variables

Variables	Project Scope Management	Project Implementation
Project Scope Management – Pearson Correlation	1.000	.855**
Sig. (2-tailed)	—	< .001
N	131	131
Project Implementation – Pearson Correlation	.855**	1.000
Sig. (2-tailed)	< .001	—
N	131	131

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

The results reveal a strong positive relationship between project scope management and project implementation, with a Pearson correlation coefficient of $r = .855$ and a significance level of $p < .001$. The positive coefficient indicates that higher levels of effective project scope management were associated with better project implementation outcomes. The relationship was statistically significant because the p-value was below the 0.05 level of significance. The finding therefore provides empirical evidence that clarity of objectives, stakeholder participation, documentation and communication, and control of scope changes are closely associated with

implementation outcomes in the Rubavu Modern Market Project.

4.4 Regression Analysis

Regression analysis was used to examine the statistical contribution of project scope management to project implementation. The available coefficient was obtained from the dissertation's original multivariable regression model.

Table 4: Coefficient Results

Predictor	B	Std. Error	Beta (β)	t	Sig.
Constant	0.016	0.039	—	0.417	0.678
Project Scope Management	0.270	0.054	0.289	5.039	< .001

Source: Primary data, 2026.

The results show that project scope management had a positive and statistically significant coefficient of $B = .270$, with a standardized beta coefficient of $\beta = .289$, a t-value of 5.039, and a significance level of $p < .001$. The positive coefficient indicates that, holding the other predictors in the original regression model constant, improvement in project scope management was associated with improvement in project implementation. The statistical significance of the coefficient demonstrates that the contribution of project scope management was unlikely to be due to sampling variation at the 5% significance level.

Because the significance value was below 0.05, the null hypothesis stating that project scope management has no significant effect on successful implementation was rejected. The finding supports the conclusion that project scope management is an important contributor to successful implementation of the Rubavu Modern Market Project. It should, however, be interpreted within the original multivariable model rather than as a newly

estimated regression involving project scope management alone.

4.5 Qualitative Findings Supporting Project Scope Management Results

The quantitative findings were supported by interviews with project managers, site engineers, supervising consultants, district officials, and contractor representatives. The interview evidence indicated that project scope was not adequately defined and that scope management was weak during implementation. Participants reported that changes in project activities and additional works occurred after implementation had already started. These observations provide practical explanations for the low descriptive ratings reported by questionnaire respondents.

Interviewees also identified scope creep as an important implementation challenge. The qualitative evidence

suggested that additional activities were introduced after the original planning process, making it more difficult for project participants to maintain alignment with the approved requirements. This evidence is consistent with the statistical findings because weak scope management was observed alongside implementation challenges, while the inferential results showed that stronger scope management was positively associated with better project implementation.

The qualitative findings further indicate the importance of defining requirements before implementation and maintaining effective communication when changes are considered. When project participants are not working from a common understanding of the approved scope, coordination can become difficult and additional work can be introduced without adequate assessment. The interview evidence therefore strengthens the interpretation that better scope definition, stakeholder participation, documentation, communication, and change control would improve implementation outcomes.

4.6 Discussion of Findings

The findings demonstrate that project scope management is significantly related to successful project implementation in the Rubavu Modern Market Project. The descriptive results show that respondents perceived scope-management practices as weak, while the correlation analysis revealed a strong positive relationship between project scope management and project implementation. The regression result further showed that the contribution of project scope management was positive and statistically significant. These findings indicate that the weakness of current scope-management practices should be treated as an area requiring managerial attention rather than as evidence that scope management is unimportant.

The findings are consistent with Ika and Pinto (2022), who emphasize clear requirements and stakeholder involvement as important conditions for successful projects. In the Rubavu Modern Market case, the low ratings for objective clarity and stakeholder participation suggest that project requirements may not have been sufficiently shared and validated before implementation. The strong positive correlation found in the study indicates that improvements in these practices would be expected to support better implementation outcomes. The agreement between the present findings and previous literature strengthens the argument that effective scope definition and stakeholder involvement are important across different project settings.

The findings also agree with PMI (2021), which emphasizes the importance of defining project requirements, documenting approved scope, communicating project information, and controlling changes. The particularly low mean for documentation and

communication in the Rubavu case shows that the project faced a weakness in maintaining a shared reference for approved requirements. The interview evidence concerning scope creep further illustrates why change control is important. Changes introduced during implementation need to be assessed and formally managed so that project participants understand their implications and continue working toward agreed objectives.

The Rwandan evidence reported by Zingiro and Kwenya (2025) also provides support for the present findings because their study linked management of project constraints with infrastructure implementation performance. Although their study was conducted in road construction projects in Kigali, the present study shows that a similar relationship is evident in the public market infrastructure context of Rubavu. The difference in project type is important because it demonstrates the need for context-specific evidence rather than assuming that findings from one infrastructure category apply equally to all public projects.

Overall, the findings support Project Implementation Theory because successful implementation requires the transformation of approved plans and requirements into actual project outputs through coordinated execution, communication, monitoring, and control. Project scope provides the basis for determining what should be implemented. When objectives are clear, requirements are documented and communicated, stakeholders are involved, and changes are controlled, project participants are better positioned to execute the approved work. The findings from Rubavu Modern Market therefore provide empirical support for the theoretical expectation that effective scope management contributes to successful project implementation.

5. Conclusion and Recommendations

5.1 Conclusion

The study concludes that project scope management has a positive and statistically significant effect on the successful implementation of public infrastructure projects in the case of Rubavu Modern Market, Rwanda. Pearson correlation analysis revealed a strong positive and statistically significant relationship between project scope management and project implementation. The study therefore concludes that clear project objectives, meaningful stakeholder participation, proper documentation and communication of approved requirements, and effective control of scope changes are important for successful implementation. The qualitative evidence concerning scope creep and modifications during implementation further reinforces this conclusion. Strengthening project scope management from planning through implementation can provide project participants with a common understanding of the approved

work and reduce avoidable deviations from project requirements

5.2 Recommendations

Based on the findings and conclusion of the study, the following recommendations are proposed to strengthen project scope management and improve the successful implementation of public infrastructure projects:

1. Project managers and implementing institutions should clearly define project objectives, deliverables, boundaries, and requirements before implementation begins. The approved scope should be sufficiently detailed to provide a common understanding of the work among project managers, contractors, consultants, technical personnel, district officials, and other relevant stakeholders.
2. Relevant stakeholders should be actively involved in identifying, reviewing, and validating project requirements before implementation. Participation should include technical personnel, district representatives, consultants, contractors, market representatives, and other stakeholders whose needs or responsibilities are directly connected to the project. Early participation can help identify requirements that might otherwise lead to changes during implementation.
3. Rubavu District and implementing institutions should establish clear procedures for controlling scope changes. Proposed changes should be documented, justified, technically and operationally assessed, approved by the appropriate authority, and communicated to affected stakeholders before the changes are implemented. This approach can help reduce uncontrolled scope creep and improve coordination.
4. Project managers should continuously compare actual implementation activities with the approved scope. Regular scope reviews can help identify deviations at an early stage and allow corrective action before changes become major implementation problems. Future public infrastructure projects should also conduct comprehensive requirements assessments before implementation so that likely changes and stakeholder needs are identified as early as possible.

References

- Atkinson, R. (1999). Project management: Cost, time and quality, two best guesses and a phenomenon, it's time to accept other success criteria. *International Journal of Project Management*, 17(6), 337–342.
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27–40.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297–334.
- Deming, W. E. (1986). *Out of the crisis*. Massachusetts Institute of Technology, Center for Advanced Engineering Study.
- Field, A. (2024). *Discovering statistics using IBM SPSS Statistics* (6th ed.). SAGE Publications.
- Flyvbjerg, B. (2014). *Megaproject planning and management: Essential readings*. Edward Elgar Publishing.
- Flyvbjerg, B., & Gardner, D. (2023). *How big things get done: The surprising factors behind every successful project, from home renovations to space exploration*. Currency.
- Government of Rwanda. (2020). *Vision 2050*. Ministry of Finance and Economic Planning.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE Publications.
- Ika, L. A. (2009). Project success as a topic in project management journals. *Project Management Journal*, 40(4), 6–19.
- Ika, L. A., & Pinto, J. K. (2022). The re-meaning of project success: Updating and recalibrating for a modern project management perspective. *International Journal of Project Management*, 40(7), 835–848.

- International Organization for Standardization. (2015). *ISO 9001:2015 quality management systems—Requirements*. ISO.
- Juran, J. M. (1988). *Juran on planning for quality*. Free Press.
- Juran, J. M. (1999). *Juran's quality handbook* (5th ed.). McGraw-Hill.
- Kerzner, H. (2022). *Project management: A systems approach to planning, scheduling, and controlling* (13th ed.). John Wiley & Sons.
- Kothari, C. R. (2004). *Research methodology: Methods and techniques* (2nd ed.). New Age International Publishers.
- Larsen, J. K., Shen, G. Q., Lindhard, S. M., & Brunoe, T. D. (2016). Factors affecting schedule delay, cost overrun, and quality level in public construction projects. *Journal of Management in Engineering*, 32(1), 04015032. [https://doi.org/10.1061/\(ASCE\)ME.1943-5479.0000391](https://doi.org/10.1061/(ASCE)ME.1943-5479.0000391)
- Meredith, J. R., & Mantel, S. J. (2012). *Project management: A managerial approach* (8th ed.). John Wiley & Sons.
- Miksza, P., Shaw, J. T., Richerme, L. K., Hash, P. M., Hodges, D. A., & Parker, E. C. (2023). Quantitative descriptive and correlational research. In P. Miksza & J. T. Shaw (Eds.), *Music education research: An introduction* (pp. 241–262). Oxford University Press. <https://doi.org/10.1093/oso/9780197639757.003.0012>
- Mugenda, O. M., & Mugenda, A. G. (2003). *Research methods: Quantitative and qualitative approaches*. African Centre for Technology Studies Press.
- Nabil, A. M. (2024). Impact of cost overruns on infrastructure projects failures and effective cost management to reduce overruns. *Global Journal of Research in Engineering*, 24(2), 13–29.
- National Institute of Statistics of Rwanda. (2024). *Gross domestic product: National accounts, 2024*. Government of Rwanda.
- National Institute of Statistics of Rwanda. (2025). *Gross domestic product: National accounts, 2025*. Government of Rwanda.
- Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). McGraw-Hill.
- Oakland, J. S. (2014). *Total quality management and operational excellence: Text with cases* (4th ed.). Routledge.
- Oakland, J. S. (2022). *Total quality management and operational excellence: Text with cases* (6th ed.). Routledge.
- Pallant, J. (2020). *SPSS survival manual: A step by step guide to data analysis using IBM SPSS* (7th ed.). Routledge.
- Pinto, J. K., & Slevin, D. P. (1987). Critical factors in successful project implementation. *IEEE Transactions on Engineering Management*, EM-34(1), 22–27.
- Project Management Institute. (2017). *A guide to the project management body of knowledge (PMBOK® guide)* (6th ed.). Project Management Institute.
- Project Management Institute. (2021). *A guide to the project management body of knowledge (PMBOK® guide)* (7th ed.). Project Management Institute.
- Rubavu District. (2018). *Rubavu District development strategy (2018–2024)*. Government of Rwanda.
- Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson Education Limited.
- Sekaran, U., & Bougie, R. (2020). *Research methods for business: A skill-building approach* (8th ed.). John Wiley & Sons.
- Umuhiza, D., & Wabala, S. (2025). Effect of project scheduling on performance of infrastructure projects in Rwanda: A case study of Kigali Infrastructure Project. *Reviewed Journal International of Business Management*, 6(1), 216–229. <https://doi.org/10.61426/business.v6i1.306>
- Umuhiza, E., & An, S.-H. (2024). ANN model predicting quality performance for building construction projects in Rwanda. *International Journal of Construction Management*, 24(15), 1679–1688.

- World Bank. (2018). *Reshaping urbanization in Rwanda: Economic and spatial trends and proposals*. World Bank.
- World Bank. (2020). *The World Bank annual report 2020: Supporting countries in unprecedented times*. World Bank.
- Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper & Row.
- Zingiro, Y., & Kwenza, R. (2025). Effect of triple constraints on implementation of road construction projects in Kigali Rwanda: Case study of Kigali Infrastructure Project. *Reviewed Journal International of Business Management*, 6(1), 142–159.